"Hiroshima for Global Peace" Plan

2017 Edition

Hiroshima Report

Evaluation of Achievement in Nuclear Disarmament, Non-Proliferation and Nuclear Security in 2016

Hiroshima Prefecture

Center for the Promotion of Disarmament and Non-Proliferation

The Japan Institute of International Affairs

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We would appreciate any comments or suggestions that will help us to enhance the Hiroshima Report. Please send your comments and suggestions regarding this report to chiheiwa@pref.hiroshima.lg.jp or visit our online survey at: http://www.pref.hiroshima.lg.jp/site/peace-en/hiroshimareport2017e.html.

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Preface and Acknowledgements

This *Hiroshima Report 2017: Evaluation of Achievement in Nuclear Disarmament, Non-Proliferation and Nuclear Security in 2016* (hereinafter referred to as "*Hiroshima Report 2017*") is an outcome of the "Hiroshima Report Publication Project,"[1] commissioned by Hiroshima Prefecture to the Japan Institute of International Affairs (JIIA). It updates the previous reports issued since 2013. As in the last four years, the *Hiroshima Report* is published in both Japanese and English.

The prospects of eliminating nuclear weapons are still distant at best. Even more worrying, the situation regarding nuclear weapons is becoming more and more complex. The five nuclear-weapon states (NWS) under the Nuclear Non-Proliferation Treaty (NPT)—China, France, Russia, the United Kingdom and the United States—and other nuclear-armed states—India, Israel and Pakistan—continue to perceive their nuclear weapons as one of the indispensable components for their national security, and have not made any definite move toward renouncing their nuclear arsenals. Instead, they have taken measures, such as modernization of nuclear forces and development of new delivery vehicles, with a view to sustaining nuclear deterrence for a longer period. Non-nuclear-weapon states (NNWS) increase their frustration over such a situation, and many of them pursue to promote a legal prohibition of nuclear weapons. However, it is also a concern that the rift between proponents (many NNWS) and opponents (nuclear-weapon/armed states and nuclear umbrella states) has been further widening.

The status and prospects regarding nuclear non-proliferation are also gloomy. Good news is that the international community was given a chance to solve the long-standing concern about the nuclear ambition of Iran. On the other hand, North Korea is determined to pursue building up of its nuclear forces after declaring withdrawal from the NPT and conducted five nuclear tests. The North also repeats its nuclear provocations. While the world falters in erecting a firm barrier against nuclear proliferation, the threat persists for a new proliferator to emerge on the scene. The threat of nuclear terrorism by non-state actors remains a high security concern in this globalized world. Growing worldwide interest in peaceful use of nuclear energy increases the risk of nuclear proliferation as well as terrorism. While problems facing nuclear disarmament, non-proliferation and nuclear security intensify, efforts toward solving them have progressed at a snail's pace.

The *Hiroshima Report* attempts to help the movement toward the abolition of nuclear weapons, first, by clarifying the current status of the issues and efforts surrounding nuclear disarmament, non-proliferation and nuclear security. By doing so, it aims to encourage increased debate on these issues by policy-makers, experts in and outside governments, and civil society. Furthermore, by issuing the "Report" and the "Evaluation" from Hiroshima, where a nuclear weapon was once used, it aims to help focus attention and promote further actions in various fields toward the realization of a world without nuclear weapons.

[1] This project has been conducted as a part of the "Hiroshima for Global Peace" Plan launched by Hiroshima Prefecture in 2011.

The Research Committee was established to conduct this project, namely producing the "Report" and the "Evaluation." This Committee met once within the Japanese Fiscal Year 2016 to discuss the contents. The members of the Research Committee are as follows:

Chairperson

Sumio Tarui (Director, Center for the Promotion of Disarmament and Non-Proliferation (CPDNP), JIIA)

Research Members

Sukeyuki Ichimasa (Senior Research Fellow, National Institute for Defense Studies)
Akira Kawasaki (Executive Committee Member, Peace Boat)
Masahiro Kikuchi (Board Member, Nuclear Material Control Center)
Mitsuru Kurosawa (Professor, Osaka Jogakuin University)
Kazumi Mizumoto (Vice-President, Hiroshima Peace Institute, Hiroshima City University)
Hiroshi Tamai (Senior Expert, Integrated Support Center for Nuclear Nonproliferation and Nuclear Security, Japan Atomic Energy Agency)

Research Member and Project Coordinator

Hirofumi Tosaki (Senior Research Fellow, CPDNP, JIIA)

The Research Committee appreciates the comments and advices to the "Report" given by the following experts.

Ambassador Nobuyasu Abe (Commissioner, Japan Atomic Energy Commission)
Mr. Mark Fitzpatrick (Executive Director of the Americas Office and head of the Non-Proliferation and Disarmament Programme, International Institute for Strategic Studies)
Professor John Simpson (Emeritus Professor of International Relations, University of Southampton)
Professor Tatsujiro Suzuki (Director, Research Center for Nuclear Weapons Abolition, Nagasaki University)

To mark the fifth anniversary of the inauguration of the *Hiroshima Report*, in this edition, Japanese experts posted special articles on prospects and challenges regarding nuclear disarmament, non-proliferation and nuclear security.[2]

Appreciation is also expressed to Mr. Gordon Wyn Jones (King's College London, Centre for Science and Security Studies) for editing the *Hiroshima Report* as well as making valuable comments.

Views or opinions expressed in the "Report," "Evaluation" and "Special Articles" are those of the members of the Research Committee or respective authors, and do not necessarily represent the view of the Hiroshima Prefecture, the JIIA, or the organizations to which they belong. Not all of the members necessarily agree on all of the points discussed.

[2] Views or opinions expressed in the special articles are those of the respective authors, and do not represent the view of the Hiroshima Prefecture, the JIIA, or the organizations to which they belong. The Research Committee appreciates Mahiro Nakamaru, Sho Hayase and Naosuke Mukoyama for translating those articles in English given by, as well as Dr. Wakana Mukai (Project Assistant Professor, Policy Alternatives Research Institute, The University of Tokyo) for supervising their translations.

Introduction

(1) Overview

The most significant developments in the nuclear field in 2016 were the convening of the Open-Ended Working Group on Taking Forward Multilateral Nuclear Disarmament Negotiations (OEWG) in Geneva, the last Nuclear Security Summit in Washington, D.C., implementation of the Iran nuclear accord and North Korea's two nuclear tests.

In accordance with a United Nations General Assembly (UNGA) resolution in 2015, the OEWG was held in March, May and August 2016. Discussions focused on whether negotiations of a legal instrument of banning nuclear weapons should be launched. Many non-nuclear-weapon states (NNWS) have become increasingly frustrated over the long-standing stalemate in nuclear disarmament and sought to commence such negotiations. Some other NNWS allied with the United States (so-called nuclear umbrella states) argued that concrete and practical building-blocks should instead be pursued toward a world without nuclear weapons. The former group prevailed in a vote on the final report of the OEWG and based on a recommendation therein, the UNGA adopted a resolution titled "Taking forward multilateral nuclear disarmament negotiations." In this resolution, the UNGA "[d]ecides to convene in 2017 a United Nations conference to negotiate a legally binding instrument to prohibit nuclear weapons, leading towards their total elimination." However, none of the states that possess nuclear weapons participated in the OEWG nor voted in favor of the UNGA resolution. Even if a treaty prohibiting nuclear weapons is concluded, they are highly unlikely to accede to it, at least for the foreseeable future. Moreover, there is also concern that the rift between proponents (many NNWS) and opponents (nuclear-weapon/armed states and nuclear umbrella states) has been further widening.

The most prominent event related to nuclear security in 2016 was the 4th and final round of the Nuclear Security Summit held in Washington, D.C. in March, which was led by former U.S. President Barack Obama's initiative. The process of the summit visualized each country's efforts to prevent nuclear terrorism and to continue to follow the joint statements of the multilateral "basket proposal," in a moderate way. It attracts much attention that the states are still making continuous efforts to strengthen nuclear security measures, although the series of such security summits came to an end. Also, in March, simultaneous terrorist attacks occurred in Belgium, and police investigation after the incidents revealed the devastating fact that the terrorists had also sought to attack nuclear facilities. In terms of nuclear security, this case made a huge impact on the international community. In December, the second IAEA International Conference on Nuclear Security was held in Vienna, and the agency took the lead on multilateral efforts to deal with nuclear security issues. In this sense, international efforts on nuclear security reached an important stage in the year 2016.

Meanwhile, remarkable progress was made in nuclear non-proliferation, with the implementation in January of the Joint Comprehensive Plan of Action (JCPOA), which was concluded the previous July by Iran and the six powers (France, Germany and the United Kingdom/European Union plus China, Russia and the United States, known collectively as the E3/EU+3), limiting Iran's nuclear activities. Despite ongoing criticism in both Washington and Tehran, the accord was implemented relatively smoothly its first year. On the other hand, no progress was made on the North Korean nuclear issue in 2016. Rather, North Korea conducted two more nuclear explosion tests and more than 20 ballistic missiles flight tests during the year. Furthermore, it repeated to threaten nuclear attacks against Japan, the United States and South Korea, and refused to denuclearize.

Finally, one most noteworthy event for Hiroshima and Japan was U.S. President Barack Obama's visit to Hiroshima on May 27, after the G7 Ise-Shima Summit, together with Japan's Prime Minister Shinzo Abe, in the first visit by a sitting U.S. president to a city which suffered atomic attack. In Hiroshima, they visited the Peace Memorial Museum, placed flowers at the "Memorial Monument for Hiroshima, City of Peace," delivered statements, and had dialogue with the A-bomb survivors. In the statements, President Obama and Prime Minister Abe advocated the importance of taking continuous efforts toward a world without nuclear weapons.

(2) Items

In the *Hiroshima Report 2017*, 64 items (31 for nuclear disarmament, 17 for nuclear non-proliferation and 16 for nuclear security) for study, analysis and evaluation of the selected countries' performance are identified and based mainly upon the following documents that reflected widely supported views on the issues of nuclear disarmament, non-proliferation and nuclear security:

- The Action Plan and recommendations pertaining to the implementation of the 1995 Middle East resolution contained in the Final Document adopted in the 2010 NPT Review Conference;
- The final draft of a Final Document for the 2015 NPT Review Conference;
- Seventy-six recommendations contained in the 2009 International Commission on Nuclear Non-proliferation and Disarmament (ICNND) report titled *Eliminating Nuclear Threats: A Practical Agenda for Global Policymakers*;
- Proposals sponsored or co-sponsored by Japan at the Preparatory Committees for the 2015 NPT Review Conference; and
- "Resolution towards the Abolition of Nuclear Weapons" launched by the Mayors for Peace in 2011.

Items were also chosen with the aim of providing a certain degree of objective measurements for evaluation.

The *Hiroshima Report 2017* maintains the same structure and items as previous years:

1. Nuclear Disarmament
    - (1) Status of Nuclear Forces (estimates)
    - (2) Commitment to Achieve a World without Nuclear Weapons
        - A) Approaches toward a world without nuclear weapons
        - B) Voting behavior on UNGA resolutions on nuclear disarmament proposals by Japan, NAC and NAM
        - C) Voting behavior on UNGA resolutions calling for commencement of negotiations on a legal prohibition of nuclear weapons
        - D) Announcement of significant policies and important activities
        - E) Humanitarian consequences of nuclear weapons
    - (3) Reduction of Nuclear Weapons
        - A) Reduction of nuclear weapons
        - B) A concrete plan for further reduction of nuclear weapons
        - C) Trends on strengthening/modernizing nuclear weapons capabilities
    - (4) Diminishing the Role and Significance of Nuclear Weapons in National Security Strategies and Policies
        - A) The current status of the roles and significance of nuclear weapons
        - B) Commitment to "sole purpose," no first use, and related doctrines
        - C) Negative security assurances
        - D) Signing and ratifying the protocols of the treaties on nuclear-weapon-free zones
        - E) Relying on extended nuclear deterrence

(5) De-alerting or Measures for Maximizing Decision Time to Authorize the Use of Nuclear Weapons

(6) CTBT

A) Signing and ratifying the CTBT

B) Moratoria on nuclear test explosions pending CTBT's entry into force

C) Cooperation with the CTBTO Preparatory Commission

D) Contribution to the development of the CTBT verification systems

E) Nuclear testing

(7) FMCT

A) Efforts toward commencing negotiations on an FMCT

B) Moratoria on production of fissile material for nuclear weapons

(8) Transparency in Nuclear Forces, Fissile Material for Nuclear Weapons, and Nuclear Strategy/Doctrine

(9) Verifications of Nuclear Weapons Reductions

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A) Implementing or planning dismantlement of nuclear warheads and their delivery vehicles

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C) Nuclear-Weapon-Free Zones

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A) Conclusion of IAEA Safeguards Agreements

B) Compliance with IAEA Safeguards Agreements

(3) IAEA Safeguards Applied to NWS and Non-Parties to the NPT

(4) Cooperation with the IAEA

(5) Implementing Appropriate Export Controls on Nuclear-Related Items and Technologies

A) Establishment and implementation of the national control systems

B) Requiring the conclusion of the Additional Protocol for nuclear export

C) Implementation of the UNSCRs concerning North Korean and Iranian nuclear issues

D) Participation in the PSI

E) Civil nuclear cooperation with non-parties to the NPT

(6) Transparency in the Peaceful Use of Nuclear Energy

A) Efforts for transparency

B) Multilateral approaches to the fuel cycle

3. Nuclear Security
    (1) The Amount of Fissile Material Usable for Weapons
    (2) Status of Accession to Nuclear Security and Safety-Related Conventions, Participation in Nuclear Security-Related Initiatives, and Application to Domestic Systems
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        B) INFCIRC/225/Rev.5
    (3) Efforts to Maintain and Improve the Highest Level of Nuclear Security
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        B) Prevention of illicit trafficking
        C) Acceptance of international nuclear security review missions
        D) Technology development —nuclear forensics
        E) Capacity building and support activities
        F) IAEA Nuclear Security Plan and Nuclear Security Fund
        G) Participation in international efforts

(3) Countries Surveyed in This Project

In the *Hiroshima Report 2016*, the performances of 36 countries were surveyed, based on their nuclear significance and geographical distribution—including members of the Non-Proliferation and Disarmament Initiative (NPDI), members of the New Agenda Coalition (NAC), participants of the Joint Statements on the Humanitarian Consequences of Nuclear Weapons. The *Hiroshima Report 2017* maintains to survey those same countries, as follows:

- Five nuclear-weapon states under the NPT (China, France, Russia, the United Kingdom and the United States);
- Non-state parties to the NPT (India, Israel and Pakistan);
- Non-nuclear-weapon states under the NPT (Australia, Austria, Belgium, Brazil, Canada, Chile, Egypt, Germany, Indonesia, Iran, Japan, Kazakhstan, South Korea, Mexico, the Netherlands, New Zealand, Nigeria, Norway, the Philippines, Poland, Saudi Arabia, South Africa, Sweden, Switzerland, Syria, Turkey and UAE); and
- Other (North Korea[1])

(4) Approach

This project focuses on the time period of calendar year 2016. Reference documents are basically from open sources, such as speeches, remarks, votes and working papers delivered at disarmament fora (e.g., NPT Review Conference, UN General Assembly, IAEA General Conference, Conference on Disarmament, Nuclear Security Summit, and the Open-Ended Working Group on Taking Forward Multilateral Nuclear Disarmament Negotiations) and official documents published by governments and international organizations.

As for the evaluation section, a set of objective evaluation criteria is established by which the respective country's performance is assessed.

The Research Committee of this project recognizes the difficulties, limitations and risks of "scoring" countries'

[1] North Korea declared its suspension from the NPT in 1993 and its withdrawal in 2003, and conducted nuclear tests in 2006, 2009, 2013 and 2016. However, there is no agreement among the states parties on North Korea's official NPT status.

performances. However, the Committee also considers that an indicative approach is useful to draw attention to nuclear issues, so as to prompt debates over priorities and urgency.

The different numerical value within each category (i.e., nuclear disarmament, nuclear non-proliferation and nuclear security) reflects each activity's importance within that area, as determined through deliberation by the Research Committee of this project. However, the differences in the scoring arrangements within each of the three categories do not necessarily reflect their relative significance in comparison with others, as it has been driven by the differing number of items surveyed. Thus, the value assigned to nuclear disarmament (full points 94) does not mean that it is more important than nuclear non-proliferation (full points 61) or nuclear security (full points 41).

Regarding "the number of nuclear weapons" (in the nuclear disarmament section) and "the amount of fissile material usable for nuclear weapons" (in the nuclear security section), the assumption is that the more nuclear weapons or weapons-usable fissile material a country possesses, the greater the task of reducing them and ensuring their security. However, the Research Committee recognizes that "numbers" or "amounts" are not the sole decisive factors. It is definitely true that other factors—such as implications of missile defense, chemical and biological weapons, conventional force imbalances and a psychological attachment to a minimum overt or covert nuclear weapon capability—would affect the issues and the process of nuclear disarmament, non-proliferation and nuclear security. However, they were not included in our criteria for evaluation because it was difficult to make objective scales of the significance of these factors. In addition, in view of the suggestions and comments made to *Hiroshima Report 2013*, the Research Committee modified criteria of the following items: current status of the roles and significance of nuclear weapons in national security strategies and policies; relying on extended nuclear deterrence; and nuclear testing. Since the *Hiroshima Report 2014*, these items have been negatively graded if applicable.

As there is no way to mathematically compare the different factors contained in the different areas of disarmament, non-proliferation and nuclear security, the evaluations should be taken as indicative of the performances in general and not as an exact representation or precise assessment of different countries' performances.

Part I Report

Surveying Trends of Nuclear Disarmament, Non-Proliferation and Nuclear Security in 2016

Chapter 1. Nuclear Disarmament[1]

(1) Status of Nuclear Forces (estimates)

As of December 2016, eight countries have declared that they have nuclear weapons. According to Article IX-3 of the Nuclear Non-Proliferation Treaty (NPT), "a nuclear-weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967." China, France, Russia, the United Kingdom, and the United States meet this requirement, and have acceded to the NPT as nuclear-weapon states (NWS) as defined by the treaty. The three other countries that have tested nuclear weapons and declared having nuclear weapons are India, Pakistan and North Korea. India and Pakistan have never been parties to the NPT. In 2003 North Korea declared withdrawal from the treaty. Israel, a non-NPT state, has maintained a policy of "nuclear ambiguity" by neither confirming nor denying having nuclear weapons, although it is widely considered that it has them (no evidence has yet been found that Israel has conducted a nuclear test). In this report these four additional states that have publicly declared or are believed to possess nuclear weapons are referred to as "nuclear-armed states."

The number of nuclear weapons, which grew to approximately 70,000 at the peak of the Cold War era, has been reduced steadily since the late 1980s. According to the estimates produced by the Stockholm International Peace Research Institute (SIPRI), however, an estimated 15,395 nuclear weapons still exist on the earth, and the U.S. and Russian nuclear stockpiles together constitute more than 90 percent of the total.[2] Compared to the approximately 7,200 nuclear weapons that were eliminated between 2010 and 2016, the 455 nuclear weapons eliminated between 2015 and 2016 indicates that the pace of reduction has been slowing. It is widely estimated that China, India and Pakistan have each added about 10 warheads in the course of the past year (see Tables 1-1 and 1-2).

Among nuclear-weapon/armed states, France declared it possesses 300 nuclear weapons,[3] and the United Kingdom announced plans to reduce its total nuclear stockpiles to not more than 180 by the mid-2020s. Other nuclear-weapon/armed states have not declassified the exact number of nuclear weapons in their arsenal.[4] Meanwhile, the United States has recently declassified information more actively, as described in the following section. For example, U.S. Department of Defense released an update of its nuclear stockpile (except those awaiting dismantlement) and announced that, as of 2015, the total U.S. stockpile of nuclear warheads was 4,571.[5] In addition, U.S. Vice President Joseph R. Biden announced that that the United States dismantled approximately 500 nuclear warheads in 2016, and totally 2,226 warheads since 2009. He also stated that the number of the U.S. nuclear warheads in service is

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[1] This chapter 1 is written by Hirofumi Tosaki.

[2] Stockholm International Peace Research Institute, *SIPRI Yearbook 2016: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2016), chapter 16.

[3] In addition, France reports that "[i]t has no undeployed weapons. All of its weapons are deployed and operational." NPT/CONF.2015/10, March 12, 2015.

[4] On this point, Bruno Tertrais explains the reasons as following: "Stockpiles include weapons which are not entirely functional (when exactly does an atomic device become a 'nuclear weapon'?), or which are used for non-destructive testing. As a result, giving an exact number can be difficult, misleading, and/or be accurate just for a given day." Bruno Tertrais, "Comments on Hiroshima Report of March 2013," *Hiroshima Report Blog: Nuclear Disarmament, Nonproliferation and Nuclear Security*, October 29, 2013, http://hiroshima-report. blogspot.jp/2013/10/op-ed-bruno-tertrais-comments-on. html.

[5] See the U.S. Department of Defense website (http://open.defense.gov/Portals/23/Documents/frddwg/2015_Tables_UNCLASS.pdf).

4,018,[6] which means that the United States eliminated 1,255 warheads during the Obama administration.

Table 1-1: Number of nuclear weapons—2010-2016

	2010	2011	2012	2013	2014	2015	2016
China	~240	~240	~240	~250	~250	~260	~260
France	~300	~300	~300	~300	~290	~290	~300
Russia	~12,000	~11,000	~10,000	~8,500	~8,000	~7,500	~7,290
U.K.[a]	~225	~225	~225	~225	~225	~215	~215
U.S.	~9,600	~8,500	~8,000	~7,700	~7,300	~7,260	~7,000
India	60~80	80~100	80~100	90~110	90~110	90~110	~100-120
Pakistan	70~90	90~110	90~110	100~120	100~120	100~120	~110-130
Israel	~80	~80	~80	~80	~80	~80	~80
North Korea	?	?	?	6~8	~8	~8	~10
Total	~22,600	~20,530	~19,000	~17,270	~16,383	~15,850	~15,395

Sources: Stockholm International Peace Research Institute (SIPRI), *SIPRI Yearbook 2010: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2010), chapter 8; SIPRI, S*IPRI Yearbook 2011: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2011), chapter 7; SIPRI, *SIPRI Yearbook 2012: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2012), chapter 7; SIPRI, *SIPRI Yearbook 2013: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2013), chapter 7; SIPRI, SIPRI *Yearbook 2014: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2014), chapter 6; SIPRI, *SIPRI Yearbook 2015: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2015), chapter 11; SIPRI, *SIPRI Yearbook 2016: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2016), Chapter 16.

a) The United Kingdom, according to a document obtained under the freedom of information act, "has been decommissioning and breaking down Trident nuclear warheads at a rate of three per year, with a goal of reducing domestic stocks to 'no more than 180' by the mid-2020s," at Burghfield in Berkshire (Rob Edwards, "UK's Nuclear Weapons being Dismantled Under Disarmament Obligations," *Guardian*, August 11, 2013, http://www.theguardian.com/uk-news/2013/aug/11/uk-nuclear-weapons-dismantled-trident.). While the SIPRI estimated that the United Kingdom possessed 225 nuclear weapons from 2010 through 2014, it could be assumed that it had reduced the number of nuclear weapons gradually.

[6] "Remarks by the Vice President on Nuclear Security," Washington, DC., January 11, 2017, https://obamawhitehouse.archives.gov/the-press-office/2017/01/12/remarks-vice-president-nuclear-security.

Table 1-2: The status of nuclear forces (estimates, as of September 2016)

	Total nuclear stockpile	Breakdown				Nuclear warheads	Delivery vehicles
U.S.	～7,000	Retired / Awaiting dismantlement ～2,500					
		Operational ～4,500	Non-deployed ～2,570				
			Deployed ～1,930	Non-strategic 500			
				Strategic ～1,750	ICBM	440	440
					SLBM	1,000	264
					Strategic bomber	300	60
Russia	～7,290	Retired / Awaiting dismantlement ～2,800	（Non-strategic） （1,950）				
		Operational 4,490	Non-deployed 2,600	（Non-strategic） （1,950）			
			Deployed ～1,790	Strategic ～2,540	ICBM	1,040	307
					SLBM	704	176
					Strategic bomber	798	60
U.K.	～215	Deployed 150			SLBM	215	48
France	～300	Deployed 290			SLBM	240	48
					Attack aircraft（including carrier based aircraft）	50	50
China	～260				Land-based medium- and long-range ballistic missile	180	150
					SLBM	48	48
					Attack aircraft	20	20
					Cruise missile	n/a	150 ～350
India	100～120				Land-based ballistic missile	～56	～56
					Attack aircraft	～36-48	～36-48
					Sea-based ballistic missile	～14	～2
Pakistan	110～130				Land-based ballistic missile	～86	～86
					Attack aircraft	～36	～36
					Cruise missile	～8	～8
Israel	～80				Ballistic missile Attack aircraft		
N. Korea	～10						
World	～15,395	（Deployed） （4,300）					

ICBM：Inter-Continental Ballistic Missile　SLBM：Submarine Launched Ballistic Missile

Source: Stockholm International Peace Research Institute, *SIPRI Yearbook 2016: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2016), chapter 16.

(2) Commitment to Achieve a World without Nuclear Weapons
A) Approaches toward a world without nuclear weapons

According to the preamble of the NPT, states parties "[declare] their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament, [and urge] the co-operation of all States in the attainment of this objective." Article VI of the Treaty stipulates that "[e]ach of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control."

As mentioned in the previous *Hiroshima Reports*, no country, including the nuclear-weapon/armed states, openly opposes the goal of the total elimination of nuclear weapons or the vision of a world without nuclear weapons. The commitment to nuclear disarmament has been reiterated in various fora, including the NPT review process and the UN General Assembly (UNGA). However, this does not necessarily mean that nuclear-weapon/armed states actively pursue realization of a world without nuclear weapons. The stalemate regarding the goal of nuclear disarmament continued again in 2016.

As for approaches to nuclear disarmament, the five NWS have reiterated their basic stance: "We continue to pursue a progressive step-by-step approach towards this end, in a way that promotes international stability, peace, and security, and based on the principle of increased and undiminished security for all. We continue to believe that this approach is the only practical way to make progress toward nuclear disarmament while enhancing international peace and stability, and is the only realistic way to achieve a world without nuclear weapons."[7] Similar, in part, to the position of the five NWS, India stated that "the goal of universal, non-discriminatory and verifiable nuclear disarmament could be achieved by a step by step process."[8]

At the Open-Ended Working Group on Taking Forward Multilateral Nuclear Disarmament Negotiations (OEWG) held in 2016, the western NNWS, mainly allied with the United States, advocated a "progressive approach" based on a "building blocks" principle.[9] In their working paper submitted to the OEWG, they argued that "[o]nly by addressing both the security as well as humanitarian dimensions of nuclear weapons can we take the incremental but necessary steps that will enhance security for all and provide the best chance of reaching a world without nuclear weapons…[T]he international community should focus not on differences but on common ground by identifying concrete and practical 'building blocks' to reach that shared goal." The progressive approach, according to the working paper, is composed of parallel and simultaneous effective non-legal and legal measures as building blocks. It contends that "[a]n early contribution to development of trust and confidence would be agreement on a broad and flexible 'framework,' comprising non-legal and legal measures, which should drive the disarmament process." The paper then argued:

> An important landmark of the progressive approach will be when we reach the 'minimisation' point where weapon numbers are reduced to very low numbers and when an internationally reliable verification regime with effective verification techniques and methods is established…But much prior work needs to

[7] "Joint Statement from the Nuclear-Weapons States at the 2016 Washington, DC P5 Conference," Washington, DC., September 15, 2016, http://www.state.gov/r/pa/prs/ps/2016/09/261994.htm.

[8] "Statement by India," at the First Committee of the UN General Assembly, General Debate, October 6, 2016.

[9] A/AC.286/WP.9, February 24, 2016. The working paper was firstly submitted by 18 countries, including Australia, Belgium, Canada, Germany, Japan, the Netherlands and Poland. Subsequently, another six countries, such as Norway, South Korean and Turkey, joined it.

be done to get to this minimisation point.

We do not have to wait until this point is reached before giving consideration to the many political, security, technical, verification and enforcement issues that remain to be resolved before States would be prepared to progress to minimisation point and then to give up their last nuclear weapons. We could start with this now.

On the other hand, the Non-Aligned Movement (NAM) countries have called for launching negotiations on a phased program for the complete elimination of nuclear weapons with a specified time frame. At the 2016 UNGA, they stated:

> The international community has waited too long for the realization of the goal of the total elimination of nuclear weapons. It has become obvious that the existing approach adopted by nuclear weapon States, the so-called step-by step approach, has failed to make concrete and systematic progress towards the total elimination of nuclear weapons. Despite positive developments on nuclear nonproliferation in the past decades, forward movement on nuclear disarmament cannot be held hostage to progress on non-proliferation or the perceived notions of strategic stability. It is time to take a new and comprehensive approach on nuclear disarmament.[10]

Among the nuclear-armed states, Pakistan had expressed concurrence with a time-bound, phased approach at least until 2015. However, at the First Committee of the UNGA, it did not mention this approach. While criticizing that countries proposing step-by-step and progressive approaches are "attempting to divert attention from the fulfilment of their obligations and commitments on nuclear disarmament by proposing additional non-proliferation measures," Pakistan also argued, "there are moves to trivialize and exclude vital security considerations from the debate on nuclear disarmament, and to recast the discourse in exclusively humanitarian and ethical terms—supposedly paving the way for a ban on nuclear weapons. In addition to taking international peace and security for granted, these initiatives go against the agreed principles enshrined in the [First Special Session on Disarmament] Final Document."[11]

B) Voting behavior on UNGA resolutions on nuclear disarmament proposals by Japan, NAC and NAM

In 2016, the UNGA again adopted a resolutions titled "United action with renewed determination towards the total elimination of nuclear weapons"[12] promoted by Japan; "Towards a nuclear-weapon-free world: accelerating the implementation of nuclear disarmament commitments"[13] proposed by the New Agenda Coalition (NAC); and "Nuclear disarmament"[14] by the NAM members. The voting behavior of the countries surveyed in this project on the three resolutions at the UNGA in 2016 is presented below.

- "United action with renewed determination towards the total elimination of nuclear weapons"
  - Proposing: Australia, Austria, Belgium, Canada, Chili, Germany, Japan, Nigeria, Norway, the

[10] "Statement by Indonesia, on behalf of the Non-Aligned Movement," at the First Committee of the UN General Assembly, Thematic Debate on Nuclear Disarmament, October 13, 2016.

[11] "Statement by Pakistan," at the First Committee of the UN General Assembly, General Debate, October 10, 2016.

[12] A/RES/71/49, December 5, 2016.

[13] A/RES/71/54, December 5, 2016.

[14] A/RES/71/63, December 5, 2016.

Philippines, Poland, Sweden, Switzerland, the United States and others
- ✧ 167 in favor, 4 Against (China, Russia, North Korea and Syria), 16 Abstentions (Egypt, France, India, Iran, Israel, South Korea, Pakistan, South Africa, Syria, the U.K. and others)

- ➢ "Towards a nuclear-weapon-free world: accelerating the implementation of nuclear disarmament commitments"
  - ✧ Proposing: Brazil, Egypt, Mexico, New Zealand, South Africa and others
  - ✧ 137 in favor, 25 Against (Belgium, France, Germany, India, Israel, North Korea, Poland, Russia, Turkey, the U.K. and the U.S.), 19 Abstentions (Australia, China, Japan, the Netherlands, Norway, Pakistan and others) *South Korea did not vote.
- ➢ "Nuclear disarmament"
  - ✧ Proposing: Indonesia, Iran, the Philippines and others
  - ✧ 122 in favor, 44 Against (Australia, Belgium, Canada, France, Germany, Israel, South Korea, the Netherlands, Norway, Poland, Russia, Switzerland, Turkey, the U.K., the U.S. and others), 17 Abstentions (Austria, India, Japan, New Zealand, Pakistan, South Africa, Sweden and others)

Regarding the resolution titled "United action with renewed determination towards the total elimination of nuclear weapons," among nuclear-weapon/armed states, the United States changed its position from the previous year when it abstained, and joined as lead co-sponsor and voted in favor in 2016. China, as in 2015, again claimed that Japan sought to give a false impression of being a victim of World War II through attempting to insert the following sentence in the resolution: "[encouraging] every effort to raise awareness of the realities of the use of nuclear weapons, including through, among others, visits by leaders, youth and others to and interactions with communities and people, including atomic bomb survivors, the hibakusha, to pass on their experiences to future generations."

C) Voting behavior on UNGA resolutions calling for commencement of negotiations on a legal prohibition of nuclear weapons

In the final report adopted at the OEWG in 2016, "[t]he Working Group recommended with widespread support for the General Assembly to convene a conference in 2017…to negotiate a legally-binding instrument to prohibit nuclear weapons." Upon this recommendation, the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations" was adopted as a result of the following voting behaviors.[15]

- ➢ Proposing: Austria, Brazil, Chile, Indonesia, Mexico, New Zealand, Nigeria, the Philippines, South Africa and others;
- ➢ 113 in favor, 35 against (Australia, Belgium, Canada, France, Germany, Israel, Japan South Korea, Norway, Poland, Russia, Turkey, the U.K., the U.S. and others), 13 abstentions (China, India, the Netherlands, Pakistan, Switzerland and others) *North Korea and Syria did not vote.

While two thirds of UN member states voted in favor, nearly all NWS (except China) as well as NNWS allied with the United States (except the Netherlands[16]) were against the resolution.

According to this resolution, the UNGA "[d]ecides to convene in 2017 a United Nations conference to negotiate a

[15] A/RES/71/258, December 23, 2016.

[16] The reason of the Netherlands' voting behavior was reported that the lower house of the Dutch parliament had pressed the government to support the resolution. See Kingston Reif, "UN Approves Start of Nuclear Ban Talks," *Arms Control Today*, Vol. 46, No. 9 (November 2016), p. 27.

legally binding instrument to prohibit nuclear weapons, leading towards their total elimination…[T]he conference shall convene in New York, under the rules of procedure of the General Assembly unless otherwise agreed by the conference, from 27 to 31 March and from 15 June to 7 July 2017, with the participation and contribution of international organizations and civil society representatives." It also "[c]alls upon States participating in the conference to make their best endeavours to conclude as soon as possible a legally binding instrument to prohibit nuclear weapons, leading towards their total elimination."

Before voting at the UNGA First Committee, Austria stated, "As disarmament history has shown, weapons are only eliminated after a legally-binding norm for their prohibition has been established. So more and more states came to the conclusion that such prohibition convention is needed and the relevant recommendation to start such negotiations next year found broad support."[17] Mexico also argued that the only guarantee to prevent humanitarian consequences resulting from nuclear detonations is a total elimination of nuclear weapons.[18]

The NWS, except China, which abstained, strongly opposed the resolution. Prior to voting, the United States stated, "[it] will vote 'no' on any resolution establishing nuclear weapons ban treaty negotiations, and will not participate in the negotiations. We urge all others to do the same." From the U.S. perspectives, a treaty banning nuclear weapons would not lead to any further reductions of nuclear weapons; rather, it would undermine the existing nuclear non-proliferation and disarmament regime. It also insisted that a ban treaty runs the risk of undermining regional security since it "cannot deny the reality that nuclear weapons continue to play a role in maintaining peace and stability in some parts of the world."[19] Furthermore, the United States sent a non-paper to the NATO member states, in which it urged them to vote against the draft resolution, not to merely abstain.[20] As for the other three NWS, Russia warned of the "fatal, destructive repercussions" of adopting the resolution, describing it as a "largely propagandistic step" leading to "outright antagonism";[21] France stated that a nuclear weapons ban treaty "would be both ineffective for disarmament and destabilizing for security";[22] and the United Kingdom asserted, "A ban has the potential to do great harm…Politically, a ban will be a referendum on the NPT."[23]

China, India and Pakistan all abstained, and implied that they would prefer negotiations under the rule of consensus, instead of the decision by majority procedure of the General Assembly. In its explanation of vote, India also stated that a comprehensive nuclear weapons convention should have been negotiated at the CD.[24]

NNWS allied with the United States explained that they voted against the resolution because they could not expect

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[17] "Statement by Austria," at the First Committee of the UN General Assembly, General Debate, October 4, 2016.

[18] "Statement by Mexico," at the First Committee of the UN General Assembly, Thematic Debate on Nuclear Disarmament, October 14, 2016.

[19] "Statement by the United States," at the First Committee of the UN General Assembly, Thematic Debate on Nuclear Disarmament, October 14, 2016.

[20] "United States Non-Paper: Defense Impacts of Potential United Nations General Assembly Nuclear Weapons Ban Treaty," October 17, 2016. This non-paper is posted on the ICAN's homepage (http://www.icanw.org/wp-content/uploads/2016/10/NATO_OCT2016.pdf).

[21] Cited from Ray Acheson, "Nuclear Weapons," *First Committee Monitor*, Reaching Critical Will, No. 5 (October 31, 2016), p. 3.

[22] "Statement by France," at the First Committee of the UN General Assembly, Thematic Debate on Nuclear Disarmament, October 14, 2016.

[23] Cited from Ray Acheson, "Editorial: Revolt," *First Committee Monitor*, Reaching Critical Will, No. 3 (October 17, 2016), p. 4.

[24] "Explanation of Vote by India on First Committee Resolution L.41," October 28, 2016.

participation of nuclear-weapon/armed states in negotiation conferences, which were essential for practical progress of nuclear disarmament.[25] Japan's Foreign Minister Fumio Kishida said:

> After an extended, careful consideration, we cast our vote against it. The reasons for our opposition are that this draft resolution (1) does not correspond to our country's fundamental position of aiming at a "world without nuclear weapons" by taking concrete and practical measures one by one and (2) further aggravates the confrontation between nuclear-weapon states and non-nuclear-weapon states and widens the schism even as we face the increasing seriousness of nuclear weapon and missile development by North Korea. Regarding this assessment, look to the voting behavior of each country, where, for example, North Korea supported the resolution while none of the nuclear-weapon states supported it. Our view is that such voting behavior demonstrates such assessment.
>
> On the other hand, this resolution seeking the commencement of negotiations on a nuclear weapons convention, in the end, was adopted by majority vote. It is now certain that the negotiations on a treaty will be conducted next year. As for our course of action including whether or not we will participate in the negotiations, it will be considered by the government as a whole, taking into consideration future discussions on the details of the orientation of the negotiations as well as the orientation of the countries taking neutral position that we have collaborated with so far such as Australia and Germany. At this point in time, I would like to take part actively in the negotiations and firmly state what must be stated as the only country to have suffered atomic bombings and from our position of emphasizing cooperation between nuclear-weapon states and non-nuclear-weapon states.[26]

At the 2016 UNGA, the resolution titled "Follow-up to the advisory opinion of the International Court of Justice on the Legality of the Threat or Use of Nuclear Weapons" was adopted, as was done previous years.[27] It says that "by commencing multilateral negotiations leading to an early conclusion of a nuclear weapons convention" all states should implement the obligation in Article VI of the NPT. The voting behavior in 2016 is presented below.

- Proposing: Brazil, Chile, Egypt, Indonesia, Iran, Kazakhstan, Nigeria, the Philippines and others
- 136 in favor, 25 Against (Belgium, France, Germany, Israel, the Netherlands, Poland, Russia, Turkey, the U.K., the U.S. and others), 22 Abstentions (Australia, Canada, Japan, Norway and others) *South Korea did not vote.

In addition, the UNGA resolution titled "Convention on the Prohibition of the Use of Nuclear Weapons," requesting "to the Conference on Disarmament to commence negotiations in order to reach agreement on an international convention prohibiting the use or threat of use of nuclear weapons under any circumstances," was also proposed and adopted.[28] Voting behavior on this resolution was as follows:

- Proposing: Chile, Egypt, India, Iran, Kazakhstan, Egypt, India, Indonesia, Iran and others
- 128 in favor, 50 Against (Australia, Austria, Belgium, Canada, France, Germany, Israel, South Korea,

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[25] "Taking forward multilateral nuclear disarmament negotiations - Explanation of Position on behalf of the following states : Albania, Australia, Belgium, Bulgaria, Canada, Czech Republic, Denmark, Estonia, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Montenegro, Poland, Portugal, Republic of Korea, Romania, Slovakia, Slovenia, Spain and Turkey," October 28, 2016.

[26] "Press Conference by Foreign Minister Fumio Kishida," Ministry of Foreign Affairs of Japan, October 28, 2016, http://www.mofa.go.jp/press/kaiken/kaiken4e_000315.html. This Japan's decision was criticized by, inter alia, Hiroshima and Nagasaki, and Mr. Kazumi Matsui, Mayor of Hiroshima city, sent a letter to Foreign Minister.

[27] A/RES/71/58, December 5, 2016.

[28] A/RES/71/75, December 5, 2016.

the Netherlands, New Zealand, Norway, Poland, Sweden, Switzerland, Turkey, the U.K., the U.S. and others), 9 Abstentions (Japan, Russia and others)

D) Announcement of significant policies and important activities

OEWG

The 2015 UNGA adopted a resolution, titled "Taking forward multilateral nuclear disarmament negotiations," in which the UNGA decided "to convene an open-ended working group to substantively address concrete effective legal measures, legal provisions and norms that will need to be concluded to attain and maintain a world without nuclear weapons."[29] Following from this resolution, the Open-Ended Working Group on Taking Forward Multilateral Nuclear Disarmament Negotiations (OEWG) was held in February, May and August 2016 in Geneva.

More than 90 NNWS, along with NGOs, participated in the OEWG. However, all nuclear-weapon/armed states and North Korea rejected to join it.

During the February session, the following issues were discussed by the participants: concrete effective legal measures, legal provisions and norms that will need to be concluded to attain and maintain a world without nuclear weapons; and recommendations on other measures that could contribute to taking forward multilateral nuclear disarmament negotiations. At the May session, participants discussed measures to reduce and eliminate the risk of accidental, mistaken, unauthorized, or intentional nuclear weapon detonations; transparency measures related to the risks associated with existing nuclear weapons; additional measures to increase awareness and understanding of the complexity of, and interrelationship between, the wide range of humanitarian consequences that would result from any nuclear detonation; essential elements that could form part of effective legal measures, legal provisions, and norms that will need to be concluded to attain and maintain a world without nuclear weapons; possible pathways to take forward multilateral nuclear disarmament negotiations; and other measures in terms of reviewing the role of nuclear weapons in the security and other contexts of the 21st century.

The primary focus of the discussions at this OEWG was on whether negotiations of a legal instrument of banning nuclear weapons should have been launched. Countries supporting the "Humanitarian Pledge," led by Austria, argued to "pursue an additional legal instrument or instruments with urgency and to support international efforts to prohibit and eliminate nuclear weapons."[30] Among them, Mexico insisted that, since the majority of countries called for a legal prohibition of nuclear weapons, the issue was not whether such a treaty should be concluded, but when and what the international community would do. Proponents of a ban treaty also mentioned, inter alia:

- A main function of the State is to protect and provide security to its population. In a "narrow security approach" the mere focus on State security triggers the question of the protection and security of the State's population. In a world driven by military logic nuclear weapons attract a counter strike. So the existence of nuclear weapons in a given State does not increase the protection and security of its population, but, on the contrary, actually lowers the protection and security of its population. A "narrow security approach" therefore does not appear to contradict the humanitarian approach. Rather, it leads to humanitarian considerations and reinforces the validity of the humanitarian approach.[31]
- Article VI of the NPT is a legally-binding multilateral nuclear disarmament obligation and hence

[29] A/RES/70/33, December 7, 2015.
[30] A/AC.286/WP.36, May 4, 2016.
[31] A/AC.286/WP.4, February 22, 2016.

the general basis for multilateral nuclear disarmament efforts. However, it does not provide specific guidance as to what kind of negotiations should be pursued in good faith nor what the effective measures relating to the cessation of the nuclear arms race should be…Other legal measures, however, such as the prohibition of possession, use, production, stockpiling, and transfer of nuclear weapons have not yet been considered in detail in the NPT context. Verification arrangements – legally-binding as well as non-legally binding – will also be key elements, especially to maintain a nuclear weapon free world.[32]

- A nuclear weapons ban treaty will not contradict the NPT and the existing nuclear non-proliferation regime.

Regarding the form of a legal instrument for prohibiting nuclear weapons, proponents of the "Humanitarian Pledge" proposed that "[a] prohibition/ban-treaty would likely entail the prohibition of the use, stockpiling, production and transfer of nuclear weapons, without necessarily addressing all effective legal measures covered by a comprehensive nuclear weapons convention." They argued that such a treaty "could also be considered as one (legal) link of the chain in a 'building blocks' approach, a part of a framework agreement as well as a sub-set of a 'comprehensive nuclear weapons convention' that would cover legally binding prohibitions but maybe not all other elements, such as for example verification measures. Consequently, the various approaches cannot be considered as mutually exclusive but as complementary. They have much in common as they aim at reinforcing the implementation of the Article VI obligation and taking forward nuclear disarmament negotiations."[33] Meanwhile, Costa Rica and Malaysia proposed a model NWC.[34] They also clarified their thoughts: "Agreement and participation of the nuclear-armed States would not be necessary for the negotiation of such a treaty…Most of the legal and other measures that have so far been proposed to attain and maintain a world without nuclear weapons are currently blocked by one or more nuclear-armed States. The only measures that could immediately be pursued in the current political and diplomatic environment are," a Nuclear Weapons Ban Treaty (NWBT), a framework agreement, and development of verification capabilities.[35]

Argentina, Brazil, Costa Rica, Ecuador, Guatemala, Indonesia, Malaysia, Mexico, the Philippines and Zambia submitted a working paper in which they proposed to "[c]onvene a Conference in 2017, open to all States, international organizations and civil society, to negotiate a legally-binding instrument to prohibit nuclear weapons."[36] The majority of NNWS participating in the OEWG expressed support for this proposal.

On the other hand, NNWS mainly allied with the United States proposed the "progressive approach"[37] and argued, inter alia:

- While the humanitarian group insists on two legal gap that needs to be filled for the prohibition and elimination of nuclear weapons, "[t]he mere fact that a law or legal norm has not been imposed does not necessarily mean there is a legal gap. In fact, a true legal gap requires a situation where the absence of a law or legal norm prevents an inherently 'illegal' situation from being addressed, or where the applicable

[32] A/AC.286/WP.36, May 4, 2016. In addition to this working paper, see also A/AC.286/WP.5, February 22, 2016.
[33] A/AC.286/WP.36, May 4, 2016.
[34] A/AC.286/WP.11, February 24, 2016.
[35] A/AC.286/WP.8, February 23, 2016.
[36] A/AC.286/WP.34/Rev.1, May 11, 2016.
[37] A/AC.286/WP.9, February 24, 2016.

law is incomplete such that it prevents States Parties from fulfilling their obligations."[38]

- "It is quite possible that the premature negotiation of a ban would intensify existing rifts among states on nuclear issues, creating a less conducive environment for pursuing negotiations in good faith on nuclear disarmament…[S]ome NPT States Parties may actually be reluctant to do so, particularly if they are in regions where proliferation threats exist. Such a situation would generate new doubts about the actual commitment of these countries to their NPT obligations for non-proliferation or cooperation in the peaceful uses of nuclear energy."[39]
- "Nuclear disarmament must be promoted based on two basic understandings, the first being a clear understanding of the humanitarian impacts of the use of nuclear weapons and the second being the objective assessment of the reality of the security environment…[A]n attempt to prioritize one over the other is not, in our view, a constructive approach. Both national security and people's security are intrinsically intertwined and important factors in promoting nuclear disarmament, and the national security must not be ignored."[40]

During the August session, a report was drafted for submission to the UNGA. While any decisions at this OEWG could be done through majority vote, many participating countries sought to adopt a final report by consensus, which could not be achieved.

The focus of their debates was on the paragraph in which a commencement of negotiations on a legal prohibition of nuclear weapons in 2017 was mentioned. In the initial, so called "zero" draft:

> [A] *majority of States supported* the convening by the General Assembly of a conference in 2017, open to all States, international organizations and civil society, to negotiate a legally-binding instrument to prohibit nuclear weapons, leading towards their total elimination. A group of States, however, considered that such negotiations would be premature in light of the current international security environment, stressed the need for any process to take forward multilateral disarmament negotiations to address national and international security considerations and supported the pursuit of practical building blocks consisting of parallel and simultaneous effective legal and non-legal measures.[41] (Emphasis added.)

NNWS allied with the United States insisted to revise the term "majority." As a result of negotiations, this paragraph was finally drafted as follows:

> The Working Group recognized that there was a recommendation which received *widespread support* for the General Assembly to convene a conference in 2017, open to all States, with the participation and contribution of international organizations and civil society, to negotiate a legally-binding instrument to prohibit nuclear weapons, leading towards their total elimination, as outlined in paragraph 34. The Working Group also recognized that other States did not agree with the above recommendation and that they recommended that any process to take forward multilateral nuclear disarmament negotiations must address national, international and collective security concerns and supported the pursuit of practical

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[38] A/AC.286/WP.20/Rev.1, April 27, 2016. "Two legal gaps" which Canada mentioned in its working paper are that "the implementation of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) contains a number of legal gaps, because Article VI does not specify which effective measures are needed to achieve disarmament…[and that] there is currently no universal prohibition on the use and possession of nuclear weapons."

[39] A/AC.286/WP.20/Rev.1, April 27, 2016.

[40] A/AC.286/WP.22, April 14, 2016.

[41] A/AC.286/L.1, July 28, 2016.

> steps consisting of parallel and simultaneous effective legal and non-legal measures to take forward multilateral nuclear disarmament negotiations, as outlined in paragraphs 40 and 41 for which there was no agreement. The Working Group further recognized the views expressed on other approaches.[42] (Emphasis added.)

However, on the last day of the OEWG, Australia, on behalf of 14 countries (including Belgium, South Korea, Poland and Turkey), stated that they could not join the consensus due to the fundamental difference regarding a part of "agreed recommendations," and requested a vote. Then, Guatemala proposed to revise the first sentence of this paragraph to say: "[t]he Working Group recommended with widespread support for the General Assembly to convene a conference in 2017, open to all States, with the participation and contribution of international organizations and civil society, to negotiate a legally-binding instrument to prohibit nuclear weapons, leading towards their total elimination, as outlined in paragraph 34." The OEWG adopted its final report with 68 in favor, 22 against and 13 abstentions. Of the 24 NNWS advocating the "progressive approach," 19 countries (including Australia, Belgium, Canada, Germany, South Korea, Poland and Turkey) voted against it, and five (Finland, Japan, the Netherlands, Norway and Portugal) abstained. In addition, several NNWS, including Iran, Kazakhstan, New Zealand, Sweden and Switzerland, also abstained.

Japan decided to abstain because of its concern that adoption of the final report by voting would have further widened the rift in the international community in terms of nuclear disarmament. At the same time, Japan also expressed its determination of making maximum efforts for consolidating countries so as to promote nuclear disarmament. After the voting, Iran, Kazakhstan, Switzerland and Sweden also expressed their concern that the final report could not be adopted by consensus. New Zealand explained that because of the lack of time for the Foreign Minister's consideration, it was not able to vote on the report.

As mentioned above, the UNGA resolution, deciding to convene negotiations of a legal instrument banning nuclear weapons in 2017, was adopted upon the recommendation stipulated in the final report of the OEWG. As of the end of 2016, the proponents seem to converge towards establishing a NWBT. At the OEWG, the proponents proposed the core elements of a NWBT as: prohibition of possession, use, threat of use, acquisition, stockpile, development, test, manufacture, transfer, transit, station, deployment of nuclear weapons, and prohibition on assisting, encouraging or inducing, directly or indirectly, the engagement in any activity prohibited by the legally-binding instrument.[43] Brazil also said: [44]

> It would not have an immediate effect on the existing nuclear arsenals, but it would have a political as well as legal impact on the disarmament debate. It would also set out a compass for further initiatives regarding the actual elimination of nuclear weapons. Since it does not need to be universal at its inception, it could be a more practical way to take forward multilateral nuclear disarmament negotiations.
>
> Under the plausible assumption that no nuclear-weapon State—*de jure* or *de facto*—would support the conclusion of a ban treaty or join it before it enters into force, there would be no political urgency in negotiating immediately the destruction of current arsenals and its verification instruments. Those measures could be the subject of future negotiations of a model-protocol, especially after one (or more)

[42] A/AC.286/CRP.3, August 19, 2016.
[43] A/AC.286/WP.34/Rev.1, May 11, 2016.
[44] A/AC.286/WP.10, February 24, 2016.

nuclear-weapon State joins the treaty.

ICJ

In 2014, the Marshall Islands filed applications at the International Court of Justice (ICJ) to hold the nine nuclear-weapon/armed states accountable for violations of international law with respect to their nuclear disarmament obligations under the NPT and customary international law. Proceedings were held on the applications regarding the United Kingdom, India and Pakistan, which have accepted the compulsory jurisdiction. The other six countries do not recognize the court's jurisdiction.

After the proceedings, on October 5, 2016, the ICJ ruled that the Marshall Islands failed to prove that a legal dispute over disarmament existed between it and the three nuclear-weapon/armed states before the case was filed in 2014, and that consequently the court lacks jurisdiction. The 16-member court upheld the arguments of the nuclear states in two 9-7 votes, in the cases of India and Pakistan, and an 8-8 vote in the U.K. case, in which the president of the court broke the tie.[45]

Other activities

Regarding other major activities related to nuclear disarmament:

- At the G7 Foreign Ministers' Meeting in Hiroshima in April, the "G7 Foreign Ministers' Hiroshima Declaration on Nuclear Disarmament and Nonproliferation" was issued. In this Declaration, the Ministers "emphasize[d] the importance of our meeting in Hiroshima," and said "[t]he people of Hiroshima and Nagasaki experienced immense devastation and human suffering as a consequence of the atomic bombings and have rebuilt their cities so impressively." They "urge[d] all states to work with us on practical and realistic initiatives that can promote meaningful dialogue on nuclear disarmament and non-proliferation among all, including between nuclear-weapon States and non-nuclear-weapon States." Furthermore, the Ministers underlined, "For decades, political leaders like us and other visitors have come to Hiroshima and Nagasaki and been deeply moved. We hope others follow that path. We share the deep desire of the people of Hiroshima and Nagasaki that nuclear weapons never be used again."[46]
- In August, Kazakhstan organized an international conference on "Building a Nuclear-Weapons-Free World." President Nursultan Nazarbayev proposed to establish a crisis management system among major countries, and to conclude an international nuclear safety treaty.

E) Humanitarian consequences of nuclear weapons

Since the 2015 NPT Review Conference (RevCon), the Humanitarian Group, which focuses on the humanitarian dimensions of nuclear weapons, has increasingly emphasized the significance of starting negotiations of a legally binding instrument on prohibiting nuclear weapons. The result was the adoption of the UNGA resolution on its

[45] "Obligations Concerning Negotiations Relating to Cessation of the Nuclear Arms Race and to Nuclear Disarmament (Marshall Islands V. United Kingdom) Preliminary Objections," International Court of Justice, October 5, 2016; "Obligations Concerning Negotiations Relating to Cessation of the Nuclear Arms Race and to Nuclear Disarmament (Marshall Islands V. India) Jurisdiction of the Court and Admissibility of the Application," International Court of Justice, October 5, 2016; "Obligations Concerning Negotiations Relating to Cessation of the Nuclear Arms Race and to Nuclear Disarmament (Marshall Islands V. Pakistan) Jurisdiction of the Court and Admissibility of the Application," International Court of Justice, October 5, 2016.

[46] "G7 Foreign Ministers' Hiroshima Declaration on Nuclear Disarmament and Nonproliferation," Hiroshima, April 11, 2016.

commencement in 2017.

At the 2016 UNGA, Austria and other co-sponsors, as in the previous year, proposed a resolution titled "Humanitarian consequences of nuclear weapons."[47] The voting behavior of countries surveyed in this project on this resolution is presented below.

- Proposing: Australia, Brazil, Chili, Egypt, Indonesia, Kazakhstan, Mexico, New Zealand, Nigeria, South Africa, Sweden, UAE and others
- 144 in favor, 16 Against (France, Israel, South Korea, Poland, Russia, Turkey, the U.K., the U.S. and others), 24 Abstentions (Australia, Belgium, Canada, China, Germany, North Korea, the Netherlands, Norway, Pakistan and others)

In addition, based on the "Humanitarian Pledge," Austria also proposed the resolution titled "Humanitarian pledge for the prohibition and elimination of nuclear weapons,"[48] which was adopted by the following voting behavior:

- Proposing: Austria, Chili, Indonesia, Kazakhstan, Mexico, Nigeria, South Africa and others
- 137 in favor, 34 Against (Australia, Belgium, Canada, France, Germany, Israel, South Korea, the Netherlands, Norway, Poland, Russia, Turkey, the U.K., the U.S. and others), 12 Abstentions (China, India, Japan, North Korea, Pakistan and others)

Furthermore, the voting behavior of the resolution titled "Ethical imperatives for a nuclear-weapon-free world"[49] led by South Africa was:

- Proposing: Austria, Brazil, Iran, Mexico, Nigeria, South Africa and others
- 130 in favor, 37 Against (Australia, Belgium, Canada, France, Germany, Israel, South Korea, the Netherlands, Norway, Poland, Russia, Turkey, the U.K., the U.S. and others), 15 Abstentions (China, India, Japan, North Korea, Pakistan, Sweden, Switzerland and others)

[47] A/RES/71/46, December 5, 2016.
[48] A/RES/71/47, December 5, 2016.
[49] A/RES/71/55, December 5, 2016.

Table 1-3: Voting behaviors to selected UNGA resolutions in 2015

	China	France	Russia	U.K.	U.S.	India	Israel	Pakistan	Australia	Austria	Belgium	Brazil
United action towards the total elimination of nuclear weapons	×	△	×	△	○	△	△	△	○	○	○	○
Towards a nuclear-weapon-free world	△	×	×	×	×	×	×	△	△	○	×	○
Nuclear disarmament	○	×	×	×	×	△	×	△	×	△	×	○
Taking forward multilateral nuclear disarmament negotiations	△	×	×	×	×	△	×	△	×	○	×	○
Follow-up to the advisory opinion of the ICJ	○	×	×	×	×	○	×	○	△	○	×	○
Convention on the Prohibition of the Use of Nuclear Weapons	○	×	△	×	×	○	×	○	×	×	×	○
Humanitarian consequences	△	×	×	×	×	○	×	△	△	○	△	○
Humanitarian pledge	△	×	×	×	×	△	×	△	×	○	×	○
Ethical imperatives	△	×	×	×	×	△	×	△	×	○	×	○

	Canada	Chile	Egypt	Germany	Indonesia	Iran	Japan	Kazakhstan	South Korea	Mexico	Netherlands	New Zealand
United action towards the total elimination of nuclear weapons	○	○	△	○	○	△	○	○	△	○	○	○
Towards a nuclear-weapon-free world	△	○	○	×	○	○	△	○	?	○	△	○
Nuclear disarmament	×	○	○	×	○	○	△	○	×	○	×	△
Taking forward multilateral nuclear disarmament negotiations	×	○	○	×	○	○	×	○	×	○	△	○
Follow-up to the advisory opinion of the ICJ	△	○	○	×	○	○	△	○	?	○	×	○
Convention on the Prohibition of the Use of Nuclear Weapons	×	○	○	×	○	○	△	○	×	○	×	×
Humanitarian consequences	△	○	○	△	○	○	○	○	×	○	△	○
Humanitarian pledge	×	○	○	×	○	○	△	○	×	○	×	○
Ethical imperatives	×	○	○	×	○	○	△	○	×	○	×	○

	Nigeria	Norway	Philippine	Poland	Saudi Arabia	South Africa	Sweden	Switzerland	Syria	Turkey	UAE	North Korea
United action towards the total elimination of nuclear weapons	○	○	○	○	○	△	○	○	×	○	○	×
Towards a nuclear-weapon-free world	○	△	○	×	○	○	○	○	○	×	○	×
Nuclear disarmament	○	×	○	×	○	△	△	×	○	×	○	○
Taking forward multilateral nuclear disarmament negotiations	○	×	○	×	○	○	○	△	?	×	○	?
Follow-up to the advisory opinion of the ICJ	○	△	○	×	○	○	○	○	○	×	○	○
Convention on the Prohibition of the Use of Nuclear Weapons	○	×	○	×	○	○	×	×	○	×	○	○
Humanitarian consequences	○	△	○	×	○	○	○	○	○	×	○	△
Humanitarian pledge	○	×	○	×	○	○	○	○	○	×	○	△
Ethical imperatives	○	×	○	×	○	○	△	△	○	×	○	△

[○: Favor, ×: Against, △: Abstention, ?:Not voting]

(3) Reduction of Nuclear Weapons
A) Reduction of nuclear weapons

The New START

Russia and the United States continue to undertake reductions of their strategic nuclear weapons under the New Strategic Arms Reduction Treaty (New START). Since the entry into force of the Treaty, neither side has alleged noncompliance. The status of their strategic (nuclear) delivery vehicles and warheads under the Treaty has been periodically updated in the U.S. State Department homepage (see Table 1-4 below). The United States also declared the number of each type of its strategic delivery vehicles. According to the data as of September 2015, the number of U.S. deployed strategy warheads fell below the upper limit stipulated in the New START for the first time, and this status has continued.

Russia, by contrast, has increased its deployed strategic (nuclear) warheads and launchers, although these activities do not constitute a violation of the New START.[50] An American expert analyzes that "[r]ather than a nuclear build-up…the increase is a temporary fluctuation cause by introduction of new types of launchers that will be followed by retirement of older launchers before 2018."[51]

According to a report published by the U.S. State Department, "[b]ased on the information available as of December 31, 2015, the United States certifies the Russian Federation to be in compliance with the terms of the New START Treaty."[52] Neither has Russia asserted any U.S. non-compliance.

In summer 2016, the Obama administration was reported to have contemplated the possibility of an extension of the New START's expiry date. This was one of five items that the administration sought to achieve in fulfillment of its initiative on nuclear disarmament, or the "Prague Agenda." The New START stipulates that Russia and the United States shall reduce their strategic nuclear forces below the upper limit set in the Treaty by 2018, and it expires 10 years after its entry into force—that is, 2021—but that the expiry date can be extended up to five years. It is not certain whether that proposal of extending the expiration day was actually made to Russia. However, Russia was considered not to accept it unless the United States agreed, for instance, to cancel deployments of ballistic missile defense (BMD) systems in Eastern European countries, or to remove its non-strategic nuclear weapons deployed in the European NATO countries.[53] Consequently, the extension of the New START could not be realized during the Obama administration.

Reductions of non-strategic nuclear weapons and allegations of non-compliance of the INF Treaty

After the conclusion of the New START in 2010, the United States called on Russia to mutually reduce non-strategic nuclear weapons, but Russia has yet to respond positively. While Russia has repeatedly called on the United States and other NATO member states, as a first step, to take all the U.S. non-strategic nuclear weapons back to the

[50] See, for example, Hans M. Kristensen, "US Drops below New START Warhead Limit for the First Time," Federation of American Scientists, October 6, 2015, http://fas.org/blogs/security/2015/10/newstart2015-2/.

[51] Hans M. Kristensen, "New START Data Shows Russian Warhead Increase Before Expected Decrease," Federation of American Scientists, October 3, 2016, http://fas.org/blogs/security/2016/10/new-start-data-2016/.

[52] U.S. Department of State, "Annual Report on Implementation of the New Start Treaty," January 2016, http://www.state.gov/t/avc/rls/rpt/2016/255558.htm.

[53] "New START Treaty Extension Unlikely Amid Lack of Political Support in US," *Sputnik News*, July 12, 2016, https://sputniknews.com/military/201607121042802963-new-start-treaty-unlikely/.

territories of the owners of such weapons, the United States has maintained its policy of reciprocal reduction of non-strategic nuclear weapons with Russia.

Meanwhile, Russia and the United States took no concrete step for resolving the allegations of Russian non-compliance with the Intermediate-range Nuclear Forces (INF) Treaty. According to the Report issued by the U.S. Department of State in July 2016, titled "Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments," "[t]he United States has determined that in 2015, the Russian Federation (Russia) continued to be in violation of its obligations under the INF Treaty not to possess, produce, or flight-test a ground-launched cruise missile (GLCM) with a range capability of 500 km to 5,500 km, or to possess or produce launchers of such missiles," and listed the Treaty articles relevant to Russia's violation.[54] In addition, it is reported in October 2016 that "American officials [were]…expressing concerns that Russia [was] producing more missiles than [were] needed to sustain a flight-test program, spurring fears that the Kremlin [was] moving to build a force that could ultimately be deployed."[55]

For its part, Russia dismissed the U.S. claims and asserted that it is the United States that has violated the INF Treaty, claiming that:

- U.S. tests of target-missiles for missile defense have similar characteristics to intermediate-range missiles;
- U.S. production of armed drones falls within the definition of ground-launched cruise missiles in the Treaty; and
- Mk-41 launch system, which the United States intends to deploy in Poland and Romania in accordance with the European Phased Adaptive Approach of the BMD, can also launch intermediate-range cruise missiles.

In November 2016, Russia, the United States and other parties to the INF Treaty held the Special Verification Commission under the Treaty.[56] Detail of the discussions there was not declassified.

Other Nuclear-Weapon/Armed States

Among nuclear-weapon/armed states other than Russia and the United States, France and the United Kingdom have reduced their nuclear weapons unilaterally. The United Kingdom, which previously announced plans to reduce its nuclear forces to no more than 120 operationally available warheads and a total stockpile of no more than 180 warheads by the mid 2020s, declared in January 2015 that it had completed the reduction of the number of deployed warheads on each of its Nuclear-Powered Ballistic Missile Submarine (SSBN) from 48 to 40 as committed to in 2010, and the total number of operationally available warheads has therefore been reduced to 120.[57]

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[54] U.S. Department of State, "Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments," April 2016, pp. 9-10. See also the previous *Hiroshima Reports*.

[55] Michel R. Gordon, "Russia Is Moving Ahead with Missile Program That Violates Treaty, U.S. Officials Say," *New York Times*, October 19, 2016, http://www.nytimes.com/2016/10/20/world/europe/russia-missiles-inf-treaty.html?_r=0.

[56] US Department of State, "Thirtieth Session of the Special Verification Commission under the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter-Range Missiles (INF Treaty)," November 16, 2016, https://2009-2007.state.gov/r/pa/prs/ps/2016/11/264375.htm.

[57] "UK Downsizes Its Nuclear Arsenal," *Arms Control Today*, Vol. 45, No. 2 (March 2015), http://www.armscontrol.org/ACT/2015_03/News-Brief/UK-Downsizes-Its-Nuclear-Arsenal.

Among the five NWS, China has neither declared any concrete information on the number of deployed or possessed nuclear weapons, nor any plan for their reduction, while reiterating that it "keeps its nuclear arsenal at the minimum level required for its national security" and "exercises utmost restraint in the development of its nuclear weapons."[58] Although China is known to be modernizing its nuclear forces, reputable research institutes estimate that China has not dramatically increased its nuclear arsenal numerically. At the same time, however, China is not considered to have commenced action to reduce its nuclear weapons. China has argued that "[s]tates with the largest nuclear arsenals bear a special responsibility for nuclear disarmament and should take the lead in reducing their nuclear arsenals drastically. When conditions are ripe, all nuclear-weapon States should join the multilateral nuclear disarmament framework."[59] Still, China has yet to clarify a condition under which it would participate in such a framework.

As for India, Pakistan, Israel and North Korea, there is no information, statement or analysis which suggests any reduction of their nuclear weapons or capabilities. As noted below, most of them are expanding their nuclear programs.

[58] NPT/CONF.2015/32, April 27, 2015.
[59] Ibid.

Table 1-4: Russian and U.S. strategic (nuclear) delivery vehicles and warheads under the New START

<U.S.>

Year and month	Deployed strategic (nuclear) warheads (Aggregate limits：1,550)	Deployed strategic (nuclear) vehicles (Aggregate limits：700)	Deployed/non-deployed strategic delivery vehicles/launchers (Aggregate limits：800)
2011.2	1,800	882	1,124
2011.9	1,790	822	1,043
2012.3	1,737	812	1,040
2012.9	1,722	806	1,034
2013.3	1,654	792	1,028
2013.9	1,688	809	1,015
2014.3	1,585	778	952
2014.9	1,642	794	912
2015.3	1,597	785	898
2015.9	1,538	762	898
2016.10	1,367	681	848
2017.1	1,367	681	848

<Russia>

Year and month	Deployed strategic (nuclear) warheads (Aggregate limits：1,550)	Deployed strategic (nuclear) vehicles (Aggregate limits：700)	Deployed/non-deployed strategic delivery vehicles/launchers (Aggregate limits：800)
2011.2	1,537	521	865
2011.9	1,566	516	871
2012.3	1,492	494	881
2012.9	1,499	491	884
2013.3	1,480	492	900
2013.9	1,400	473	894
2014.3	1,512	498	906
2014.9	1,643	528	911
2015.3	1,582	515	890
2015.9	1,648	526	877
2016.10	1,796	508	847
2017.1	1,796	508	847

Due to the Treaty's counting rules, the number of warheads cited above does not accurately reflect the actual situation of nuclear forces in both countries. The New START Treaty counts a heavy bomber as one delivery system and one nuclear warhead, despite the fact that the bombers can actually load 6-20 warheads. Also, according to its counting rule stipulated in the Treaty, for ICBMs and SLBMs, the number of warheads shall be the number of reentry vehicles emplaced on deployed ICBMs and on deployed SLBMs.

Sources: U.S. Department of State, "New START Treaty Aggregate Numbers of Strategic Offensive Arms," Fact Sheet, October 25, 2011, https://2009-2017.state.gov/t/avc/rls/176096.htm; U.S. Department of State, "New START Treaty Aggregate Numbers of Strategic Offensive Arms," Fact Sheet, April 6, 2012, https://2009-2017.state.gov/t/avc/rls/178058.htm; U.S. Department of State, "New START Treaty Aggregate Numbers of Strategic Offensive Arms," Fact Sheet, October 3, 2012, https://2009-2017.state.gov/t/avc/rls/198582.htm; U.S. Department of State, "New START Treaty Aggregate Numbers of Strategic Offensive Arms," Fact Sheet, April 3, 2013, https://2009-2017.state.gov/t/avc/rls/207020.htm; U.S. Department of State, "New START Treaty Aggregate Numbers of Strategic Offensive Arms," Fact Sheet, October 1, 2013, https://2009-2017.state.gov/t/avc/rls/215000.htm; U.S. Department of State, "New START Treaty Aggregate Numbers of Strategic Offensive Arms," Fact Sheet, April 1, 2014, https://2009-2017.state.gov/t/avc/rls/224236.htm; U.S. Department of State, "New START Treaty Aggregate Numbers of Strategic Offensive Arms," Fact Sheet, October 1, 2014, https://2009-2017.state.gov/t/avc/rls/232359.htm; U.S. Department of State, "New START Treaty Aggregate Numbers of Strategic Offensive Arms," Fact Sheet, July 1, 2015, https://2009-2017.state.gov/t/avc/rls/240062.htm; U.S. Department of State, "New START Treaty Aggregate Numbers of Strategic Offensive Arms," Fact Sheet, October 1, 2015, https://2009-2017.state.gov/t/avc/rls/247674.htm; U.S. Department of State, "New START Treaty Aggregate Numbers of Strategic Offensive Arms," Fact Sheet, October 1, 2016, https://2009-2017.state.gov/t/avc/rls/2016/262624.htm; U.S. Department of State, "New START Treaty Aggregate Numbers of Strategic Offensive Arms," Fact Sheet, January 1, 2017, https://2009-2017.state.gov/t/avc/rls/2016/266384.htm.

Table 1-5: U.S. strategic (nuclear) delivery vehicles

<ICBMs and ICBM Launchers>

Year and month		Deployed ICBM	Non-deployed ICBM	Deployed and Non-deployed Launchers of ICBMs	Deployed launchers of ICBMs	Non-deployed launchers of ICBMs	Test Launchers
2012.9	MM-III	449	263	506	449	57	6
	PK	0	58	51	0	51	1
	Total	449	321	557	449	108	7
2013.3	MM-III	449	256	506	449	57	6
	PK	0	58	51	0	51	1
	Total	449	314	557	449	108	7
2013.9	MM-III	448	256	506	448	58	6
	PK	0	57	51	0	51	1
	Total	448	313	557	448	109	7
2014.3	MM-III	449	250	506	449	57	6
	PK	0	56	1	0	1	1
	Total	449	306	507	449	58	7
2016.7	MM-III	431	225	454	431	23	4
	PK	n/a	n/a	n/a	n/a	n/a	n/a
	Total	431	225	454	431	23	4
2017.1	MM-III	416	270	454	416	38	4
	PK	n/a	n/a	n/a	n/a	n/a	n/a
	Total	416	270	454	416	38	4

MM-III: Minuteman III PK: Peacekeeper

<SLBMs and ICBM Launchers>

Year and month		Deployed SLBMs	Non-deployed SLBMs	Deployed and Non-deployed Launchers of SLBMs	Deployed launchers of SLBMs	Non-deployed launchers of SLBMs	Test Launchers
2012.9	Trident II	239	180	336	239	97	0
	Total	239	180	336	239	97	0
2013.3	Trident II	232	176	336	232	104	0
	Total	232	176	336	232	104	0
2013.9	Trident II	260	147	336	260	76	0
	Total	260	147	336	260	76	0
2014.3	Trident II	240	168	336	240	96	0
	Total	240	168	336	240	96	0
2016.7	Trident II	230	199	324	230	94	0
	Total	230	199	324	230	94	0
2017.1	Trident II	209	210	320	209	111	0
	Total	209	210	320	209	111	0

<Heavy Bombers>

Year and month		Deployed Heavy Bombers	Non-deployed Heavy Bombers	Test Heavy Bombers	Heavy Bombers Equipped for Non-nuclear Armament
2012.9	B-2A	10	10	1	0
	B-52G	30	0	0	0
	B-52H	78	13	2	0
	Total	118	23	3	0
2013.3	B-2A	10	10	1	0
	B-52G	24	0	0	0
	B-52H	77	14	2	0
	Total	111	24	3	0
2013.9	B-2A	11	9	1	0
	B-52G	12	0	0	0
	B-52H	78	12	2	0
	Total	101	21	3	0
2014.3	B-2A	11	9	1	0
	B-52H	78	11	2	0
	Total	89	20	3	0
2016.10	B-2A	12	8	1	0
	B-52H	68	12	2	8
	Total	80	20	3	8
2017.1	B-2A	10	10	1	0
	B-52H	46	8	2	33
	Total	56	18	3	33

Sources: U.S. Department of State, “New START Treaty Aggregate Numbers of Strategic Offensive Arms,” Fact Sheet, November 30, 2012, http:// 2009-2017.state.gov/t/avc/rls/201216.htm; U.S. Department of State, “New START Treaty Aggregate Numbers of Strategic Offensive Arms,” Fact Sheet, July 1, 2013, http:// http:// 2009-2017.state.gov/t/avc/rls/201216.htm; U.S. Department of State.state.gov/t/avc/rls/211454.htm; U.S. Department of State, “New START Treaty Aggregate Numbers of Strategic Offensive Arms,” Fact Sheet, January 1, 2014, http:// http:// 2009-2017.state.gov/t/avc/rls/201216.htm; U.S. Department of State.state.gov/t/avc/rls/21922.htm; U.S. Department of State, “New START Treaty Aggregate Numbers of Strategic Offensive Arms,” Fact Sheet, July 1, 2014, http:// http:// 2009-2017.state.gov/t/avc/rls/201216.htm; U.S. Department of State.state.gov/t/avc/rls/228652.htm; U.S. Department of State, “New START Treaty Aggregate Numbers of Strategic Offensive Arms,” Fact Sheet, October 1, 2016, https://2009-2017.state.gov/t/avc/rls/2016/262624.htm; U.S. Department of State, “New START Treaty Aggregate Numbers of Strategic Offensive Arms,” Fact Sheet, January 1, 2017, https://2009-2017.state.gov/t/avc/rls/2016/266384.htm.

B) A concrete plan for further reduction of nuclear weapons

In 2016, there were no new proposals by nuclear-weapon/armed states to take new, concrete measures for further reductions of their nuclear arsenals.

Regarding post-New START, the United States reiterated President Obama's proposal in 2013 to seek negotiated reductions of Russian and U.S. deployed strategic nuclear weapons of up to one-third of the level established in the New START.[60] However, Russia has condemned the U.S. policy on BMD and its deployment of tactical nuclear weapons in Europe, and rejected the U.S. proposal.

Some U.S. experts propose, inter alia, to terminate development of Long-Range Stand-Off (LRSO) cruise missiles loaded on strategic bombers, and to eliminate the ICBM leg among the nuclear triad before replacing its aging strategic nuclear forces. However, the Obama administration was reluctant to reduce nuclear arsenals unilaterally, and did not modify the nuclear forces modernization program or maintenance of the nuclear triad.

Russia has insisted that the other nuclear-weapon/armed states should participate in any future nuclear weapons reductions, including globalization of the INF Treaty. However, China, France and the United Kingdom have not changed their positions that further significant reduction of Russian and the U.S. nuclear arsenals is needed so as to commence a multilateral process of nuclear weapons reductions. None of the nuclear-armed states have indicated any concrete program for reducing their nuclear weapons.

After the 2010 NPT RevCon, few concrete plans or proposals on further reductions were made by nuclear-weapon/armed states, except implementation of the U.S.-Russian New START Treaty, as well as the U.S. proposals on a bilateral reduction. Instead, they have continued to modernize their nuclear forces, and generally increased their reliance on nuclear deterrents, as mentioned later.

C) Trends on strengthening/modernizing nuclear weapons capabilities

While nuclear-weapon/armed states have reiterated their commitments to promoting nuclear disarmament, they continue to modernize and/or strengthen their nuclear weapons capabilities.

China

China is considered to promote active modernization programs for its nuclear forces, details or numbers of which have never been declassified.

In its Annual Report on the Chinese Military in 2016, the U.S. Defense Department reported that China is estimated to possess approximately 75-100 ICBMs; China would have been likely to conduct its first nuclear deterrence patrol by the JIN-class SSBN (Type 094) armed with JL-2 SLBMs (though the United States has repeated this assessment for several years); and China now has four operational JIN-class SSBNs, and up to five more may enter service before China begins to build its next-generation SSBNs, Type 096, during the coming decade.[61]

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[60] "Remarks by President Obama at the Brandenburg Gate," Berlin, June 19, 2013, http://www.whitehouse.gov/the-press-office/2013/06/19/remarks-president-obama-brandenburg-gate-berlin-germany; U.S. Department of Defense, "Report on Nuclear Employment Strategy of the United States: Specified in Section 491 of 10 U.S.C.," June 19, 2013.

[61] US Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2016*, April 2016, pp. 25-26.

In 2015, the United States estimated that China had MIRVed some of its DF-5As ICBM. In April 2016, it was reported that China conducted a flight test of the new road-mobile DF-41 ICBMs with MIRVs.[62]

France

In 2016 no significant movement was reported regarding nuclear modernization by France. It introduced the new M-51 SLBMs in 2010, with an estimated range of 8,000 km. This was loaded in the fourth Le Triomphant-class SSBN. The previous three Le Triomphant-class SSBNs remain equipped with M-45 SLBMs that have a range of 6,000km. France plans to replace those M-45 with M-51 by 2017-2018.[63]

In a speech on nuclear policies in February 2015, President François Hollande announced replacing the last remaining Mirage 2000N fighters with Rafales, carrying the ASMPA (improved air-to-ground medium-range missile system), by 2018; instructing the Atomic Energy Commission to prepare the necessary adaptations of its nuclear warheads ahead of the end of their operational life, without nuclear testing; and underlining its commitments that France does not and will not produce new types of nuclear weapon. He also declassified in this speech that the French nuclear deterrent consists of 54 middle-range ALCMs and three sets of 16 SLBMs[64].

Russia

Russia continued to develop new types of strategic nuclear forces to replace its aging systems. In 2016, Russia planned 16 ICBM tests.[65] Among them, the RS-28 (Sarmat), which Russia has developed as a successor of the SS-18 heavy ICBMs, is planned to start deployment in 2018. Russia also seeks to rebuild a train-mobile ICBM by 2020, and conducted its flight test in November 2016.[66] The next month, President Putin stated that Russia had to strengthen its nuclear forces for coping with any contingencies, which are capable to penetrate opponent's BMD systems.[67]

As for the sea-leg of its strategic nuclear forces, the Russian Defense Ministry announced plans to conduct flight tests of two Bulava SLBM from a SSBN in September, but one of them failed. Russia possesses three Borei-class SSBNs, which can load 16 Bulava SLBMs each, with plans to deploy five more by 2020.

The United Kingdom

In October 2015, the United Kingdom decided to construct a new class of four SSBNs as replacements of the existing Vanguard-class SSBNs. In July 2016, the U.K. House of Commons endorsed this replacement plan, with 472 in

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[62] Bill Gertz, "China Flight Tests New Multiple-Warhead Missile," *Washington Free Beacon*, April 19, 2016, http://freebeacon.com/national-security/china-flight-tests-multiple-warhead-missile/. One Chinese scholar considers that China would mount one real nuclear warhead and many decoys on a MIRVed ICBM as a missile defense countermeasure. Cited in Ben Lowsen, "Chinese Nuclear Strategist Believes China's MIRVs Are Decoys," *Diplomats*, May 7, 2016, http://thediplomat.com/2016/05/chinese-nuclear-strategist-chinas-mirvs-are-decoys/.

[63] See, for example, "France Submarine Capabilities," Nuclear Threat Initiative, August 15, 2013, http://www.nti.org/analysis/ articles/france-submarine-capabilities/.

[64] François Hollande, "Nuclear Deterrence—Visit to the Strategic Air Forces," February 19, 2015, http://basedoc.diplomatie.gouv.fr/vues/Kiosque/FranceDiplomatie/kiosque.php?fichier=baen2015-02-23.html#Chapitre1.

[65] "Russia Plans 16 Launches of Intercontinental Ballistic Missiles in 2016," *Tass*, January 10, 2016, http://tass.ru/en/defense/848617.

[66] Viktor Litovkin, "Russia to Revive Missile Trains as U.S. Launches European Defense System," *UPI*, May 17, 2016, http://www.upi.com/Business_News/Security-Industry/2016/05/17/Russia-to-revive-missile-trains-as-US-launches-European-defense-system/2451463505980/.

[67] "Putin: Russia's Military is Stronger Than 'Any Potential Aggressor,'" *FOX News*, December 22, 2016, http://www.foxnews.com/world/2016/12/22/putin-russias-military-is-stronger-than-any-potential-aggressor.html.

favor and 117 against. While many members of the opposition Labor Party voted in favor, their leader was against the plan. Members of the Scottish National Party (SNP) also opposed it. Upon this approval, the United Kingdom started production on its new SSBNs. U.K.'s "National Security Strategy and Strategic Defence and Security Review (SDSR) 2015" stated: "Our latest estimate is that manufacturing the four Successor submarines is likely to cost a total of £31 billion (including inflation over the lifetime of the programme), with the first submarine entering service in the early 2030s."[68] In a March 2016 speech, U.K. Defense Secretary Michael Fallon put the estimated cost of four subs as £31 billion (plus £10 billion contingency), with maximum acquisition cost spread over 35 years.[69]

The United States

The U.S. government has been studying the development of follow-on ICBMs, SLBMs, Long Range Strike-Bombers and LRSO weapons to replace its existing strategic delivery systems that entered service in the Cold War era.[70] Their cost for procurements is estimated at $85-100 billion for ground-based strategic deterrent (GBSD), $140 billion for Colombia-class SSBN, more than $100 billion for B-21 strategic bomber, and $11 billion for LRSO. Non-government experts estimate that the modernization will cost $1 trillion over 30 years.[71]

Since the U.S. defense budget is being sequestrated, some experts question whether the United States should maintain the existing nuclear triad. Others argue against development of dual-capable LRSO because of lack of necessity for its nuclear posture, as well as a possibility of misperception of nuclear attack by an opponent (even if the missile mounts a conventional warhead).[72]

However, the Obama administration maintained the existing position, and Defense Secretary Ash Carter said, "All three legs of the nuclear triad operate with a high degree of readiness, reliability and excellence, but the aging systems need more investment for the future."[73] In August 2016, the U.S. Air Force approved the Milestone A for the GBSD, meaning the new weapon system meant to replace the Minuteman III ICBM, including those at Malmstrom Air Force Base, remains on track.[74] A new SSBN is planned to start commissioning in 2021.

India

India seems to be energetically pursuing developments toward constructing a strategic nuclear triad, that is: ICBMs, SLBMs and nuclear bombers. In 2016, development of SLBM forces, in particular, was advanced, and

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[68] United Kingdom, "National Security Strategy and Strategic Defence and Security Review 2015: A Secure and Prosperous United Kingdom," November 2015, p. 36.

[69] Michael Fallon, "The Case for the Retention of the UK's Independent Nuclear Deterrent," London, March 23, 2016, https://www.gov.uk/government/speeches/the-case-for-the-retention-of-the-uks-independent-nuclear-deterrent.

[70] On the U.S. modernization of nuclear weapons capabilities, see, for example, "U.S. Nuclear Modernization Program," *Fact Sheet and Brief*, Arms Control Association, December 2016, https://www.armscontrol.org/factsheets/USNuclearModernization.

[71] Jon B. Wolfsthal, Jeffrey Lewis and Marc Quint, "The Trillion Dollar Nuclear Triad," James Martin Center for Nonproliferation Studies, January 2014, http://www.nonproliferation.org/wp-content/uploads/2016/04/140107_trillion_dollar_nuclear_triad.pdf.

[72] See, for example, William J. Perry and Andy Weber, "Mr. President, Kill the New Cruise Missile," *Washington Post*, October 15, 2015, https://www.washingtonpost.com/opinions/mr-president-kill-the-new-cruise-missile/2015/10/15/e3e2807c-6ecd-11e5-9bfe-e59f5e244f92_story.html.

[73] Cheryl Pellerin, "Carter: Nuclear Triad Needs Investment for Future," U.S. Department of Defense, September 28, 2016, http://www.defense.gov/News/Article/Article/957874/carter-nuclear-triad-needs-investment-for-future?source=GovDelivery.

[74] Jenn Rowel, "What Does New ICBM Milestone Mean for Malmstrom?" *Great Fall Tribune*, August 26, 2016, http://www.greatfallstribune.com/story/news/local/2016/08/25/new-icbm-reaches-development-milestone/89368948/.

India successfully tested an intermediate-range nuclear capable SLBM in April.[75] It was reported that the ballistic missile submarine Arihant—India's first indigenous SSBN, which completed sea trials in late February and was designated to carry SLBMs[76]—was commissioned into service.[77] In the end of December, the Indian Defense Ministry announced that the fourth test launch of the Agni-5 mobile ICBM was conducted successfully.[78]

Israel

It is unclear whether the Israeli Jericho III IRBM remains under development or is already deployed. Along with the land- and air-based components of its nuclear deterrent, Israel is also believed to have deployed nuclear-capable SLCMs. It inaugurated the fifth Dolphin-class diesel submarine in September 2015, which is capable of launching the SLCMs.[79] Israel is reported to be preparing to buy three more advanced, nuclear-capable, submarines from Germany at a combined price of $1.3 billion.[80]

Pakistan

Pakistan has prioritized development and deployment of nuclear-capable short- and medium-range missiles for ensuring deterrence vis-à-vis India. Among them, the NASR or Hatf-9, nuclear-capable SRBMs with 60 km range, aims to counter a potential Indian conventional incursion into Pakistani territory. Such a posture raises lowers the threshold for nuclear use.[81]

North Korea

Nuclear weapons

North Korea conducted nuclear- and missile-related activities in 2016 more aggressively than previous years.

On January 6, North Korea conducted a fourth nuclear test. While the North's announcement that it tested a "hydrogen bomb" is widely doubted, some experts speculated that the device employed boosted fission. Regarding the fifth nuclear test on September 9, the North Korean "Nuclear Weapons Institute" stated:

> Scientists and technicians of the DPRK carried out a nuclear explosion test for the judgment of the power of a nuclear warhead newly studied and manufactured by them at the northern nuclear test ground under the plan of the Workers' Party of Korea (WPK) for building strategic nuclear force…
>
> The nuclear test finally examined and confirmed the structure and specific features of movement of

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[75] Ankit Panda, "India Successfully Tests Intermediate-Range Nuclear-Capable Submarine-Launched Ballistic Missile," *Diplomat*, April 10, 2016, http://thediplomat.com/2016/04/india-successfully-tests-intermediate-range-nuclear-capable-submarine-launched-ballistic-missile/.

[76] Kelsey Davenport, "India's Submarine Completes Tests," *Arms Control Today*, Vol. 46, No. 3 (April 2016), p. 24.

[77] "Indigenous Nuclear Sub Reportedly Inducted to Complete Nuke Triad," *Indian Express*, October 18, 2016, http://indianexpress.com/article/india/india-news-india/indigenous-nuclear-sub-reportedly-inducted-to-complete-nuke-triad/.

[78] "India Tests Long-Range Missile," *Arms Control Today*, Vol. 47, No. 1 (January/February 2017), p. 6.

[79] "'The Security of Israel': Fifth 'Nuclear-Capable' Submarine, Cruise Missiles with Nuclear Warheads, 'Deterrent against Iran,'" *Global Research*, September 5, 2015, http://www.globalresearch.ca/the-security-of-israel-fifth-nuclear-capable-submarine-cruise-missiles-with-nuclear-warheads-deterrent-against-iran/5473414.

[80] "Israel Looks to Buy Three New Nuke-Capable Subs—Report," *Times of Israel*, October 21, 2016, http://www.timesofisrael.com/israel-looks-to-buy-three-new-nuclear-capable-subs-report.

[81] "US Expresses Concern Over Pakistan's Deployment of Nuclear Weapons," *Economic Times*, March 19, 2016, http://economictimes.indiatimes.com/news/defence/us-expresses-concerns-over-pakistans-deployment-of-nuclear-weapons/articleshow/51465040.cms.

> nuclear warhead that has been standardized to be able to be mounted on strategic ballistic rockets of the Hwasong artillery pieces units of the Strategic Force of the Korean People's Army as well as its performance and power.[82]

There still exists a cautious view regarding progress of North Korea's nuclear weapons capabilities. On March 9, for example, the South Korean Defense Ministry indicated its analysis that the North had yet to possess miniaturized nuclear warheads. On March 15, a spokesman of the U.S. Defense Department said that it did not see "North Korea demonstrate[d] capability to miniaturize a nuclear weapon and again, put it on a ballistic missile."[83] On the other hand, soon after North Korea's fourth nuclear test, as an answer to a question from a Diet member, Japan revealed its assessment that it could not deny a possibility of North Korea's achievement to miniaturize nuclear warheads.[84] In addition, at the hearing of the U.S. Senate Armed Services Committee on March 10, William E. Gortney, Commander of the U.S. Northern Command, stated that North Korea possessed a capability of launching ICBMs covering the US homeland, and emphasized that as a commander, it was wise to prepare on the assumption that the North Korea had already acquired a capability to load a miniaturized nuclear warhead onto an ICBM. Furthermore, the South Korean National Assembly Research Service delivered a similar assessment.[85]

After the fifth nuclear test in September, Japan, the United State and South Korea increased their concern that North Korea had acquired a capability of miniaturization of nuclear warheads. In December, however, a U.S. defense official commented that North Korea has yet to master a re-entry capability for its nuclear warheads.[86]

Fissile Material

North Korea is also likely to continue activities to produce fissile material for nuclear weapons. In January 2016, it was reported that the North's 5 MW graphite reactor was restarted and that the enrichment plant also likely operational.[87] In February, Director of National Intelligence James Clapper said, "We assess that North Korea has followed through on its announcement by expanding its Yongbyon enrichment facility and restarting the plutonium production reactor."[88] Subsequently, according to satellite imagery, it was assessed that North Korea was likely to

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[82] "DPRK Succeeds in Nuclear Warhead Explosion Test," *KCNA*, September 9, 2016, http://www.kcna.co.jp/item/2016/201609/news09/20160909-33ee.html.

[83] "Department of Defense Press Briefing by Pentagon Press Secretary Peter Cook in the Pentagon Press Briefing Room," March 15, 2016, https://www.defense.gov/News/Transcripts/Transcript-View/Article/694516/department-of-defense-press-briefing-by-pentagon-press-secretary-peter-cook-in.

[84] "Answer to the Question on Missile Defense," January 19, 2016, http://www.shugiin.go.jp/internet/itdb_shitsumon.nsf/html/shitsumon/b190029.htm. (in Japanese)

[85] "North Korea Has Miniaturized Nuclear Weapons, Seoul Researchers Say," *UPI*, April 19, 2016, http://www.upi.com/Top_News/World-News/2016/04/19/North-Korea-has-miniaturized-nuclear-weapons-Seoul-researchers-say/1491461079453/.

[86] "N.Korea Capable of Launching Nuke, Not Mastered Targeting — US Official," *AFP*, December 8, 2016, http://www.timesofisrael.com/liveblog_entry/n-korea-capable-of-launching-nuke-not-mastered-targeting-us-official/.

[87] David Albright and Serena Kelleher-Vergantini, "Update of Key Activities at North Korea's Yongbyon Nuclear Site," *Imagery Brief*, Institute for Science and International Security, January 13, 2016.

[88] "North Korea May Get Plutonium From Restarted Reactor in Weeks: U.S.," *Reuters*, February 10, 2016, http://www.reuters.com/article/us-northkorea-nuclear-usa-plutonium-idUSKCN0VI1WV.

reprocess plutonium at the Yongbyon Radiochemical Laboratory complex.[89]

On June 6, IAEA Director-General Yukiya Amano also stated that some activity suggesting reprocessing of nuclear fuel was found as a result of analyzing the satellite images. According to the IAEA report on August 19, there was no indication of operation of the 5 MW reactor between mid-October and early December, and that this period was sufficient for the reactor to have been de-fuelled and subsequently re-fuelled. The report also stated that "[f]rom the first quarter of 2016, there were multiple indications consistent with the Radiochemical Laboratory's operation, including deliveries of chemical tanks and the operation of the associated steam plant."[90] Furthermore, in August, North Korea confirmed that "it has resumed plutonium production and said it has no plans to stop nuclear tests as long as perceived threats from the United States continue."[91]

According to the analysis by a U.S. research institution, North Korea is likely to have produced separated plutonium and highly enriched uranium for 4-6 nuclear weapons since the end of 2014.[92] The North is also considered to have restarted a research reactor as an isotope separation facility for producing tritium that is needed for production of boosted fission weapons or hydrogen bombs.[93]

Missiles

In addition to its nuclear activities, North Korea's ballistic missile-related activities in 2016 were also extraordinary active.

For instance, on February 7, North Korea launched an "Unha" space-launch vehicle (SLV)—utilizing the same delivery system as the Taepodong-2 long-range ballistic missile—carrying the "Kwangmyongsong-4 (KMS-4)" earth observation satellite weighing an estimated 200kg, after prior notifications to the International Maritime Organization (IMO) and the International Telecommunication Union (ITU). North Korea stated: "Carrier rocket Kwangmyongsong blasted off from the Sohae Space Center in Cholsan County, North Phyongan Province at 09:00 on February 7…The satellite entered its preset orbit at 09:09:46, 9 minutes and 46 seconds after the lift-off. The satellite is going round the polar orbit at 494.6 km perigee altitude and 500 km apogee altitude at the angle of inclination of 97.4 degrees. Its cycle is 94 minutes and 24 seconds."[94] The U.S. Joint Space Operation Center (JSpOC) confirmed that the satellite and a debris as the orbital elements were in stable orbits. However, it is not clear whether the KMS-4 is actually an earth observation satellite. Japan, the United States and South Korea

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[89] See David Albright and Serena Kelleher-Vergantini, "Monitoring Developments at North Korea's Yongbyon Nuclear Site," *Imagery Brief*, Institute for Science and International Security, March 4, 2016; William Mugford and Joseph S. Bermudez Jr., "Suspicious Activity at Yongbyon Radiochemical Laboratory; Progress Towards Completing the Experimental Light Water Reactor," *38 North*, April 4, 2016, http://38north.org/2016/04/yongbyon040416/; Joseph S. Bermudez, Jr., "New Evidence of Probable Plutonium Production at the Yongbyon Nuclear Facility," *38 North*, May 31, 2016, http://38north.org/2016/05/yongbyon053116/.

[90] GOV/2016/45-GC(60)/16, August 19, 2016.

[91] "North Korea Confirms Restart of Plutonium Processing," *Japan Times*, August 17, 2016, http://www.japantimes.co.jp/news/2016/08/17/asia-pacific/north-korea-confirms-restart-plutonium-processing/.

[92] David Albright and Serena Kelleher-Vergantini, "Plutonium, Tritium, and Highly Enriched Uranium Production at the Yongbyon Nuclear Site," *Imagery Brief*, Institute for Science and International Security, June 14, 2016.

[93] David Albright and Serena Kelleher-Vergantini, "Update on North Korean's Reactors, Enrichment Plant, and Possible Isotope Separation Facility," Institute for Science and International Security, February 1, 2016; David Albright and Serena Kelleher-Vergantini, "North Korea's IRT Reactor: Has it Restarted? Is it Safe?" *Imagery Brief*, Institute for Science and International Security, March 9, 2016.

[94] "DPRK National Aerospace Development Administration Releases Report on Satellite Launch," *KCNA*, February 7, 2016, http://www.kcna.co.jp/item/2016/201602/news07/20160207-02ee.html.

consider this event as contributing to North Korea's intention to develop a long-range ballistic missile with a potential range is estimated 12,000-13,000 km. The South Korean Defense Ministry analyzed that the three-stage missile separated normally, and that the first stage objective then disintegrated into about 270 fragments before splashing into the ocean, probably by being intentionally detonated.[95]

Subsequently, North Korea repeated tests of rocket engines for ballistic missiles. For example, the North's supreme leader Kim Jong-un was reported as observing a test of a newly developed solid-fuel rocket engine on March 24, which is considered "as the upper stage of a solid-fuel replacement for the liquid-fuel Nodong medium-range ballistic missile (MRBM)."[96] On April 9, the North announced that it had successfully conducted a ground test of an engine for an intercontinental ballistic missile. Kim Jong-un also said the North "can tip new-type intercontinental ballistic rockets with more powerful nuclear warheads and keep any cesspool of evils in the earth, including the U.S. mainland, within our striking range."[97] The tested engine, which enables a North Korean ballistic missile to reach the U.S. homeland, is considered a liquid-fuel one derived from an old Soviet R-27 SLBM.[98] Regarding the new mobile KN-08 ICBM unveiled in the military parade in October 2015, it is estimated that its range could be 9,000 km with loading a light warhead, and its reliability would be increased since the design has become simpler.[99] Furthermore, it was reported that the KN-08 Brigade was established as a subordinate unit of the Strategic Forces.[100] In May, the North was reported to have been deploying road-mobile KN-08 and KN-14 ICBMs at military bases near its border with China.[101]

Since April 2016, North Korea has repeatedly test-launched ballistic missiles. On April 15, it launched a Musudan IRBM without notification, but it is assessed to have exploded immediately after launching. However, after repeated failures on April 28 and May 31, one of two tested Musudan, according to the Korean Central News Agency on June 22, "took off a self-propelled launching ramp and accurately landed in the targeted waters 400km away, after flying to the maximum height of 1,413.6km along the planned flight orbit."[102] Despite being less credible as a weapon system, because of the additional test-launch failure in October, the Musudan may enter operational service sometime in 2017.[103] Meanwhile, one expert estimates that the Musudan "does not appear to be capable of threatening Guam, unless the warhead mass is less than 600kg, and more probably 500kg. This would require

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[95] "Controversial Rocket Launch: North Korea Successfully Places Satellite into Orbit," *SpaceFlight 101*, February 7, 2016, http://spaceflight101.com/north-korea-kms-4-launch-success/.

[96] John Schilling, "A Solid but Incremental Improvement in North Korea's Missiles," *38 North*, March 29, 2016, http://38north.org/2016/03/jschilling032916/.

[97] K.J. Kwon and Madison Park, "North Korea Boasts Test of Engine Technology for Intercontinental Missile," *CNN*, April 9, 2016, http://edition.cnn.com/2016/04/09/asia/north-korea-rocket-engine-test/.

[98] John Schilling, "North Korea's Large Rocket Engine Test: A Significant Step Forward for Pyongyang's ICBM Program," *38 North*, April 11, 2016, http://38north.org/2016/04/schilling041116/.

[99] John Schilling, Jeffrey Lewis and David Schmerler, "A New ICBM for North Korea?" *38 North*, December 22, 2015, http://38north.org/2015/12/icbm122115/.

[100] "N. Korea Launches New ICBM Unit: Sources," *Yonhap News Agency*, February 14, 2016, http://english.yonhapnews.co.kr/search1/2603000000.html?cid=AEN20160214001100315.

[101] "N.Korea Deploying ICBMs Near Chinese Border," *Korea Times*, May 13, 2016, http://www.koreatimes.co.kr/www/news/nation/2016/05/116_204694.html.

[102] "Kim Jong Un Guides Test-fire of SSM Hwasong-10," *KCNA*, June 23, 2016, http://www.kcna.co.jp/item/2016/201606/news23/20160623-01ee.html.

[103] John Schilling, "Musudan Could Be Operational Sooner Than Expected," *38 North*, October 17, 2016, http://38north.org/2016/10/jschilling101716.

North Korea to design and build a nuclear bomb that weighs less than 300kg."[104]

The North's repeated tests of the KN-11 SLBMs was also remarkable. In April and July, missiles were ejected from an underwater platform, but exploded soon after launch. However, on August 24, North Korea conducted a successful test of KN-11, which reportedly flew approximately 500 km before impacting the Sea of Japan—within Japan's Air Defense Identification Zone (ADIZ)—having passed a lofted trajectory. Whereas previous analysis assessed that the North's SLBM is not a current but an emerging threat, one expert predicted in July that North Korea will have tried or succeeded to test launch within 12 month, and to develop SLBM launchers by 2020.[105] The same analysis estimated that possible deployment in an initial operational capability would be by the second half of 2018 at the earliest,[106] implying that its development was advancing at a faster pace than expected. North Korea also seems to have constructed a new submarine that carries SLBMs.[107]

Besides, North Korea conducted test-launches of its existing ballistic missiles. On March 18, it launched two Nodong MRBMs, one of which landed in Japan's ADIZ after flying 800 km. Another Nodong launched on August 3 for the first time landed in Japan's EEZ. Furthermore, three MRBMs (Scud ER or Nodong) flew about 1,000 km and landed in Japan's EEZ. These test-launches revealed that the North's MRBMs have certain reliability and accuracy, and pose a serious security threat to Japan.

(4) Diminishing the Role and Significance of Nuclear Weapons in National Security Strategies and Policies

A) The current status of the roles and significance of nuclear weapons

No NWS announced new policies regarding roles of nuclear weapons in 2016. Each NWS submitted a report on nuclear issues at the 2015 RevCon. In their reports, the five NWS emphasized that the roles of their nuclear weapons are quite defensive, respectively describing them as follows:

- "China's nuclear weapons are for the sole purpose of defending against possible nuclear attacks and never for threatening or targeting and other country."[108]
- "In the French doctrine of deterrence, nuclear weapons are not battlefield weapons but a means of deterring a potential adversary from attacking vital national interests…Nuclear deterrence is strictly defensive… [T]he purpose of nuclear deterrence is to protect the country's vital interests against any State-led aggression, whatever its origin or its form."[109]
- "Through its nuclear arms reductions the Russian Federation has taken step by step measures to adapt its military doctrine in terms of declining reliance on the nuclear factor. Currently, all standard nuclear weapons are removed from use of Russia's combat army forces. Intercontinental ballistic missiles are

[104] Michael Elleman, "North Korea's Musudan Missile Effort Advances," *IISS Voices*, June 27, 2016, http://www.iiss.org/en/iiss%20voices/blogsections/iiss-voices-2016-9143/june-2c71/north-koreas-musudan-missile-effort-advances-5885.

[105] Joseph S. Bermudez, Jr., North Korea's Ballistic Missile Submarine Program: An Update," *38 North*, March 17, 2016, http://38north.org/2016/03/sinpo031716/; "Pyongyang May Have SLBM Capability in Year: U.S. Expert," *Japan Times*, July 14, 2016, http://www.japantimes.co.jp/news/2016/07/14/asia-pacific/pyongyang-may-slbm-capability-year-u-s-expert/#.WGcgmbaLSHo.

[106] John Schilling, "North Korea's SLBM Program Progresses, But Still Long Road Ahead," *38 North*, August 26, 2016, http://38north.org/2016/08/slbm082616/.

[107] Joseph S. Bermudez Jr., "Is North Korea Building a New Submarine?" *38 North*, September 30, 2016, http://38north.org/2016/09/sinpo093016/.

[108] NPT/CONF.2015/32, April 27, 2015.

[109] NPT/CONF.2015/10, March 12, 2015.

> on combat duty with zero missions, which means that they are not targeted… The current version of the Military Doctrine of the Russian Federation approved by President Vladimir Putin on December 26, 2014, is of clearly defensive nature. According to the Doctrine, the use of nuclear weapons is strictly limited and is solely admitted in two exceptional cases: that of an attack against Russia or its allies involving the use of [weapons of mass destruction (WMD)] and that of a threat to the existence of the state itself. Furthermore, the concept of "non-nuclear deterrence" was introduced into the text of the Doctrine…"[110]

- "The United Kingdom has long been clear that we would only consider using our nuclear weapons in extreme circumstances of self-defence, including the defence of our…NATO allies."[111]
- "The United States would only consider the use of nuclear weapons in extreme circumstances to defend the vital interests of the United States or its allies and partners." [112]

As an issue on the roles of nuclear weapons, it should be noted that Russia has continued to repeat nuclear saber-rattling since 2014. Russian strategic bombers have frequently approached and sometimes violated the airspace of European NATO member states; and Russia deployed nuclear-capable Iskander-M SRBMs in Kaliningrad, and conducted ICBMs and SLBMs test launches. On the other hand, Russia denied accusations that it has lowered the threshold for using nuclear weapons or increased the roles of nuclear weapons for its military doctrine; rather, it emphasizes that no significant change was decided.[113]

On the other hand, the United States test-fired two Minuteman III ICBMs in February 2016, and dropped joint test assemblies for the B61-7 and B61-11 nuclear gravity bomb from B-2 strategic bomber in October. According to the announcement, the purpose of these tests was to validate credibility and effectiveness of those weapons systems. At the same time, however, the United States seemed to take into consideration the factor of responding to Russian and North Korean nuclear and missile demonstrations.

Since 2003 when it declared "possession of nuclear deterrent," North Korea's repeated nuclear provocations have been accompanied by demands, inter alia, for a cancelation of U.S.-ROK joint military exercises, an end to U.S. "hostile policy" and attempts of regime change, as well as with responding to the South's tough attitude against the North and rejecting the UN Security Council Resolutions (UNSCRs) vis-à-vis North Korea. In 2016, the North reiterated such provocations, including the threat of nuclear preemption. For instance, the Supreme Command of the Korean People's Army (KPA) issued a statement on February 23 saying:

> From this moment all the powerful strategic and tactical strike means of our revolutionary armed forces will go into preemptive and just operation to beat back the enemy forces to the last man if there is a slight sign of their special operation forces and equipment moving to carry out the so-called "beheading operation" and "high-density strike."

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[110] NPT/CONF.2015/48, May 22, 2015. In the report in 2014 (NPT/CONF.2015/PC.III/17, April 25, 2014), it states, "Russia reserves the right to use nuclear weapons in response to the use of nuclear and other types of weapons of mass destruction against Russia and/or its allies, as well as in the case of aggression against the Russian Federation involving the use of conventional weapons where the very existence of the State is placed under threat."

[111] NPT/CONF.2015/29, April 22, 2015.

[112] NPT/CONF.2015/38, May 1, 2015.

[113] "Russian Nuclear Doctrine Unchanged Despite Escalation Claims – Official," *Sputnik News*, September 19, 2016, https://sputniknews.com/russia/201609171045395099-russian-nuclear-doctrine-unchanged/.

> Our primary target is the Chongwadae [Blue House –executive office and residence of the South Korean president], the centre for hatching plots for confrontation with the fellow countrymen in the north, and reactionary ruling machines…The U.S. imperialist aggressor forces' bases for invading the DPRK in the Asia-Pacific region and the U.S. mainland are its second striking target.[114]

On July 20, North Korea announced that "[t]he drill was conducted by limiting the firing range under the simulated conditions of making preemptive strikes at ports and airfields in the operational theater in south Korea where the U.S. imperialists nuclear war hardware is to be hurled. And it once again examined the operational features of the detonating devices of nuclear warheads mounted on the ballistic rockets at the designated altitude over the target area."[115]

B) Commitment to "sole purpose," no first use, and related doctrines

In 2016, no nuclear-weapon/armed state other than North Korea changed or transformed their policies regarding no first use (NFU) or the "sole purpose" of nuclear weapons, while the U.S. administration was reported to contemplate a possibility of changing its policy, as mentioned later. Among the NWS, only China has highlighted a NFU policy. The United States maintains a policy that "[t]he fundamental role of [its] nuclear weapons remains to deter nuclear attack on the United States and its Allies and partners"[116] though it could not adopt a NFU or a "sole purpose" policy.

Among the nuclear-armed states, India maintains a NFU policy despite reserving an option of nuclear retaliation vis-à-vis a major biological or chemical attack against it. Pakistan, on the other hand, does not exclude a possibility of using nuclear weapons against an opponent's conventional attack.

While North Korea had declared NFU of nuclear weapons, it declared a change to this policy in 2016, saying: "Now is the time for us to convert our mode of military counteraction toward the enemies into an preemptive attack one in every aspect."[117] In May, it stated: "As a responsible nuclear weapons state, our Republic will not use a nuclear weapon unless its sovereignty is encroached upon by any aggressive hostile forces with nukes,"[118] but it did not declare NFU.

Debates on U.S. nuclear policies

In July 2016, the Obama administration was reported to contemplate the possibility to change or revise one or more of its nuclear policies: a NFU of nuclear weapons; de-alerting; five-year extension of the New START; a review of structure and modernization of nuclear arsenals; and adoption of a UNSCR on prohibiting nuclear

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[114] "Crucial Statement of KPA Supreme Command," *KCNA*, February 23, 2016, http://www.kcna.co.jp/item/2016/201602/news23/20160223-27ee.html.

[115] "Kim Jong Un Guides Drill for Ballistic Rocket Fire," *KCNA*, July 20, 2016, http://www.kcna.co.jp/item/2016/201607/news20/20160720-02ee.html.

[116] U.S. Department of Defense, "Report on Nuclear Employment Strategy," June 19, 2013, p. 4.

[117] "Kim Jong Un Guides Test-fire of New Multiple Launch Rocket System," *KCNA*, March 4, 2016, http://www.kcna.co.jp/item/2016/201603/news04/20160304-01ee.html.

[118] "Kim Jong Un Makes Report on Work of WPK Central Committee at Its 7th Congress," *KCNA,* May 7, 2016, http://www.kcna.co.jp/item/2016/201605/news07/20160507-15ee.html.

tests.[119] However, no proposal was actually realized, except for the last item.

Among the above five ideas, it was the NFU issue that sparked the biggest debate. Proponents argued: [120]

- U.S. deterrence will not decline even if it declares a NFU policy because the United States, possessing superior conventional forces, does not need to conduct a first use of nuclear weapons, and that many countries do not consider a possibility of U.S. first use high.
- Maintaining a first use option against a nuclear-armed adversary "runs the very high risk of triggering an uncontrollable and potentially suicidal spiral of nuclear escalation."[121]
- A U.S. NFU declaration may lead other nuclear-weapon/armed states to make similar declarations.[122]
- A U.S. explicit NFU would reduce a risk of Chinese or Russian miscalculation or misunderstanding about U.S. possible nuclear uses.[123]
- The claim that abandoning the first use option would embolden China to act more aggressively is hardly convincing; instead, U.S. maintenance of the existing nuclear posture would make China reconsider its current NFU policy.[124]
- A U.S. NFU declaration would contribute to reducing nuclear tensions, and to de-alerting nuclear operational status.[125]

On the other hand, opponents of declaring a NFU argued that:

- A U.S. pledge of NFU now would encourage current and future opponents to believe that they need not fear the US nuclear deterrent in response to their potential massive use of military force against the United States or its allies—including the use of advanced conventional weapons, and chemical and biological weapons.[126]
- NFU fundamentally confuses the distinction between deterrence and war-fighting; the United States wants to deter an opponent's massive use of force from ever taking place, instead of compelling or winning a non-nuclear war. [127]
- Maintaining ambiguity is central to the success of the U.S. nuclear deterrence policy, and declaring a NFU policy may assure opponents that they could ignore a U.S. nuclear response unless they cross a nuclear threshold.[128]

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[119] Josh Rogin, "Obama Plans Major Nuclear Policy Changes in His Final Months," *Washington Post*, July 10, 2016, https://www.washingtonpost.com/opinions/global-opinions/obama-plans-major-nuclear-policy-changes-in-his-final-months/2016/07/10/fef3d5ca-4521-11e6-88d0-6adee48be8bc_story.html; David E. Sanger and William J. Broad, "Obama Unlikely to Vow No First Use of Nuclear Weapons," *New York Times*, September 6, 2016, http://www.nytimes.com/2016/09/06/science/obama-unlikely-to-vow-no-first-use-of-nuclear-weapons.html.

[120] See, for example, James E. Cartwright and Bruce G. Blair, "End the First-Use Policy for Nuclear Weapons," *New York Times*, August 14, 2016, http://www.nytimes.com/2016/08/15/opinion/end-the-first-use-policy-for-nuclear-weapons.html?_r=0.

[121] Kingston Reif and Daryl G. Kimball, "Rethink Oldthink on No First Use," *Bulletin of the Atomic Scientists*, August 29, 2016, http://thebulletin.org/rethink-oldthink-no-first-use9816.

[122] Ramesh Thakur, "Why Obama Should Declare a No-First-Use Policy for Nuclear Weapons," *Bulletin of the Atomic Scientists*, August 19, 2016, http://thebulletin.org/why-obama-should-declare-no-first-use-policy-nuclear-weapons9789.

[123] Reif and Kimball, "Rethink Oldthink on No First Use."

[124] Ibid.

[125] Thakur, "Why Obama Should Declare a No-First-Use Policy for Nuclear Weapons."

[126] Franklin C. Miller and Keith B. Payne, "The Dangers of No-First-Use," *Bulletin of the Atomic Scientists*, August 22, 2016, http://thebulletin.org/dangers-no-first-use9790.

[127] Ibid.

[128] Ibid.

- "NFU" is a misnomer. "The United States has used its nuclear weapons for deterrence with success every day since the dawn of the nuclear age."[129]
- Unilateral changes of the U.S. nuclear strategy/posture should be done when the strategic and security environment is stable.[130]
- A declaration that the United States would no longer threaten to use its nuclear weapons to defend allies against a conventional attack would erode confidence of the U.S. commitment on extended (nuclear) deterrence because it would implicitly acknowledge that the threat was not credible.[131]

It is reported that U.S. Secretaries of State, Defense and Energy were all opposed to declaring a NFU.[132] For example, Defense Secretary Carter said, "That's our doctrine now, and we don't have any intention of changing that doctrine."[133] U.S. allies, in particular East European countries and South Korea, also expressed their concerns that an adversary would conduct conventional aggression without fearing a possible U.S. nuclear retaliation.[134]

In the end, though no official announcement by the Obama administration was forthcoming; it did not adopt a NFU policy. However, Vice President Biden said in January 2017, "the President and I strongly believe we have made enough progress that deterring—and if necessary, retaliating against—a nuclear attack should be the sole purpose of the U.S. nuclear arsenal."[135]

C) Negative security assurances

No NWS changed its negative security assurance (NSA) policy in 2016. While China is the only NWS that has declared an unconditional NSA for NNWS, other NWS add some conditionality to their NSA policies. The United Kingdom and the United States declared not to use or threaten to use nuclear weapons against NNWS that are parties to the NPT and in compliance with their non-proliferation obligations. The U.K.'s additional condition is that: "while there is currently no direct threat to the United Kingdom or its vital interests from States developing capabilities in other weapons of mass destruction, for example chemical and biological, we reserve the right to

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[129] Michaela Dodge, "'No First Use' Nuclear Weapons Policy a Dangerous Obama Idea," *Washington Times*, August 1, 2016, http://www.washingtontimes.com/news/2016/aug/1/no-first-use-nuclear-weapons-policy-a-dangerous-ob/.

[130] Gordon G. Chang, "Declaring a No-First-Use Nuclear Policy Would Be Exceedingly Risky," *Bulletin of the Atomic Scientists*, July 27, 2016, http://thebulletin.org/declaring-no-first-use-nuclear-policy-would-be-exceedingly-risky9689.

[131] Hugh White, "'No First Use' Nuclear Pledge Bad for US Standing in Asia," *East Asia Forum*, August 24, 2016, http://www.eastasiaforum.org/2016/08/24/no-first-use-nuclear-pledge-bad-for-us-standing-in-asia.

[132] Paul Sonne, Gordon Lubold and Carol E. Lee, "'No First Use' Nuclear Policy Proposal Assailed by U.S. Cabinet Officials, Allies," *Wall Street Journal*, August 12, 2016, http://www.wsj.com/articles/no-first-use-nuclear-policyproposal-assailed-by-u-s-cabinet-officials-allies-1471042014.

[133] Remarks on "Sustaining Nuclear Deterrence" As Delivered by Secretary of Defense Ash Carter, Minot Air Force Base, Minot, North Dakota, Sept. 26, 2016 http://www.defense.gov/News/Speeches/Speech-View/Article/956630/remarks-on-sustaining-nuclear-deterrence.

[134] Josh Rogin, "U.S. Allies Unite to Block Obama's Nuclear 'Legacy,'" *Washington Post*, August 14, 2016, https://www.washingtonpost.com/opinions/global-opinions/allies-unite-to-block-an-obama-legacy/2016/08/14/cdb8d8e4-60b9-11e6-8e45-477372e89d78_story.html. On Japan, Prime Minister Shinzo Abe denied a report that he expressed concern over a possible U.S. NFU declaration to Admiral Harry Harris, commander of the U.S. Pacific Command. See "Abe Tells U.S. of Japan's Concerns over 'No First Use' Nuke Policy Being Mulled by Obama," *Japan Times*, August 16, 2016, http://www.japantimes.co.jp/news/2016/08/16/national/politics-diplomacy/abe-tells-u-s-japans-concerns-obama-mulled-no-first-use-nuke-policy/#.WEURsrKLSUk; "Abe Denies Conveying Concern to U.S. Commander over 'No First Use' Nuke Policy," *Japan Times*, August 21, 2016, http://www.japantimes.co.jp/news/2016/08/21/national/politics-diplomacy/japan-to-keep-in-close-contact-with-u-s-over-possible-change-in-nuke-policy-abe/.

[135] "Remarks by the Vice President on Nuclear Security," Washington, DC., January 11, 2017, https://obamawhitehouse.archives.gov/the-press-office/2017/01/12/remarks-vice-president-nuclear-security.

review this assurance if the future threat, development and proliferation of these weapons make it necessary."[136]

In 2015, France slightly modified its NSA commitment, that is, "France will not use nuclear weapons against states not armed with them that are signatories of the NPT and that respect their international obligations for non-proliferation of weapons of mass destruction."[137] However, it preserves an additional condition that its commitment does not "affect the right to self-defence as enshrined in Article 51 of the United Nations Charter."[138] Russia maintains the unilateral NSA under which it will not use or threaten to use nuclear weapons against the NNWS parties to the NPT unless it or its allies are invaded or attacked by a NNWS in cooperation with a NWS.

Except under protocols to the nuclear-weapon-free zone (NWFZ) treaties, NWS have not provided legally-binding NSAs. At various fora, including the NPT review process, the CD and the UN General Assembly, NNWS, mainly the NAM states, urged NWS to provide legally-binding security assurances. In addition, Belgium, Canada, Germany, the Netherlands and Sweden stated in the working paper submitted to the OEWG: "It is our view that such an instrument could be feasible in the form of a protocol to the NPT or a separate multilateral arrangement. As a bare minimum, a protocol or a separate arrangement should offer negative security assurances and incorporate only the two conditions mentioned above, namely that the beneficiary NNWS must not be in material breach of the NPT and not attacking a NWS while itself acting in consort with another NWS."[139] Among NWS, only China argues that the international community should negotiate and conclude at an early date an international legal instrument on providing unconditional NSAs. Meanwhile, France stated that it "considers [the] commitment [in its statement in April 1995] legally binding, and has so stated."[140]

As written in the previous *Hiroshima Reports*, while one of the purposes of the NSAs provided by NWS to NNWS is to alleviate the imbalance of rights and obligations between NWS and NNWS under the NPT, India, Pakistan and North Korea also offered NSAs to NNWS. India declared that it would not use nuclear weapons against NNWS, except "in the event of a major attack against India, or Indian forces anywhere, by biological or chemical weapons, India will retain the option of retaliating with nuclear weapons." Pakistan has declared an unconditional NSA. In addition, North Korea has offered an NSA to NNWS so long as they do not join nuclear weapons states in invading or attacking it.

D) Signing and ratifying the protocols of the treaties on nuclear-weapon-free zones

The protocols to the nuclear-weapon-free zone (NWFZ) treaties include the provision of legally-binding NSAs. At the time of writing, only the Protocol of the Treaty for the Prohibition of Nuclear Weapons in Latin America and Caribbean (the Treaty of Tlatelolco) has been ratified by all NWS, as shown in Table 1-6 below.

Regarding the Protocol to the Central Asian NWFZ (CANWFZ) Treaty, which five NWS signed in May 2014, all NWS except the United States have already ratified by 2015. While the United States announced at the 2015 NPT

[136] NPT/CONF.2015/29, April 22, 2015.

[137] In its report submitted to the 2014 PrepCom (NPT/CONF.2015/PC.III/14, April 25, 2014), France stated that it "has given security assurance to all non-nuclear-weapon States that comply with their non-proliferation commitments."

[138] NPT/CONF.2015/10, March 12, 2015.

[139] A/AC.286/WP.26, April 21, 2016.

[140] NPT/CONF.2015/PC.III/14, April 25, 2014.

RevCon that it had submitted the Protocol to the U.S. Senate for its advice and consent to ratification,[141] no further action was observed.

As for the Protocol to the Southeast Asian NWFZ Treaty, five NWS stated that they have continued consultation with the state parties to the Treaty to resolve any remaining differences. However, they have yet to sign the Protocol.[142]

Some NWS have stated reservations or added interpretations to the protocols of the NWFZ treaties when signing or ratifying them. NAM and NAC have called for the withdrawal of any related reservations or unilateral interpretative declarations that are incompatible with the object and purpose of such treaties.[143] However, it seems unlikely that NWS will accept such a request. Upon ratification of the Protocol to the CANWFZ Treaty, for example, Russia made a reservation of providing its NSA in the event of an armed attack against Russia by a state party to the Treaty jointly with a state possessing nuclear weapons. Russia also "reserves the right not to consider itself bound by the Protocol, if any party to the Treaty 'allows foreign military vessels and aircraft with nuclear weapons or other nuclear explosive devices aboard to call at its ports and landing at its aerodromes, or any other form of transit of nuclear weapons or other nuclear explosive devices through its territory.'"[144]

Table 1-6: The status of the signature and the ratification of protocols to NWFZ treaties on NSAs

	China	France	Russia	U.K.	U.S.
Treaty of Tlatelolco	○	○	○	○	○
Treaty of Rarotonga	○	○	○	○	△
Southeast Asian NWFZ (SEANWFZ) Treaty					
Treaty of Pelindaba	○	○	○	○	△
Central Asia NWFZ (CANWFZ) Treaty	○	○	○	○	△

[○: Ratified △: Signed]

E) Relying on extended nuclear deterrence

The United States and its allies, including NATO countries, Australia, Japan and South Korea maintained their respective policies on extended nuclear deterrence. Currently, the United States deploys from 150 to 200 B-61 nuclear gravity bombs in five NATO countries (Belgium, Germany, Italy, the Netherlands and Turkey), and thus maintains nuclear sharing arrangements with them. No U.S. nuclear force is deployed outside of American territory except in the European NATO countries mentioned above.

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[141] John Kerry, "Remarks," at the 2015 NPT Review Conference, April 27, 2015.

[142] As mentioned in the *Hiroshima Report 2016*, both ASEAN member states and NWS implied that they continued consultations over possible reservations by NWS.

[143] NPT/CONF.2015/WP.4, March 9, 2015. See also the UNSCR regarding the Tlatelolco Treaty (A/RES/71/27, December 5, 2016).

[144] "Putin Submits Protocol to Treaty on Nuclear-Free Zone in Central Asia for Ratification," *Tass*, March 12, 2015, http://tass.ru/en/russia/782424.

At the 2015 NPT RevCon, the NAC argued that all countries including NNWS allies with NWS should "reduce the role of nuclear weapons in their collective security doctrines, pending their total elimination."[145] The draft final document of the Conference also included a paragraph reflecting the NAC's request: "The Conference calls upon *all states concerned* to continue to review their military and security concepts, doctrines and policies over the course of the next review cycle with a view to reducing the role and significance of nuclear weapons therein." (emphasis added)

As was the case in the previous year, the United States and its allies in Asia and Europe, facing deterioration of the security situations in Asia and Europe, intensified their efforts for enhancing reliability of extended (nuclear) deterrence in 2016.

In Europe, following Russia's annexation of Crimea in 2014 and subsequent overt, repeated nuclear provocations against NATO countries, NATO has contemplated conducting exercises regarding operations of nuclear forces. In addition, the United States dispatched its strategic bombers to the NATO military exercises from the U.S. homeland, and they began to discuss about a necessity of bolstering nuclear posture behind the scenes. NATO also stated in its Warsaw Summit Communiqué in July 2016, inter alia:

- The Alliance will ensure the broadest possible participation of Allies concerned in their agreed nuclear burden-sharing arrangements;
- The fundamental purpose of NATO's nuclear capability is to preserve peace, prevent coercion, and deter aggression;
- Nuclear weapons are unique. Any employment of nuclear weapons against NATO would fundamentally alter the nature of a conflict; and
- If the fundamental security of any of its members were to be threatened however, NATO has the capabilities and resolve to impose costs on an adversary that would be unacceptable and far outweigh the benefits that an adversary could hope to achieve.[146]

Compared with recent communiqués, the description on nuclear posture in the Warsaw Summit Communiqué doubled in terms of text, suggesting NATO's awareness about the increasing importance of a nuclear dimension of (extended) deterrence. However, it can also be argued that the posture stated in the Communiqué is nearly the same lines as written in the "New Strategic Concept" in 2010 and the "Deterrence and Defense Posture Review (DDPR)" in 2012. In addition, as predicted beforehand, the focus of discussions at the NATO summit in 2016 was how to strengthen a presence of NATO conventional forces in Central and Eastern Europe.[147] During 2009-2010, the NATO members debated whether the U.S. tactical nuclear weapons in Europe should be withdrawn, and decided that a withdrawal would be done not unilaterally but only mutually with Russia's reduction of non-strategic nuclear weapons. NATO maintains the existing nuclear policies, including nuclear sharing as well as deployment of the U.S. tactical nuclear weapons.

As for Asia, facing North Korean nuclear and missile tests and repeated provocations in 2016, some South Korean politicians and experts advocated a U.S. re-deployment of tactical nuclear weapons on South Korean soil, or U.S.-

[145] NPT/CONF.2015/WP.8, March 9, 2015.

[146] NATO, "Warsaw Summit Communiqué," July 9, 2016, http://www.nato.int/cps/en/natohq/official_texts_133169.htm.

[147] Paul Belkin, "NATO's Warsaw Summit: In Brief," *CRS Report*, June 30, 2016.

ROK joint management of nuclear forces.[148] It was reported that at the bilateral Integrated Defense Dialogue in May, U.S. officials dismissed the possibility to contemplate such options when South Korean officials touched upon these possibilities.[149] Rather, the United States dispatched its strategic bombers to South Korea for bolstering deterrence vis-à-vis North Korea and reassurance to the South.

Meanwhile, few Japanese citizens advocated deployment of U.S. nuclear forces in Japanese territory; revision of Japan's Three Non-Nuclear Principles of not possessing, not producing and not permitting the introduction of nuclear weapons; or introduction of nuclear sharing arrangements. Such suggestions remained on the fringe of political debate and far from government policy. Rather, Japan and the United States have explored to bolster credibility of extended deterrence through deepening the bilateral alliance relationship, for example, by revising the Guidelines for Japan-U.S. Defense Cooperation and reforming Japan's security-related policies and legislations in 2014-15.

On the matter of the NATO nuclear sharing arrangement, Russia criticized it as violating the spirit of the NPT,[150] and called on NATO to withdraw the U.S. tactical nuclear weapons from the European NATO countries. The NAM countries have argued that nuclear sharing constitutes a clear violation of non-proliferation obligations under Article I of the NPT by those transferor NWS and under Article II by those recipient NNWS.[151] In addition, China argues that "[t]he relevant states should abandon the policy and practice of providing nuclear umbrella and nuclear sharing and withdraw all their nuclear weapons deployed overseas."[152]

(5) De-alerting or Measures for Maximizing Decision Time to Authorize the Use of Nuclear Weapons

As mentioned above, the Obama administration was reported to have contemplated a possibility to decrease the operational status of U.S. nuclear forces, along with a NFU policy and so on, but such discussions produced no new policy.[153] In 2016, no NWS made substantial changes in its policies on alert status. Their policies on alert status were summarized in their respective reports submitted to the 2015 NPT process:

- "China maintains a moderate level of readiness in peacetime. If China comes under nuclear threat, its nuclear forces will, upon orders from the Central Military Commission, go to a higher alert level and make preparations for a nuclear counterattack to deter the enemy from using nuclear weapons against China. If China comes under nuclear attack, it will launch a resolute nuclear counter-attack against the

[148] See, for instance, Ju-Min Park, "Calls in South Korea for Nuclear Weapons As Parliamentary Poll Looms," *Reuters*, February 15, 2016, http://www.reuters.com/article/us-northkorea-satellite-southkorea-polit-idUSKCN0VO0U4.

[149] Yoshihiro Makino, "S. Korea Eyed Shared Control of Nuclear Weapons with the U.S.," *Asahi Shimbun*, September 14, 2016, http://www.asahi.com/ajw/articles/AJ201609140043.html.

[150] "US Violates NPT by Training Foreign Pilots to Use Nuclear Weapons — Russian Diplomat," *Tass*, March 11, 2015, http://tass.ru/en/world/782087; "Russia Calls on U.S. to Remove Its Nuclear Weapons from Europe," *Bloomberg*, March 24, 2015, http://www.bloomberg.com/news/articles/2015-03-24/russia-calls-on-u-s-to-remove-its-nuclear-weapons-from-europe.

[151] "Statement by Indonesia, on behalf of Non-Aligned Movement," at the Third Session of the Preparatory Committee for the 2015 NPT Review Conference, General Debate, New York, April 28, 2014.

[152] "Statement by China," at the First Committee of the United Nation General Assembly, Thematic Discussion on Nuclear Disarmament, October 20, 2015.

[153] On the other hand, U.S. Vice President Biden said in January 2017, "as part of President Obama's charge to reduce reliance on 'launch under attack' procedures in U.S. planning, the Department of Defense has adjusted our planning and processes to give the president more flexibility in deciding how to respond to a range of nuclear scenarios."

enemy."[154]

- France reduced the permanent alert level of its nuclear forces twice, in 1992 and 1996. These alert level reductions concerned both force response times and the number of weapons systems. In particular: since 1996, France only maintains one ballistic missile nuclear submarine (SSBN) permanently at sea; since the missiles of the Plateau d'Albion site were eliminated, France no longer has capabilities on permanent high alert status; and in 1997, France also announced that it no longer had permanently targeted forces ("detargeting"). Its alert status is not launch on warning (LOW), launch under attack (LUA) or hair-trigger alert.[155]
- "[The] steps by the Russian Federation [regarding non-strategic nuclear weapons] have…served as a very important practical measure for 'de-alerting' nuclear weapons."[156]
- "[T]he United Kingdom has taken steps to lower the operational status of our deterrent system. United Kingdom nuclear weapons are not on high alert, nor are they on 'launch on warning' status. The patrol submarine operates routinely at a 'notice to fire' measured in days rather than minutes as it did throughout the Cold War… There is no immediacy of launch in our normal operating posture."[157]
- The United States has taken the following measures: continuing the practice of keeping all nuclear-capable bombers and dual-capable aircraft (DCA) off of day-to-day alert; emphasizing the goal of maximized decision time for the President in the event of a crisis, including by making new investments in U.S. command and control systems; and directing the Defense Department to examine options to reduce the role of Launch Under Attack in U.S. nuclear planning, recognizing that the potential for a surprise, disarming nuclear attack is exceedingly remote.[158]

According to one U.S. expert, approximately 1,800 nuclear weapons possessed by Russia and the United States are considered to be on high alert status, either LOW or LUA.[159] According to a representative of the Strategic Rocket Forces, Russia keeps 96 percent of its ICBMs on high alert.[160] In January 2016, it was announced that ten missile regiments of Russia's Strategic Missile Force have assumed combat duty and the highest level of alert.[161] Forty U.K. nuclear warheads and 80 French ones are also kept on alert under their continuous SSBN patrols, albeit at lower readiness levels than those of the two nuclear superpowers.[162]

It is assumed that China's nuclear forces are not on a hair-trigger alert posture because it keeps nuclear warheads de-mated from delivery vehicles. The key question, however, is whether Chinese nuclear warheads will be de-mated from the new JL-2 SLBM loaded onto the deployed Type 094 SSBNs. A U.S. expert analyzes that, in accordance

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[154] NPT/CONF.2015/32, April 27, 2015.

[155] NPT/CONF.2015/10, March 12, 2015.

[156] NPT/CONF.2015/PC.III/17, April 29, 2014.

[157] NPT/CONF.2015/29, April 22, 2015.

[158] NPT/CONF.2015/PC.III/16, May 1, 2014.

[159] Hans M. Kristensen, "Reducing Alert Rates of Nuclear Weapons," Presentation to NPT PrepCom Side Event, Geneva, April 24, 2013; Hans M. Kristensen and Matthew McKinzie, "Reducing Alert Rates of Nuclear Weapons," United Nations Institute for Disarmament Research, 2012.

[160] "Russian Missile Force Readiness Rate," *Russian Strategic Nuclear Forces*, December 1, 2014, http://russianforces.org/blog/ 2014/12/russian_missile_force_readines.shtml.

[161] "Ten Regiments of Russia's Strategic Missile Force Placed on Highest Alert," *TASS*, January 26, 2016, http://tass.ru/en/defense/852158.

[162] See Kristensen, "Reducing Alert Rates of Nuclear Weapons"; Kristensen and McKinzie, "Reducing Alert Rates of Nuclear Weapons."

with discussions by Chinese military officials and experts, China seems to be considering a shift from the current stance to a higher alert posture as a step to ensure assured retaliation, partly because it is concerned about the credibility of its retaliatory capabilities against U.S. precision nuclear/conventional forces and missile defense, and partly because the United States does not acknowledge mutual vulnerability with China.[163]

There is little definitive information regarding nuclear-armed states' alert-status of nuclear forces. In February 2014, Pakistan stated that it "would not delegate advance authority over nuclear arms to unit commanders, even in the event of crisis with India, [...and] all weapons are under the central control of the National Command Authority, which is headed by the prime minister."[164] It is widely considered that India's nuclear forces are not on a high alert status.

A number of NNWS have urged the NWS to alter their alert posture. Among them, Chile, Malaysia, Nigeria, New Zealand and Switzerland, as the "De-alerting Group", proactively proposed to reduce alert levels. They also submitted a working paper to the 2016 OEWG, in which they proposed again to de-alert, based on their assessment regarding risks posed by maintaining high alert status of nuclear forces.[165] At the 2016 UNGA, a resolution, "[calling] for further practical steps to be taken to decrease the operational readiness of nuclear weapons systems, with a view to ensuring that all nuclear weapons are removed from high alert status," was proposed by, inter alia, Austria, Chile, Mexico, New Zealand, Nigeria, Sweden and Switzerland, and adopted.[166] NWS except China was against, and five countries (Israel, South and North Koreas and so on) abstained.

Proponents of de-alerting have often argued that such a measure is useful to prevent accidental use of nuclear weapons.[167] Their concerns, for instance, were reflected in a session titled "Measures to reduce and eliminate the risk of accidental, mistaken, unauthorized or intentional nuclear weapon detonations," which was set up at the 2016 OEWG. The UNGA resolution, titled "Reducing nuclear danger," "[c]alls for a review of nuclear doctrines and, in this context, immediate and urgent steps to reduce the risks of unintentional and accidental use of nuclear weapons, including through de-alerting and de-targeting nuclear weapons."[168]

On the other hand, NWS emphasize in their respective reports submitted to the 2015 NPT review process that they have taken adequate measures for preventing such accidental use, and express confidence regarding the safety and

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[163] Gregory Kulacki, "China's Military Calls for Putting Its Nuclear Forces on Alert," Union of Concerted Scientists, January 2016.

[164] Elaine M. Grossman, "Pakistani Leaders to Retain Nuclear-Arms Authority in Crises: Senior Official," *Global Security Newswire*, February 27, 2014, http://www.nti.org/gsn/article/pakistani-leaders-retain-nuclear-arms-authority-crises-senior-official/.

[165] A/AC.286/WP.18, April 12, 2016.

[166] A/RES/71/53, December 5, 2016.

[167] For example, Patricia Lewis, et.al., published a report, in which they studied 13 cases of inadvertent near misuse of nuclear weapons, and concluded, *inter alia*, that "the world has, indeed, been lucky." They argue, "For as long as nuclear weapons exist, the risk of an inadvertent, accidental or deliberate detonation remains. Until their elimination, vigilance and prudent decision-making in nuclear policies are therefore of the utmost priority. Responses that policy-makers and the military should consider include buying time for decision-making, particularly in crises; developing trust and confidence-building measures; refraining from large-scale military exercises during times of heightened tension; involving a wider set of decision-makers in times of crisis; and improving awareness and training on the effects of nuclear weapons." Patricia Lewis, Heather Williams, Benoît Pelopidas and Sasan Aghlani, "Too Close for Comfort: Cases of Near Nuclear Use and Options for Policy," *Chatham House Report*, April 2014.

[168] A/RES/71/37, December 5, 2016. The resolution was proposed by Chile, India and so on, and adopted by a vote (126 in favor, 49 against and 10 abstentions).

effective control of their nuclear arsenals, for instance:

- China: "China's relevant institutions and combat troops strictly implement a nuclear safety control system, an accreditation system for nuclear-related personnel and an emergency response mechanism for nuclear-weapon-related accidents. China has adopted reliable technologies to strengthen the safety and physical protection of its nuclear weapons during storage, transportation and training, and has put in place special safety measures to avoid unauthorized and accidental launches, in order to ensure the absolute safety of these weapons."[169]
- France: "Strict procedures have been instituted to ensure that no weapons can be used without an order from the President of the Republic."[170]
- Russia: "Russian nuclear weapons are under reliable control. The effectiveness of this control is enhanced by both organizational and technical measures. In particular, since 1991, the total number of nuclear weapons storage facilities has been reduced fourfold. Russia has developed and implemented a range of measures to counter terrorist acts, and comprehensive security inspections of all nuclear- and radiation-hazardous facilities and their readiness to prevent terrorist acts are conducted regularly."[171]
- The United Kingdom: "Robust arrangements are in place for the political control of United Kingdom's strategic nuclear deterrent. There are a number of technological and procedural safeguards built into the United Kingdom's nuclear deterrent to prevent an unauthorized launch of its Trident missiles."[172]
- The United States: For ensuring safety of its nuclear arsenals, the United States has taken various measures, such as incorporating safety design features; using insensitive high explosive; applying additional measures to include the enhanced nuclear detonation safety concept; adopting "use control" design features preclude or delay unauthorized nuclear detonation through electronic and mechanical features; and continuing the practice of "open-ocean targeting" of all deployed ICBMs and SLBMs.[173]

(6) CTBT

A) Signing and ratifying the CTBT

As of December 2016, 166 countries among 183 signatories have deposited their instruments of ratification of the Comprehensive Nuclear-Test-Ban Treaty (CTBT). Myanmar and Swaziland newly ratified it in 2016. Among the 44 states listed in Annex 2 of the CTBT, whose ratification is a prerequisite for the treaty's entry into force, five states (China, Egypt, Iran, Israel and the United States) have signed but not ratified, and three (India, North Korea and Pakistan) have not even signed. Saudi Arabia and Syria, among the countries surveyed, have not signed the CTBT either. While the U.S. Obama administration had pursued CTBT ratification since its inauguration in 2009, Republican congressmen did not change their stance against the CTBT.[174] Knowing that the votes would not be favorable, the administration could not submit it to the U.S. Senate for ratification.

As for efforts to promote CTBT's entry into force during 2016, firstly, UNSCR 2310 was adopted on September 23,

[169] NPT/CONF.2015/32, April 27, 2015.

[170] NPT/CONF.2015/PC.III/14, April 25, 2014.

[171] NPT/CONF.2015/48, May 22, 2015.

[172] NPT/CONF.2015/29, April 22, 2015.

[173] NPT/CONF.2015/38, May 1, 2015.

[174] George Jahn, "20 Years on, UN Waits for Working Nuclear-Test-Ban Treaty," *Associate Press*, June 12, 2016, http://bigstory.ap.org/article/c1b8d6a876954a11889d274a647539fa/20-years-un-waits-working-nuclear-test-ban-treaty.

which was led by the United States and co-sponsored by 42 countries. Only Egypt abstained among 15 members.[175] In this resolution, the Security Council, inter alia:[176]

- Urges all States that have either not signed or not ratified the Treaty, particularly the eight remaining Annex 2 States, to do so without further delay;
- Encourages all State Signatories, including Annex 2 States, to promote the universality and early entry into force of the Treaty;
- Calls upon all States to refrain from conducting any nuclear-weapon test explosion or any other nuclear explosion and to maintain their moratoria in this regard, commends those States' national moratoria, some of which are established by national legislation pending entry into force of the Treaty, emphasizes that such moratoria are an example of responsible international behaviour that contributes to international peace and stability and should continue, while stressing that such moratoria do not have the same permanent and legally binding effect as entry into force of the Treaty, and notes the Joint Statement on the Comprehensive Nuclear Test-Ban Treaty by China, France, the Russian Federation, the United Kingdom, and the United States of America of 15 September 2016, in which those States noted that, inter alia, "a nuclear-weapon test explosion or any other nuclear explosion would defeat the object and purpose of the CTBT";
- Underlines the need to maintain momentum towards completion of all elements of the Treaty verification regime, and in this regard, calls upon all States to provide the support required to enable the PrepCom to complete all its tasks in the most efficient and cost effective way, and encourages all States hosting International Monitoring System (IMS) facilities to transmit data to the IDC on a testing and provisional basis, pending entry into force of the Treaty;
- Welcomes the voluntary information in the national statements in the PrepCom by States listed in Annex 1 to the Protocol to the Treaty as responsible for one or more facilities of the IMS on the status of completing the construction of those facilities as well as regarding the status of transmission of data from their facilities to the IDC, encourages States hosting IMS facilities to complete construction of the IMS facilities in a timely manner as provided for by the Treaty and text on the establishment of the PrepCom, and invites the Provisional Technical Secretariat to provide a report to all State Signatories within 180 days of the adoption of this resolution on the status of States Signatories assessed contributions to the PrepCom and any additional support provided by State Signatories for the completion of the Treaty's verification regime and for the maintenance and operational needs for the IDC and IMS.

While this resolution is not legally binding, U.S. Secretary of State John Kerry emphasized: "It reaffirms the de facto norm…in the world today against nuclear testing…And it encourages nations to make the necessary preparations for the day when [the CTBT] enters into force."[177] On the other hand, Director Mikhail Ulyanov, Non-Proliferation and Arms Control Department of the Russian Foreign Ministry, stated that Russia had been "highly skeptical about this resolution," which was led by the United States that did not ratify the CTBT. He also argued that issues

[175] "Before the vote, Egypt criticized the council for 'squandering' an opportunity to emphasize the urgent need to advance nuclear disarmament, while noting that Egypt nevertheless 'fully supports the purpose and objectives' of the CTBT." Shervin Taheran, "UN Security Council Backs CTBT," *Arms Control Today*, Vol. 46, No. 8 (November 2016), p. 19.

[176] S/RES/2310, September 23, 2016.

[177] John Kerry, "Remarks at United Nations Security Council Meeting on the Comprehensive Nuclear-Test-Ban Treaty (CTBT)," United Nations, September 23, 2016, http://www.state.gov/secretary/remarks/2016/09/262341.htm.

on banning nuclear testing should have been addressed at the CTBTO, rather than the UN Security Council.[178] In addition, Egypt criticized that the Security Council was not the appropriate forum to address the CTBT; the resolution failed to highlight the significance of the NPT; and it did not mention the urgency and criticality of steps toward nuclear disarmament.[179]

Prior to the adoption of this resolution, the five NWS, in their joint statement, inter alia, pledged to make efforts for the CTBT's prompt entry into force, and reaffirmed their moratoria on nuclear test explosions, called on other states to do likewise, as well as their commitments on cooperation with the CTBTO regarding development of the CTBT verification regime.[180] However, the NAM countries "expresse[d] concern regarding the joint statement…and reject[ed] their assertion in that statement that their nuclear stockpile maintenance and stewardship programs [were] consistent with NPT and CTBT objectives."[181]

Meanwhile, the importance of the CTBT's early entry into force has been reaffirmed in various fora, such as the 20 Years CTBT Ministerial Meeting in June and the Eighth Ministerial Meeting of the Friends of the CTBT in September. At the latter meeting, participating countries adopted the Joint Ministerial Statement.[182]

CTBTO's Executive Secretary Lassina Zerbo continued to address promotion of ratification by countries in the Middle East, where three "Annex II" countries have yet to ratify the CTBT. In January 2016, he stated that Iran and Israel were "the closest" of the eight holdout nations to ratifying the treaty, and that their ratification would lead to Egypt's ratification and pave the way for a nuclear test-free zone in the Middle East.[183] During his second visit to Israel in June, Executive Secretary Zerbo urged Israel to ratify the treaty, and advocated establishment of a nuclear test-free zone in the Middle East.[184] However, Israel said that it would ratify the CTBT only at "the right time," depending on the regional context.[185]

As for outreach activities for promoting the Treaty's entry into force, a document, "Activities Undertaken by Signatory and Ratifying States under Measure (J) of the Final Declaration of the 2013 Conference on Facilitating the Entry into Force of the Treaty in the Period June 2014-May 2015," distributed at the Article XIV Conference, summarized activities conducted by ratifying and signatory states. It highlighted:

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[178] "CTBT Preparatory Commission Rather Than UNSC Should Deal with Nuclear Tests—Russian Foreign Ministry," *Interfax*, September 23, 2016, http://www.interfax.com/newsinf.asp?id=703394.

[179] "Adopting Resolution 2310 (2016), Security Council Calls for Early Entry into Force of Nuclear-Test-Ban Treaty, Ratification by Eight Annex 2 Hold-Out States," Meeting Coverage, United Nations, September 23, 2016, http://www.un.org/press/en/2016/sc12530.doc.htm.

[180] "Joint Statement on the Comprehensive Nuclear-Test-Ban Treaty by the Nuclear Nonproliferation Treaty Nuclear-Weapon States," September 15, 2016, http://www.state.gov/r/pa/prs/ps/2016/09/261993.htm.

[181] "Statement by Indonesia, on behalf of the Non-Aligned Movement," at the First Committee of the UN General Assembly, Thematic Debate on Nuclear Disarmament, October 13, 2016.

[182] "Joint Ministerial Statement on the Comprehensive Nuclear-Test-Ban Treaty," September 21, 2016. Approximately 100 countries, including co-hosts as well as Co-Coordinators for the Article XIV process, participated in this meeting.

[183] "UN Official: Iran, Israel Could Ratify Nuke Test Ban Treaty," *Associated Press*, January 29, 2016, https://newsroom.ctbto.org/2016/01/29/un-official-iran-israel-could-ratify-nuke-test-ban-treaty-ap/.

[184] Yossi Melman, "UN and EU to Pressure Israel on Middle East Nuclear Test Ban," *Jerusalem Post*, June 19, 2016, http://www.jpost.com/Israel-News/Politics-And-Diplomacy/UN-and-EU-to-pressure-Israel-on-Middle-East-nuclear-test-ban-457196. On a nuclear test-free zone, see also Pierre Goldschmidt, "A Realistic Approach Toward a Middle East Free of WMD," Carnegie Endowment for International Peace, July 8, 2016, http://carnegieendowment.org/2016/07/07/realistic-approach-toward-middle-east-free-of-wmd-pub-64039.

[185] "Israel Confirms It'll Ratify Nuke Test Ban, 'At the Right Time,'" *Times of Israel*, June 20, 2016, http://www.timesofisrael.com/israel-confirms-itll-ratify-nuke-test-ban-at-the-right-time/.

- bilateral activities related to Annex 2 states (conducted by Australia, Austria, Belgium, Brazil, France, Japan, South Korea, Mexico, New Zealand, Norway, the Philippines, Russia, Sweden, Switzerland, Turkey, the U.K., the U.S. and others);
- bilateral activities pertaining to non-Annex 2 states (conducted by Australia, Austria, Belgium, Brazil, France, Japan, Mexico, New Zealand, Norway, the Philippines, Russia, Sweden, Turkey, UAE, the U.K., the U.S. and others);
- global-level activities (conducted by Australia, Austria, Belgium, Brazil, Canada, France, Indonesia, Japan, Mexico, New Zealand, Norway, the Philippines, Russia, Sweden, Switzerland, Turkey, UAE, the U.K., the U.S. and others); and
- regional-level activities (conducted by Australia, Belgium, Brazil, France, Indonesia, Japan, South Korea, Mexico, New Zealand, Norway, the Philippines, Sweden, Turkey, the U.K., the U.S. and others).[186]

B) Moratoria on nuclear test explosions pending CTBT's entry into force

The five NWS plus India and Pakistan maintain a moratorium on nuclear test explosions. At the 2016 UNGA, Pakistan proposed to India to conclude a bilateral nuclear test ban treaty, but India rejected this idea, as arguing: "We believe that the issues pertaining to nuclear disarmament do not have regional solutions."[187] Israel, which has kept its nuclear policy opaque, has not disclosed the possibility of conducting nuclear tests.

Despite a decision of banning nuclear testing in repeated UNSCRs against North Korea, it refuses to declare a moratorium; instead, the North conducted nuclear tests twice in 2016, as mentioned later.

C) Cooperation with the CTBTO Preparatory Commission

Regarding the countries surveyed in this study, the status of payments of contributions to the Preparatory Commission for the CTBT Organization (CTBTO), as of 2016, is as follows.[188]

- Fully paid: Australia, Austria, Belgium, Canada, Chile, China, Egypt, France, Germany, Israel, Japan, Kazakhstan, South Korea, the Netherlands, New Zealand, Norway, the Philippines, Poland, Russia, South Africa, Sweden, Switzerland, Turkey, UAE, the U.K. and the U.S.
- Not paid: Egypt, Indonesia and Mexico
- Voting right in the Preparatory Commission suspended because arrears are equal to or larger than its contributions due for the last two years: Brazil, Iran and Nigeria

D) Contribution to the development of the CTBT verification systems

The establishment of the CTBT verification system has steadily progressed. However, the pace of establishing the IMS stations in China, Egypt and Iran—in addition to those of India, North Korea, Pakistan and Saudi Arabia which have yet to sign the Treaty—has been lagging behind, compared to that in the other signatory countries.[189]

When North Korea conducted nuclear tests in 2016, the IMS detected unusual seismic events in both cases.

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[186] CTBT-Art.XIV/2015/4, September 18, 2015.

[187] "India Rejects Pakistan's Offer for Nuclear Test Ban Treaty," *Deccan Herald*, September 26, 2016, http://www.deccanherald.com/content/572085/india-rejects-pakistans-offer-nuclear.html.

[188] CTBTO, "CTBTO Member States' Payment as at 31-Dec-2016," https://www.ctbto.org/fileadmin/user_upload/treasury/52._31_Dec_2016_Member_States__Payments.pdf.

[189] CTBTO, "Station Profiles," http://www.ctbto.org/verification-regime/station-profiles/.

E) Nuclear testing

North Korea conducted nuclear test explosions twice in 2016. As for the fourth nuclear test on January 6, the North asserted that it "fully proved that the technological specifications of the newly developed H-bomb for the purpose of test were accurate and scientifically verified the power of smaller H-bomb."[190] Because of a small explosive yield, estimated at approximately 6 kt, the assertion of using a hydrogen bomb was highly dubious. However, some experts were concerned about a possible testing of a boosted fission weapon, which use a small amount of fusion to boost the fission process.[191]

After the fourth test, it was reported that North Korea continued activities for preparation of nuclear tests and maintenances of test sites, which indicated its capability to conduct additional tests whenever it decided.[192] Then, on September 9, North Korea conducted the fifth nuclear test, with a yield estimated at about 11-12 kt by Japan's Defense Ministry. The North's Nuclear Weapons Institute stated soon after the test:

> Scientists and technicians of the DPRK carried out a nuclear explosion test for the judgment of the power of a nuclear warhead newly studied and manufactured by them at the northern nuclear test ground under the plan of the Workers' Party of Korea (WPK) for building strategic nuclear force…The nuclear test finally examined and confirmed the structure and specific features of movement of nuclear warhead that has been standardized to be able to be mounted on strategic ballistic rockets of the Hwasong artillery pieces units of the Strategic Force of the Korean People's Army as well as its performance and power… The standardization of the nuclear warhead will enable the DPRK to produce at will and as many as it wants a variety of smaller, lighter and diversified nuclear warheads of higher strike power with a firm hold on the technology for producing and using various fissile materials. This has definitely put on a higher level the DPRK's technology of mounting nuclear warheads on ballistic rockets.[193]

Although the actual status is not clear, Japan, the United States and South Korea estimate that the North is likely to acquire a technical capability of miniaturizing nuclear warheads because a decade has already passed since its first nuclear test.

Regarding experimental activities other than a nuclear explosion test, the United States continues to conduct various non-explosive tests and experiments under the Stockpile Stewardship Program (SSP), in order to sustain and assess the nuclear weapons stockpile without the use of underground nuclear tests, such as subcritical tests and experiments using the Z machine, which generates X-rays by fast discharge of capacitors, thus allowing for exploring the properties of plutonium materials under extreme pressures and temperatures. The U.S. National Nuclear Security Administration (NNSA), which is part of the U.S. Department of Energy, had released quarterly reports on such experiments, but not updated since the first quarter of FY 2015 (as of December 2016).

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[190] "DPRK Proves Successful in H-bomb Test," *KCNA*, January 6, 2016, http://www.kcna.co.jp/item/2016/201601/news06/20160106-12ee.html.

[191] See, for example, Bruce Bennett, "Does North Korea Really Have an H-bomb?" *CNN*, January 5, 2015, http://us.cnn.com/2015/12/15/opinions/bennett-north-korea-hydrogen-bomb-claim/.

[192] See, for instance, Jack Liu, "North Korea's Punggye-ri Facility Appears Ready to Support New Nuclear Tests," *38 North*, March 18, 2016, http://38north.org/2016/03/punggye031816/; Joseph S. Bermudez Jr., "North Korea: High-Level of Activity at Nuclear Test Site Portal but Purpose is Unclear," *38 North*, July 11, 2016, http://38north.org/2016/07/punggye071116/.

[193] "DPRK Succeeds in Nuclear Warhead Explosion Test," *KCNA*, September 9, 2016, http://www.kcna.co.jp/item/2016/201609/news09/20160909-33ee.html.

Among the other nuclear-weapon/armed states, France clarified that it has conducted "activities aimed at guaranteeing the safety and reliability of its nuclear weapons [including] a simulation program and hydrodynamic experiments designed to model materials' performance under extreme physical conditions and, more broadly, the weapons' functioning."[194] However, no further detail was reported. Meanwhile, France and the United Kingdom agreed to build and jointly operate radiographic and hydrodynamic testing facilities under the Teutates Treaty concluded in November 2010.[195] The status of the remaining nuclear-weapon/armed states' non-explosive testing activities in this respect is not well-known since they do not release any information.

While the CTBT does not prohibit any nuclear test unaccompanied by explosion, the NAM countries argued at the 2015 NPT RevCon that "all States parties that have not yet done so should close and dismantle, as soon as feasible and in a transparent, irreversible and verifiable manner, any remaining sites for nuclear test explosions and their associated infrastructure, and prohibit completely nuclear weapons research and development, and also refrain from conducting nuclear weapon test explosions or any other nuclear explosions, or nuclear weapon tests in alternative ways, as well as prohibit the use of new technologies for upgrading existing nuclear weapons systems, which would defeat the object and purpose of the Comprehensive Nuclear-Test-Ban Treaty."[196]

(7) FMCT

A) Efforts toward commencing negotiations on an FMCT

In the "Decision 2: Principles and Objectives for Nuclear Non-Proliferation and Disarmament" adopted at the 1995 NPT Review and Extension Conference, participating countries agreed on "[t]he immediate commencement and early conclusion of negotiations on a non-discriminatory and universally applicable convention banning the production of fissile material for nuclear weapons or other nuclear explosive devices, in accordance with the statement of the Special Coordinator of the Conference on Disarmament and the mandate contained therein." However, the substantive negotiations have not yet commenced. The 2016 session of the CD again ended without adopting its program of work that included the establishment of an Ad Hoc Committee on a Fissile Material Cut-Off Treaty (FMCT) negotiation, due to Pakistan's strong objection, as was the case in previous years. Pakistan stated:

> In order to retain their respective strategic advantages, [NWS and India] are not willing to include existing stocks of fissile materials in the treaty's negotiating mandate. A treaty that does not address the asymmetry in fissile material stocks, while being completely cost-free for these powers, would adversely affect Pakistan's vital security interests. Pakistan does not have any room for entertaining any ambiguities on this account.[197]

While the NAM countries also "strongly support banning the production of fissile materials for nuclear weapons and other nuclear explosive devices and eliminating all the past production and existing stockpiles of such materials, in an irreversible and verifiable manner and taking into account both nuclear disarmament and non-proliferation

[194] NPT/CONF.2015/PC.III/14, April 25, 2014.
[195] NPT/CONF.2015/29, April 22, 2015.
[196] NPT/CONF.2015/WP.7, March 9, 2015.
[197] "Statement by Pakistan," Conference on Disarmament, January 26, 2016.

objectives,"[198] they did not block the CD from commencing negotiation of an FMCT.[199] Pakistan voted against the 2016 UNGA resolution on the FMCT, with abstentions by nine countries, including China, Egypt, Iran, Israel, Russia and Syria.[200] North Korea did not vote. This resolution requested the UN Secretary-General to establish a high-level FMCT expert preparatory group with a membership of 25 states, which will meet in Geneva for a session of two weeks in each of 2017 and 2018.

China expresses support for the commencement of negotiations on an FMCT prohibiting the future production of fissile material for nuclear weapons, but it does so less actively than the other NWS, as revealed by its voting behavior to the UNGA resolution on an FMCT. Israel has a similar posture. China has stated that it supports "the start by the Conference on Disarmament of substantive work, in a comprehensive and balanced manner, on such important topics as nuclear disarmament, security assurances to non-nuclear-weapon States, a treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices and prevention of an arms race in outer space."[201] This stance is different from those of France, the United Kingdom and the United States, which have insisted that the commencement of negotiations for an FMCT is a top priority at the CD.

B) Moratoria on production of fissile material for nuclear weapons

Among nuclear-weapon/armed states, China, India, Israel, Pakistan and North Korea have not declared a moratorium on the production of fissile material for nuclear weapons. While China is widely considered not to be producing fissile material for nuclear weapons currently, it was against referring to any moratorium in a final document of the 2015 NPT RevCon. At the First Committee of the 2015 UNGA, China explained its position regarding the moratorium as following: "China always holds that such a moratorium can neither be clearly defined nor effectively verified, hence has no practical significance, as it cannot guarantee that the fissile material produced will not be used for nuclear weapons or other nuclear explosive devices."[202] North Korea, as mentioned above, appears to be continuing activities for producing plutonium and enriched uranium for weapons purpose.

India is reported to be constructing a new uranium conversion facility and an enrichment facility, named the Special Material Enrichment Facility (SMEF), at the Rare Materials Plant near Mysore, with operational status now reportedly scheduled for 2017.[203] India seems to have a capability to produce twice the amount of highly enriched uranium needed for its planned nuclear-power submarine fleet. In 2011, India made clear that the SMEF would not be subject to the IAEA safeguards.[204]

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[198] NPT/CONF.2015/WP.13, March 10, 2015. Brazil also argues: "it has also favoured negotiations on a fissile material treaty in the Conference on Disarmament and supported different initiatives to find a consensus formula that would make it possible to overcome the current stalemate in that body. It is Brazil's view that a fissile material treaty would only be meaningful as a disarmament measure if it would deal in one way or another with the issue of pre-existing stockpiles of fissile material." NPT/CONF.2015/30, April 24, 2015.

[199] Countries, including Pakistan, which insist that the existing stockpiles should also be covered, prefer to call it a "Fissile Material Treaty (FMT)," instead of an FMCT.

[200] A/RES/71/259, December 23, 2016.

[201] NPT/CONF.2015/32, April 27, 2015.

[202] "Explanation of Vote by Ambassador FU Cong of China on the UNGA First Committee Resolution L.26 Entitled 'United action towards the total elimination of nuclear weapons,'" November 2, 2015, http://www.china-un.ch/eng/hom/t1311512.htm.

[203] Ahmad Khan, "Don't Say the N-word in Karnataka," *South Asia Journal*, October 23, 2016, http://southasiajournal.net/dont-say-the-n-word-in-karnataka/.

[204] David Albright and Serena Kelleher-Vergantini, "India's New Uranium Enrighment Plant in Karnataka," *Imagery Brief*, July 1, 2014; Douglas Busvine, "India Nuke Enrichment Plant Expansion Operational in 2015 – HIS," *Reuters*, June 20, 2014, http://in.reuters.com/article/2014/06/20/india-nuclear-idINKBN0EV0JR20140620.

It appears that Pakistan continues to produce both weapon-grade HEU and plutonium for its nuclear arsenal. By early 2015 Pakistan started to operate its fourth heavy water reactor at Khushab. Together the four reactors are estimated to produce approximately 70kg of plutonium per year.[205]

None of the nuclear-weapon/armed states have declared the amount of fissile material for nuclear weapons which they possess. Estimates by research institutes are summarized in Chapter 3 of this Report.

(8) Transparency in Nuclear Forces, Fissile Material for Nuclear Weapons, and Nuclear Strategy/Doctrine

In the Final Document of the 2010 NPT RevCon, the NWS were called upon to report on actions taken toward "accelerat[ion of] concrete progress on the steps leading to nuclear disarmament" to the 2014 PrepCom (Action 5). All states parties to the NPT, including the NWS, were also requested to submit regular reports on implementing nuclear disarmament measures agreed at the previous RevCon (Action 20), and the NWS to agree on a standard reporting form, as a confidence-building measure (Action 21).

The NWS submitted their respective reports on implementation of the NPT's three pillars to the 2014 NPT PrepCom, using a common framework, themes and categories. This was the first attempt by the NWS to release information on their respective nuclear forces, nuclear policies and nuclear disarmament efforts comprehensively and in a common format. They also submitted their respective updated reports to the 2015 NPT RevCon. No similar report was submitted by any NWS in 2016, probably because of the absence of any specific NPT-related meeting. However, the United States continued to declassify the number of its nuclear weapons. It declared that as of the end of 2015, its total stockpile of active and inactive nuclear warheads was 4,571, with an additional 109 warheads having been dismantled during that year.[206] In addition, Vice President Biden announced that that the United States dismantled approximately 500 nuclear warheads in 2016, and totally 2,226 warheads since 2009. He also stated that the number of the U.S. nuclear warheads in service is 4.018,[207] which means that the United States reduced 1,255 warheads during the Obama administration.

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[205] David Albright, "Pakistan's Inventory of Weapon-Grade Uranium and Weapon-Grade Plutonium Dedicated to Nuclear Weapons," *Plutonium and Highly Enriched Uranium 2015*, Institute For Science and International Security, October 19, 2015, p. 13.

[206] NNSA, *Fiscal Year 2017 Stockpile Stewardship and Management Plan–Biennial Plan Summary*, March 2016, page 2-5.

[207] "Remarks by the Vice President on Nuclear Security," Washington, DC., January 11, 2017, https://obamawhitehouse.archives.gov/the-press-office/2017/01/12/remarks-vice-president-nuclear-security.

Table 1-7: Number of the U.S. nuclear weapons stockpiles and their dismantlement

	2009	2010	2011	2012	2013	2014	2015	2016
Number of nuclear weapons stockpile	5,113	5,066	4,897	4,881	4,804	4,717	4,571	4,018
Number of dismantlement		352	305	308	239	299	146	553

Sources: U.S. Department of State, "Transparency in the U.S. Nuclear Weapons Stockpile," Fact Sheet, April 29, 2014, https://2009-2017.state.gov/t/avc/rls/225343.htm; NPT/CONF.2015/38, May 1, 2015; John Kerry, "Remarks at the 2015 Nuclear Nonproliferation Treaty Review Conference," New York, April 27, 2015, http://www.state.gov/secretary/remarks/2015/04/241175.htm; http://open.defense.gov/Portals/23/Documents/frddwg/2015_Tables_UNCLASS.pdf; "Remarks by the Vice President on Nuclear Security," Washington, DC., January 11, 2017, https://obamawhitehouse.archives.gov/the-press-office/2017/01/12/remarks-vice-president-nuclear-security.

The NPDI submitted a working paper "Transparency of Nuclear Weapons" to the 2012 NPT PrepCom, which included a draft form for standard nuclear disarmament reporting on nuclear warheads, delivery vehicles, fissile material for nuclear weapons, and nuclear strategy/policies.[208] Using the draft form, the following table summarizes the degree of transparency taken by the nuclear-weapon/armed states.

[208] NPT/CONF.2015/PC.I/WP.12, April 20, 2012.

Table 1-8: Transparency in nuclear disarmament

	CHN	FRA	RUS	UK	US	IND	ISR	PAK	PRK
Nuclear warheads									
Total number of nuclear warheads (including those awaiting dismantlement)		○							
Aggregate number of nuclear warheads in stockpile		○		○	○				
Number of strategic or non-strategic nuclear warheads		○	△	○	△				
Number of strategic or non-strategic deployed nuclear warheads		○	△	○	△				
Number of strategic or non-strategic non-deployed nuclear warheads		○		○					
Reductions (in numbers) of nuclear warheads in 2014		○	○	○	○				
Aggregate number of nuclear warheads dismantled in 2014									
Delivery vehicles									
Number of nuclear warhead delivery systems by type (missiles, aircraft, submarines, artillery, other)		○	△	○	○				
Reduction (in numbers) of delivery systems in 2014			○		○				
Aggregate number of delivery systems dismantled in 2014									
Nuclear disarmament since 1995									
1995-2000		○	○	○	○				
2000-2005		○	○	○	○				
2005-2010		○	○	○	○				
2010-2014		○	○	○	○				
Nuclear doctrine									
Measures taken or in process to diminish the role and significance of nuclear weapons in military and security concepts, doctrines and policies	○	○	○	○	○	○		○	
Measures taken or in process to reduce the operational readiness of the reporting State's nuclear arsenal	○	○	○	○	○	○		○	
Measures taken or in process to reduce the risk of accidental or unauthorized use of nuclear weapons	○	○	○	○	○				
Description of negative security assurances (including status and definition) by reporting States	○	○	○	○	○	○		○	○
Current status and future prospect of the ratification of the relevant protocols to nuclear-weapon-free-zone treaties	○	○	○	○	○	–	–	–	–
Current status of consultations and cooperation on entry into force of the relevant protocols of nuclear-weapon-free-zone treaties	○	○	○	○	○	–	–	–	–
Current status of review of any related reservations about the relevant protocols of nuclear-weapon-free-zone treaties by concerned States						–	–	–	–
Nuclear testing									
Current status of ratification of the Comprehensive Nuclear-Test-Ban Treaty	△	○	○	○	△		△		
Current status of the reporting State's policy on continued adherence to the moratorium on nuclear-weapon test explosions	○	○	○	○	○	○		○	
Activities to promote the entry into force of the Comprehensive Nuclear-Test-Ban Treaty at the national, regional and global levels		○		○	○				
Scheduled policy reviews									
Scope and focus of policy reviews, scheduled or under way, relating to nuclear weapon stocks, nuclear doctrine or nuclear posture				○	○				
Fissile material									
Aggregate amount of plutonium produced for national security purposes (in metric tons)				○	○				
Aggregate amount of HEU produced for national security purposes (in metric tons)				○	○				
Amount of fissile material declared excess for national security purposes (in metric tons)			△		△				
Current status (and any future plan), including the amount and year, of declarations to the International Atomic Energy Agency of all fissile material designated by the reporting State as no longer required for military purposes and placement of such material under Agency or other relevant international verification and arrangements for the disposition of such material for peaceful purposes		○		○					
Current status of the development of appropriate legally binding verification arrangements to ensure the irreversible removal of such fissile material			△	△	△				
Current status (and any future plan) of the dismantlement or conversion for peaceful uses of facilities for the production of fissile material for use in nuclear weapons		○							
Other measures in support of nuclear disarmament									
Any cooperation among Governments, the United Nations and civil society aimed at increasing confidence, improving transparency and developing efficient verification capabilities		○		○	○				
Year and official document symbol of regular reports on the implementation of Article VI, paragraph 4(c), of the 1995 decision entitled "Principles and objectives for nuclear non-proliferation and disarmament," and the practical steps agreed to in the Final Document of the 2000 Review Conference	○	○	○	○	○				
Activities to promote disarmament and non-proliferation education				○	○				

[○: Highly transparent △: Partially transparent]

(9) Verifications of Nuclear Weapons Reductions

Russia and the United States have implemented verification measures, including on-site inspections, under the New START. Among them, more than 150 on-site inspections have been conducted, according to the U.S. report submitted to the 2015 NPT RevCon.[209]

Five NWS introduced their efforts on nuclear disarmament verifications in their reports submitted to the 2014 NPT PrepCom and 2015 NPT RevCon, which were summarized in previous *Hiroshima Reports*.

One of the noticeable activities on verification is the "International Partnership for Nuclear Disarmament Verification (IPNDV)," launched by the United States in December 2014. With 26 participating countries and the EU,[210] the IPNDV continues to study verification measures and technologies on dismantlement of nuclear weapons, as well as fissile material derived from dismantled nuclear warheads. In February 2016, its working groups, joined by 80 experts from 20 countries, were held, and the following issues were discussed:[211]

- Working Group 1 considered verification objectives for the dismantlement phase of the nuclear weapons lifecycle, including the types of information and criteria needed to determine whether those objectives are being met, and the specific areas of expertise and resources required.
- Working Group 2 identified useful elements, drew lessons from a number of existing on-site inspection regimes, and began to assess the applicability of fundamental on-site inspection principles to possible future nuclear disarmament verification activities. The group began to explore the knowledge and training inspectors might require to do their jobs effectively and to manage on-site inspections to ensure they provide effective verification while meeting national safety, security and non-proliferation requirements.
- Working Group 3 began to discuss and identify solutions to the technical challenges related to nuclear warhead authentication, and monitored storage and the chain of custody required for monitoring warheads and warhead components. Seven countries provided briefings on 13 technologies, and work commenced to develop a matrix that identifies specific technology that would not reveal sensitive information for use in support of the dismantlement scenario developed by working Group 1.

The third plenary meeting and working groups were held in Tokyo in June 2016, and the fourth plenary meeting was done in Abu Dhabi in October-November 2016. At the Tokyo meeting, each working group reported its progress and planned next steps toward completing the tasks.[212] In addition, as a side event, Japan's Foreign Ministry and Tokyo University co-hosted a symposium titled "How Can We Verify Nuclear Disarmament?" At the fourth meeting at Abu Dhabi, the United States stated: "now is the time for the working groups to begin thinking about and planning for subsequent phases of the Partnership's work. In your meetings this week, the co-chairs and members should begin to think about how we can most effectively build off all of our existing work in ways that will

[209] NPT/CONF.2015/38, May 1, 2015.

[210] The participating countries include five NWS, Australia, Belgium, Brazil, Canada, Chile, Germany, Indonesia, Japan, Kazakhstan, Mexico, the Netherlands, Norway, the Philippines, Poland, South Korea, Sweden, Switzerland, Turkey and UAE.

[211] "IPNDV Working Group Meetings," Fact Sheet, US Department of State, March 3, 2016, http://www.state.gov/t/avc/rls/2016/253944.htm.

[212] Frank A. Rose, "Remarks on the IPNDV Following the Third Plenary Meeting," Geneva, September 7, 2016, http://www.state.gov/t/avc/rls/261623.htm.

be practical, productive, and most contribute to our shared objectives."[213] The next plenary meeting of the IPNDV is scheduled to be held in Argentina at the end of 2017.

Before launching the IPNDV, the respective U.K.-U.S. and U.K.-Norway joint developments on nuclear disarmament verification measures were carried out. According to a report published in 2015, the United Kingdom and the United States have conducted joint research and development on measures for nuclear disarmament verification, including: managed assess exercise; joint measurement and data analysis; warhead campaign and comprehensive data set development; and portal monitor for arms control.[214] As for the U.K.-Norway Initiative, both countries reported their activities at the 2015 NPT RevCon, such as holding workshops and conducting exercises for students.[215]

Some NNWS call for the involvement of the IAEA regarding nuclear disarmament verification. For example, the NAC "call[ed] on IAEA, in furthering the establishment of safeguarded worldwide nuclear disarmament, to develop and conclude legally binding verification arrangements which would apply to all fissile material permanently removed from nuclear weapons programmes and to develop adequate and efficient nuclear disarmament verification capabilities which would, in accordance with the principles of irreversibility, verification and transparency, provide the necessary confidence that such material could not in future be withdrawn or diverted for nuclear weapons purposes."[216] At the 2014 NPT PrepCom, the NAM countries called for establishing an IAEA standing committee to verify nuclear disarmament.[217] In December 2016, the United States announced that "the United States is beginning consultations with the IAEA to monitor the dilution and packaging of up to six metric tons of surplus plutonium at the Savannah River Site (SRS) in Aiken, South Carolina."[218]

(10) Irreversibility

A) Implementing or planning dismantlement of nuclear warheads and their delivery vehicles

Just like their previous nuclear arms control agreements, the New START obliges Russia and the United States to dismantle or convert strategic (nuclear) delivery vehicles beyond the limits set in the Treaty, in a verifiable way. The New START does not oblige them to dismantle nuclear warheads, but the two states have partially dismantled retired nuclear warheads as unilateral measures.

Neither country has provided comprehensive information regarding the dismantlement of nuclear warheads, including the exact numbers of dismantled warheads. However, the United States has publicized some information. According to its statement at, and report submitted to the 2015 NPT RevCon, the United States conducted the

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[213] Frank A. Rose, "Opening Remarks to the 4th Plenary Meeting of the International Partnership for Nuclear Disarmament Verification (IPNDV)," Abu Dhabi, November 1, 2016, http://www.state.gov/t/avc/rls/263923.htm.

[214] U.S. National Nuclear Security Administration, "Joint U.S.-U.K. Report on Technical Cooperation for Arms Control," 2015.

[215] NPT/CONF.2015/WP.31, April 22, 2015.

[216] NPT/CONF.2015/WP.8, March 9, 2015.

[217] "Statement by Indonesia, on behalf of Non-Aligned Movement," at the Third Session of the Preparatory Committee for the 2015 NPT Review Conference, Cluster 2, New York, May 1, 2014.

[218] U.S. Department of Energy, "United States Commits to IAEA Monitoring for the Verifiable Disposition of Six Metric Tons of Surplus Plutonium," December 5, 2016, https://energy.gov/articles/united-states-commits-iaea-monitoring-verifiable-disposition-six-metric-tons-surplus.

following activities:[219]

- Over the last 20 years alone, the United States has dismantled 10,251 warheads, with another approximately 2,500 warheads retired and in the queue for elimination;
- President Obama has decided that the United States will seek to accelerate the dismantlement of retired nuclear warheads by 20 percent; and
- It eliminated 52 Minuteman III silos and one Peacekeeper ICBM silo in 2014.[220]

The United States also declared that it had eliminated 109 nuclear warheads during 2015.[221] The U.S. declaration also included the number of eliminated nuclear warheads: 352 in 2010, 305 in 2011, 308 in 2012, 239 in 2013, and 299 in 2014. The U.S. NNSA explained as a reason for the lower number of reductions in 2015 as it "fell behind schedule because of safety reviews, unusually high lightning events, and a worker strike at Pantex."[222]

Other NWS did not provide any new or updated information regarding the elimination of their nuclear weapons in 2015, though France and the United Kingdom do continue to dismantle their retired nuclear warheads and delivery vehicles.

B) Decommissioning/conversion of nuclear weapons-related facilities

Few remarkable activities or progress were reported in 2016, in terms of decommissioning or conversion of nuclear weapons-related facilities. In respective reports submitted to the 2014 NPT PrepCom, China, France and the United States summarized their activities of decommissioning and conversion of nuclear weapons-related facilities. Those activities were launched prior to 2014, and have already been completed or continuing. France reiterated the same information at the 2015 RevCon, where Russia newly reported on its own activities.

- China: officially closing its nuclear weapon research and development base in Qinghai.[223]
- France:[224]
  - Deciding to undertake the immediate dismantling of production units of fissile material for nuclear weapons in 1996—it intends complete and irreversible decommissioning and will spend totally €6 billion;
  - Fully decommissioning the Pierrelatte enrichment facility;
  - Continuing to decommission the Marcoule UP1 reprocessing facility until 2035, which began in 1997; and
  - Completing the first phase of clean-up and dismantling of the three plutonium production reactors at Marcoule—the second phase will begin in 2020 and continue until 2035.
- Russia: Since 1997, in accordance with the Agreement Between Russia and the United States Concerning

[219] John Kerry, "Remarks," at the 2015 NPT Review Conference, April 27, 2015. See also Hans M. Kristensen, "Obama Administration Releases New Nuclear Warhead Numbers," Federation of American Scientists. April 28, 2015, http://fas.org/blogs/security/2015/04/nukenumbers2015/.

[220] NPT/CONF.2015/38, May 1, 2015.

[221] See the U.S. Defense Department's homepage (http://open.defense.gov/Portals/23/Documents/frddwg/2015_Tables_UNCLASS.pdf.

[222] See the U.S. Defense Department's homepage (http://open.defense.gov/Portals/23/Documents/frddwg/2015_Tables_UNCLASS.pdf). In the 8 years under the Obama administration, a total reduction of 702 nuclear weapons was made, but some criticize that this number was far less than the scale of nuclear weapons reduction made under previous administration after the Cold War. Hans M. Kristensen, "US Nuclear Stockpile Numbers Published Enroute to Hiroshima," Federation of American Scientists, May 26, 2016, https://fas.org/blogs/security/2016/05/hiroshima-stockpile/.

[223] NPT/CONF.2015/PC.III/13, April 29, 2014.

[224] NPT/CONF.2015/PC.III/14, April 25, 2014; NPT/CONF.2015/10, March 12, 2015.

Cooperation Regarding Plutonium Production Reactors, Russia has been working on shutting down 13 reactors that had produced weapon-grade uranium [*sic*]. The last of them was closed in 2010. Currently, Russia is dismantling 9 reactors. The remaining ones are being prepared for dismantlement.[225]

- The United States:[226]
  - Consolidating the number of sites needed to maintain the U.S. nuclear stockpile;
  - Reducing the number of sites which made up the nuclear complex from 18 in 1980 to eight in 2014;
  - Cessation of production of plutonium for weapons in 1987 and closure of all plutonium production reactors at the Hanford Site in Richland, Washington, and at the Savannah River Site in Aiken, South Carolina;
  - Closure and decommissioning of the Hanford Site nuclear reprocessing plants;
  - Cessation of production of highly enriched uranium for weapons in 1964 and shutdown of the K-25 enrichment complex in Oak Ridge, Tennessee; Conversion of enrichment plants in Portsmouth, Ohio, and Paducah, Kentucky, to support civil nuclear fuel production only;
  - Closure and decommissioning of the Feed Materials Production Center at Fernald, Ohio, the Rocky Flats plutonium pit production facility in Colorado, and the Mound and Pinellas plants for nuclear weapons components in Miamisburg, Ohio, and Pinellas, Florida;
  - Consolidation of highly enriched uranium storage into the newly constructed highly enriched uranium Materials Facility at Y-12 in Oak Ridge, Tennessee; and
  - Consolidation of non-pit plutonium into the K-Area Materials Storage facility at the Savannah River Site;

In addition to the information mentioned above, France is the only country that decided to completely and irreversibly dismantle its nuclear test sites in 1996. They were fully decommissioned in 1998.[227]

C) Measures for fissile material declared excess for military purposes, such as disposition or conversion to peaceful purposes

On October 3, 2016, Russian President Putin ordered the Presidential Decree on suspending implementation of the Russian-U.S. Plutonium Management and Disposition Agreement (PMDA). As reasons for this decision, he mentioned "the need to undertake urgent measures to protect security of the Russian Federation" due to a "fundamental change of the circumstances, an emerging threat to strategic stability that resulted from unfriendly actions of the United States toward the Russian Federation," and the U.S. inability to fulfill its plutonium disposition obligations—instead of using by converting to MOX fuel, the United States changes its policy to dispose of it as waste, without being able to obtain Russian approval.[228]

The U.S. plan on plutonium disposal has been criticized due to shortcomings in terms of feasibility as well as cost-effectiveness. Finally, the NNSA stated that it "has proposed to terminate the MOX fuel approach to plutonium

[225] NPT/CONF.2015/48, May 22, 2015.

[226] NPT/CONF.2015/PC.III/16, May 1, 2014.

[227] NPT/CONF.2015/10, March 12, 2015.

[228] "Comment by Foreign Minister Sergey Lavrov on the publication of the presidential executive order to suspend the Russia-US plutonium management and disposition agreement," October 3, 2016, http://www.mid.ru/en/foreign_policy/news/-/asset_publisher/cKNonkJE02Bw/content/id/2485001; Mary Beth Niklitin and Cory Welt, "Recent Developments in U.S.-Russian Nonproliferation Cooperation," *CRS Insight*, October 13, 2016; "Russia Suspends Implementation of Plutonium Disposition Agreement," *IPFM Blog*, October 3, 2016, http://fissilematerials.org/blog/2016/10/russia_suspends_implement.html.

disposition beginning in FY 2017 and to pursue the dilution and disposal approach, which enables plutonium to be disposed of much sooner with far lower technical risks and less funding than the MOX fuel approach" in its report published in March 2016.[229] Russia criticized that such an approach constituted a violation of the PMDA.[230]

Russia plans not to permanently dismantle surplus weapon-grade plutonium, but to dispose of it through using as fuel for BN-600 and BN-800 fast breeder reactors.[231] In addition, according to the U.S. report submitted to the 2015 NPT RevCon, "Implementation of the U.S.-Russia Plutonium Production Reactor Agreement is ongoing. Under this agreement all weapon-grade plutonium produced since 1995 by these now-shutdown reactors remains outside of military programs, and the reactors are under bilateral monitoring."[232] Among the NWS, the United Kingdom has announced that all nuclear material no longer deemed necessary for military purposes has been placed under international safeguards.[233]

(11) Disarmament and Non-Proliferation Education and Cooperation with Civil Society

At the UNGA 2016, the resolution "United Nations study on disarmament and non-proliferation education" was adopted without a vote, as was also the case in previous years.[234]

Side events held during the NPT RevCon and the First Committee of the UNGA, where NGOs can participate, are also important elements of the efforts toward civil society cooperation.[235] During the 2016 UNGA, Australia, Austria, Brazil, Canada, France, Germany, Kazakhstan, the Netherlands, Mexico, Nigeria, New Zealand, Switzerland, Sweden, the United States and others hosted such events.

Regarding cooperation with civil society, one of the important efforts for governments is to provide more information on nuclear disarmament and non-proliferation matters. Among the countries surveyed in this report, the following set up a section or sections on disarmament and non-proliferation on their official homepages (in English) and posted enlightening information: Australia, Austria, Belgium, Canada, China, France, Germany, Japan, New Zealand, Sweden, Switzerland, the United Kingdom and the United States.

Finally, a few countries started to legislate "divestment" against organizations or companies involved in producing nuclear weapons. For instance, Switzerland and Luxembourg enacted national laws which restrict financing for nuclear weapons production. Some banks and investment funds also have policies against investing in such

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[229] DOE/NNSA, "Prevent, Counter, and Respond – A Strategic Plan to Reduce Global Nuclear Threats, FY2017-2021," March 2016, http://nnsa.energy.gov/sites/default/files/nnsa/inlinefiles/NPCR%20FINAL%203-31-16%20(with%20signatures).pdf

[230] Mary Orndorff Troyan, "Vladimir Putin Says MOX Shutdown Breaches U.S.-Russia Deal," *Greenville Online*, April 8, 2016, http://www.greenvilleonline.com/story/news/politics/2016/04/08/vladimir-putin-says-mox-shutdown-breaches-us-russia-deal/82802598/.

[231] Tom Clements, Edwin Lyman and Frank von Hippel, "The Future of Plutonium Disposition," *Arms Control Today*, Vol. 43, No. 6 (July/August 2013), pp. 9-10.

[232] NPT/CONF.2015/38, May 1, 2015.

[233] NPT/CONF.2015/PC.III/15, April 30, 2014.

[234] A/RES/71/57, December 5, 2016. The resolution was co-sponsored by Australia, Austria, Brazil, Germany, India, Japan, Mexico, the Netherlands, Poland, Sweden, the United Kingdom, the United States and so on.

[235] At the 2015 NPT RevCon, the Hiroshima Prefectural Government hosted a side event, titled "Nuclear Weapons: Humanitarian Aspects and Legal Framework," in which the Hiroshima Governor and Mayor, as well as several experts, participated as panelists.

organizations or companies.[236]

(12) Hiroshima Peace Memorial Ceremony

On August 6, 2016, the Hiroshima Peace Memorial Ceremony was held in Hiroshima. Representatives from 91 countries and the EU, along with Japan, participated, including:

- Ambassadorial-level—Australia, Belgium, Canada, France, India, Israel, Kazakhstan, Mexico, the Netherlands, New Zealand, Norway, Poland, South Africa, the UAE, the United Kingdom and the United States
- Non-Ambassadorial-level—Austria, Brazil, Egypt, Germany, Iran, South Korea, Nigeria, Pakistan, Russia and Sweden (Note: underline added to denote countries whose ambassadorial-level representatives have attended the ceremony in the past three years)
- Not attending—China, Indonesia, Saudi Arabia, Syria, Switzerland, Turkey, North Korea (Note: underline added to denote countries whose representatives have attended the ceremony at least once in the past three years)

At various fora, Japan has proposed that the world's political leaders visit Hiroshima and Nagasaki, to witness the humanitarian consequences of nuclear weapons with their own eyes. In April 2016, at the opportunity of the G7 Foreign Ministers' Meeting in Hiroshima, the participating foreign ministers visited the Peace Memorial Park and Atomic Bomb Museum, and then as proposed by U.S. State Secretary Kerry, they extended their visit to the Atomic Bomb Dome.

On May 27, after the G7 Ise-Shima Summit, U.S. President Obama visited Hiroshima with Japan's Prime Minister Shinzo Abe, in the first visit by a sitting U.S. president to the cities which suffered from the atomic bombings. In Hiroshima, they visited the Peace Memorial Museum, provided flowers to the "Memorial Monument for Hiroshima, City of Peace," delivered their statements, and had dialogue with the A-bomb survivors. Before visiting Hiroshima, President Obama indicated that he did not intend to make a long speech. However, his statement lasted about 17 minutes. While President Obama did not touch upon a concrete policy on nuclear disarmament, he stated, inter alia:[237]

> Seventy-one years ago, on a bright, cloudless morning, death fell from the sky and the world was changed. A flash of light and a wall of fire destroyed a city and demonstrated that mankind possessed the means to destroy itself. Why do we come to this place, to Hiroshima? We come to ponder a terrible force unleashed in a not so distant past. We come to mourn the dead, including over 100,000 in Japanese men, women and children; thousands of Koreans; a dozen Americans held prisoner. Their souls speak to us. They ask us to look inward, to take stock of who we are and what we might become…
>
> We may not be able to eliminate man's capacity to do evil, so nations –and the alliances that we've formed – must possess the means to defend ourselves. But among those nations like my own that hold nuclear stockpiles, we must have the courage to escape the logic of fear, and pursue a world without them. We may not realize this goal in my lifetime. But persistent effort can roll back the possibility of catastrophe. We can chart a course that leads to the destruction of these stockpiles. We can stop the spread to new nations, and

[236] See IKV Pax Christi and ICAN, "Don't Bank on the Bomb: A Global Report on the Financing of Nuclear Weapons Producers," December 2016.

[237] "Remarks by President Obama and Prime Minister Abe of Japan at Hiroshima Peace Memorial," Hiroshima Peace Memorial, Hiroshima, Japan, May 27, 2016, https://www.whitehouse.gov/the-press-office/2016/05/27/remarks-president-obama-and-prime-minister-abe-japan-hiroshima-peace.

> secure deadly materials from fanatics…
> The world was forever changed here. But today, the children of this city will go through their day in peace. What a precious thing that is. It is worth protecting, and then extending to every child. That is the future we can choose – a future in which Hiroshima and Nagasaki are known not as the dawn of atomic warfare, but as the start of our own moral awakening.

In November, Kazakhstani President Nursultan Nazarbayev visited Hiroshima. Besides these visits, Swiss chairperson of the National Council, Chief Justice of India, and Norwegian Foreign Minister also visited Hiroshima in 2016.[238]

[238] See the Hiroshima City's homepage (http://www.city.hiroshima.lg.jp/www/contents/1416289898775/index.html).

Chapter 2. Nuclear Non-proliferation[1]

(1) Acceptance and Compliance with Nuclear Non-Proliferation Obligations

A) Accession to the NPT

The Nuclear Non-Proliferation Treaty (NPT) has 191 adherents (including the Holy See and Palestine). Among the current 193 United Nations (UN) Member States, those remaining outside the NPT are: India and Pakistan, both of which tested and declared having nuclear weapons in 1998; Israel, which is widely believed to possess them; and South Sudan, which declared its independence and joined the United Nations in July 2011, and does not possess any nuclear weapons; and, arguably, North Korea. North Korea declared its withdrawal from the NPT in 2003, but there is no agreement among the states parties on North Korea's official status. It has refused to return to the Treaty despite the UN Security Council resolutions (UNSCRs) demanding that it do so at an early date.

B) Compliance with Articles I and II of the NPT and the UNSC resolutions on non-proliferation

North Korea

Since the NPT entered into force, no case of non-compliance with Articles I and II of the Treaty has been officially reported by the United Nations or the rest of the international organizations. However, if North Korea's withdrawal is not interpreted as legally valid or if it acquired nuclear weapons before announcing its withdrawal from the NPT, such acquisition of nuclear weapons would constitute non-compliance with Article II. The U.S. State Department clearly stated in its 2015 report, titled "Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments," that North Korea was in violation of its obligations under Articles II and III of the NPT and in noncompliance with its International Atomic Energy Agency (IAEA) Safeguards Agreement at the time it announced its withdrawal from the NPT in 2003.[2]

The UNSCR 1787 in October 2006 stipulates that:

> [T]he DPRK shall abandon all nuclear weapons and existing nuclear programmes in a complete, verifiable and irreversible manner, shall act strictly in accordance with the obligations applicable to parties under the Treaty on the Non-Proliferation of Nuclear Weapons and the terms and conditions of its Safeguards Agreement (IAEA INFCIRC/403) and shall provide the IAEA transparency measures extending beyond these requirements, including such access to individuals, documentation, equipments and facilities as may be required and deemed necessary by the IAEA.[3]

The Security Council also decided that North Korea "shall abandon all other existing weapons of mass destruction and ballistic missile programme in a complete, verifiable and irreversible manner."

However, North Korea has failed to respond to the UN Security Council's decisions, and has continued nuclear

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[1] This chapter is written by Hirofumi Tosaki.

[2] U.S. Department of State, "Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments," April 2016, p. 26.

[3] S/RES/1718, October 14, 2006. The UN Security Council Resolution 1874 in June 2009 also demanded that North Korea "immediately comply fully with its obligations under relevant Security Council resolutions, in particular resolution 1718 (2006)."

weapon and ballistic missile-related activities, including its fourth and fifth nuclear tests in January and September 2016. The North blamed the adoption of the UNSCR 2321 in November 2016, in response to the fifth nuclear test, and stated: "the DPRK…categorically rejects it as another excess of authority and violation of the DPRK's sovereignty by the UNSC acting under instructions of the U.S…The 'sanctions resolution' that denied outright the sovereignty of the DPRK and its rights to existence and development will trigger off its tougher countermeasures for self-defence."[4]

Meanwhile, at the seventh Congress of the Workers' Party of Korea in May 2016, Party Chairman and DPRK Leader Kim Jong-un reiterated his nation's intention to advance "the strategic line of simultaneously pushing forward the economic construction and the building of nuclear force," and cast the North as "a responsible nuclear weapons state."[5] North Korea also emphasized: "The DPRK's access to nukes has, in fact, nothing to do with the north-south relations. The more desperately the south [sic] Korean authorities mix the north-south relations with the nuclear issue, the deeper quagmire they will find themselves in."[6] Furthermore, it insisted that the United States and South Korea "should accept the principled demand of the DPRK before anything else" if they were interested in the denuclearization on the Korean Peninsula:[7]

- Firstly, all the nuclear weapons should be opened to public, first of all, which the U.S. has neither acknowledged nor denied after bringing them to south Korea.
- Secondly, all the nukes and their bases should be dismantled and verified in the eyes of the world public.
- Thirdly, the U.S. should ensure that it would never bring again the nuclear strike means to south Korea, which the U.S. has frequently deployed on the Korean peninsula and in its vicinity.
- Fourthly, it should commit itself to neither intimidating the DPRK with nukes or through an act of nuclear war nor using nukes against the DPRK in any case.
- Fifthly, the withdrawal of the U.S. troops holding the right to use nukes from south Korea should be declared.

It should be noted, however, that all nuclear weapons that the United States had deployed in South Korea during the Cold War were withdrawn by December 1991. In addition, the provision of a negative security assurance to the North was included in the U.S.-North Korean Agreed Framework in 1994. Furthermore, the United States "affirmed that it [had] no nuclear weapons on the Korean Peninsula and has no intention to attack or invade the DPRK with nuclear or conventional weapons" in the Joint Statement of the Fourth Round of the Six-Party Talks in September 2005.

The Six-Party Talks could not be reconvened since March 2007 due to North Korea's actions contrary to the purpose of the talks and its refusal to re-commit to an unequivocal determination of its denuclearization.

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[4] "DPRK Foreign Ministry Spokesman Hits out at UNSC 'Sanctions Resolution,'" *KCNA*, December 1, 2016, http://www.kcna.co.jp/item/2016/201612/news01/20161201-22ee.html.

[5] "Kim Jong Un Makes Report on Work of WPK Central Committee at Its 7th Congress," *KCNA*, May 7, 2016, http://www.kcna.co.jp/item/2016/201605/news07/20160507-15ee.html.

[6] "DPRK Government, Political Parties, Organizations Call for Accelerating Final Victory of Independent Reunification," *KCNA*, May 16, 2016, http://www.kcna.co.jp/item/2016/201605/news16/20160516-09ee.html.

[7] "DPRK Government Denounces U.S., S. Korea's Sophism about 'Denuclearization of North,'" *KCNA*, July 6, 2016, http://www.kcna.co.jp/item/2016/201607/news06/20160706-41ee.html.

Iran

The E3/EU+3 (France, Germany and the United Kingdom/European Union plus China, Russia and the United States) and Iran agreed the Joint Comprehensive Plan of Action (JCPOA) on July 14, 2015 in Vienna.[8] Six days later, on July 20, the UN Security Council unanimously endorsed the agreement by means of Resolution 2231,[9] in accordance with the JCPOA. The Resolution set out a rigorous monitoring mechanism and timetable for implementation and paved the way for the lifting of United Nations sanctions against Iran.

The JCPOA stipulates the Implementation Day—the date on which, simultaneously with the IAEA report verifying implementation by Iran of agreed nuclear-related measures (Sections 15.1. to 15.11 of Annex V), the EU and the United States take the actions described in Sections 16 and 17 of Annex V respectively and in accordance with the UNSCR, the actions described in Section 18 of Annex V at the UN level. The nuclear-related provisions under the past UNSCRs are terminated (but they can be re-imposed automatically in the event of significant non-compliance by Iran). On January 16, 2016, the IAEA Director-General issued a report entitled "Verification and Monitoring in the Islamic Republic of Iran in light of UNSCR 2231 (2015)," which detailed the agency's verification of Iran's obligations under the JCPOA, noting inter alia:[10]

- Iran was not pursuing the construction of the existing IR-40 Reactor (Arak Heavy Water Research Reactor) based on its original design;
- Enrichment capacity had no more than 5060 IR-1 centrifuges installed at the Fuel Enrichment Plant (FEP) at Natanz, and Iran was not enriching uranium above 3.67% U-235 (para. 28) at any of its declared nuclear facilities;
- Iran had a stockpile of no more than 300 kg of UF6 enriched up to 3.67% U-235 (or the equivalent in different chemical forms), as a result of either downblending to natural uranium, or sale and delivery out of Iran facilities; and
- Iran had permitted the Agency to use on-line enrichment measurement devices and electronic seals which communicate their status within nuclear sites to Agency inspectors; had facilitated the automated collection of Agency measurement recording registered by installed measurement devices; and had made the necessary arrangements to allow for a long-term Agency presence.

The IAEA has submitted reports to the Board of Governors nearly every two months, confirming Iran's compliance with the JCPOA.[11] Main points written in the reports are, in addition to those mentioned above:

- The Agency has continued to have regular access to relevant buildings at Natanz;
- Iran has continued to permit the Agency to monitor—through measures agreed with Iran, including containment and surveillance measures—all uranium ore concentrate (UOC) produced in Iran or obtained from any other source, and reported by Iran to the Agency. Iran also provided the Agency with all information necessary to enable the Agency to verify the production of UOC and the inventory of UOC produced in Iran or obtained from any other source;
- On 16 January 2016, as notified in its letter to the Director General of January 7, 2016, Iran began to provisionally apply the Additional Protocol to its Safeguards Agreement;

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[8] "Joint Comprehensive Plan of Action," Vienna, July 14, 2015. JCPOA is posted on the U.S. State Department's website (http://www.state.gov/e/eb/tfs/spi/iran/jcpoa/).

[9] S/RES/2231, July 20, 2015.

[10] GOV/INF/2016/1, January 16, 2016.

[11] GOV/2016/8, February 26, 2016; GOV/2016/23, May 27, 2016; GOV/2016/46, September 8, 2016; GOV/2016/55, November 9, 2016.

- Iran also submitted declarations to the IAEA for implementation of its Additional Protocol, which gives agency inspectors expanded access to information and sites, and the IAEA is evaluating those documents; and
- The Agency has conducted complementary accesses under the Additional Protocol to sites and other locations in Iran.

In February and November, Iran was found to have technically violated the 130 ton limit of heavy water allowed under the deal. In February, the stockpile reached 130.9 metric tons and in November 130.1 tons. In both cases, the stockpile was quickly reduced by shipping some of the heavy water to Oman. Related to such exports, U.S. Energy Department in April announced it would buy 32 tons of heavy water from Iran, worth $8.6 million. Such sales are not prohibited by the JCPOA, but critics of the Obama Administration's approach to Iran claimed the purchase helped to subsidize Iran's nuclear program.[12]

On September 22, for the first time since the Implementation Day, E3+3 and Iran held a ministerial meeting to review implementation of the JCPOA. After the meeting, EU High Representative Federica Mogherini stated that the JCPOA was being implemented, and that the lifting of sanctions imposed by the EU vis-à-vis Iran had begun to exert its effect[13]

However, several concerns about the future of the JCPOA were also pointed out.

Firstly, Iran has strong dissatisfaction that it has not benefited from the lifting of sanctions, despite its implementation of the JCPOA, due to continuing U.S. unilateral sanctions. Iranian Foreign Minister Zarif said, "Our strong preference as a party that has remained fully committed and implemented its side of the bargain… is for every member and participant and for international community to continue to remain committed to the agreement…But it doesn't mean we don't have other options if the USA unwisely decides to move away from its obligations under the agreement."[14] It is also pointed out that Iran's supreme leader Ali Khamenei began to keep a distance from the JCPOA.[15] While UN sanctions imposed against Iran on nuclear issues were terminated in January 2016 by adoption of UNSCR 2231, the resolution does not regulate unilateral sanctions regarding non-nuclear activities. The United States maintains unilateral sanctions on Iran's human rights violations, sponsorship of terror, and missile development. In November-December 2016, the U.S. Congress voted overwhelmingly for legislation to extend the Iran Sanctions Act by 10 years. The U.S. financial (and secondary) sanctions, in particular, have restrained foreign companies from trading with the Iran. In response to these issues, Iran sought a meeting of the Joint Commission that was established to oversee implementation of the JCPOA.[16] Accusing the United States

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[12] Speaker Paul Ryan, "Statement on the Administration's Purchase of Heavy Water from Iran," Press Release, April 22, 2016, http://www.speaker.gov/press-release/statement-administrations-purchase-heavy-water-iran.

[13] "Remarks by High Representative Mogherini following the ministerial meeting of the Joint Commission on the implementations of the JCPOA," Brussels, September 23, 2016, https://eeas.europa.eu/headquarters/headquarters-homepage/10296/remarks-by-high-representative-mogherini-following-the-ministerial-meeting-of-the-joint-commission-on-the-implementations-of-the-jcpoa_en.

[14] "Iran Says Has Options If Nuclear Deal Fails," *Reuters*, November 10, 2016, http://www.reuters.com/article/us-usa-election-iran-zarif-idUSKBN1351IX.

[15] Ariane Tabatabai, "As the Iranian Nuclear Deal Loses a Crucial Backer, Is It in Danger of Disintegration?" *Bulletin of the Atomic Scientists*, August 3, 2016, http://thebulletin.org/iranian-nuclear-deal-loses-crucial-backer-it-danger-disintegration9700.

[16] "Iran Calls for Meeting of Nuclear Deal Powers over U.S. Sanctions," *Reuters*, December 17, 2016, http://www.reuters.com/article/us-iran-eu-usa-sanctions-idUSKBN1460PC.

of violating the deal and to create counter-veiling pressure, Iranian President Hassan Rouhani ordered officials to begin planning for the development of maritime nuclear propulsion engines and necessary highly enriched uranium fuel.[17] Actual production of such fuel, which has not commenced, would be a clear violation of the JCPOA.

A second concern is a possible policy shift under the new U.S. administration. During the presidential campaign, candidate Trump heavily criticized the JCPOA and said he would renegotiate it, something Iran has rejected. The Republican Party, winning a majority in both houses of Congress, also is also highly critical of the agreement. On the other hand, the Chairman of the Senate Foreign Relations Committee indicated that President Trump would not reverse the JCPOA but, avoiding falling into chaos in its first days, rather would take a milder approach of reviewing the agreement.[18]

In its report on compliance with disarmament and non-proliferation treaties published in 2015, the U.S. State Department concluded that Iran continued to violate obligations under the NPT and the IAEA Safeguards Agreement.[19] However, in its 2016-version report, the State Department concluded: "As of the end of the 2015 reporting period, previous issues leading to NPT noncompliance findings had been resolved. As of the end of the 2015 reporting period, there also were no outstanding issues regarding Iran's fulfillment of its commitments under the Joint Plan of Action (JPOA), and Iran was well positioned to complete the key nuclear steps necessary for implementation of the JCPOA."[20]

Withdrawal from the NPT

Although Article X-1 of the NPT contains some guidance on how a state can legitimately withdraw from the treaty, there remains a lack of clarity over some aspects of this process. Concerns have focused on a state choosing to withdraw from the NPT, after first acquiring nuclear weapons in violation of the Treaty. Japan, South Korea and other several Western countries have proposed measures to prevent the right of withdrawal from being abused.

In 2016, few remarkable proposals or arguments were made. At the 2015 NPT Review Conference (RevCon),[21] western countries insisted that withdrawal from the NPT should be made difficult by adding several conditions, while they also acknowledged about the right of states parties to withdraw. On the other hand, among NWS, Chinese and Russian positions on this issue seem more cautious than those of France, the United Kingdom and the United States. And some NNWS, including the Non-Aligned Movement (NAM) countries, argue that there is no need to revise or reinterpret Article X on a withdrawal from the NPT, which is the right of all state parties.

C) Nuclear-Weapon-Free Zones

Treaties establishing nuclear-weapon-free zones (NWFZs) have entered into force in Latin America (Tlatelolco Treaty), the South Pacific (Rarotonga Treaty), Southeast Asia (Bangkok Treaty), Africa (Pelindaba Treaty), and

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[17] "Iran Says It Will Develop Nuclear-Powered Ships after US Extends Sanctions," *BBC*, December 13, 2016, http://www.bbc.com/news/world-middle-east-38299179.

[18] Adrienne Shih, "Corker Says Trump Won't Tear up Iran Nuclear Deal," *CNN*, November 16, 2016, http://edition.cnn.com/2016/11/16/politics/bob-corker-donald-trump-iran-deal/.

[19] U.S. Department of State, "Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments," April 2015, p. 32.

[20] U.S. Department of State, "Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments," April 2016, p. 20.

[21] On the arguments and proposals made at the 2015 NPT RevCon by countries surveyed in this report, see the *Hiroshima Report 2016*.

Central Asia (Central Asian NWFZ Treaty). In addition, Mongolia declared its territory a nuclear-weapon-free zone at the UN General Assembly (UNGA) in 1992, and the UNGA has been adopting a resolution entitled "Mongolia's International Security and Nuclear-Weapon-Free-Status" every two years since 1998, in support of Mongolia's declaration.[22] All the states eligible to join the NWFZs in Latin America, Southeast Asia and Central Asia are parties to the respective NWFZ treaties.

Regarding efforts for establishing a Middle East Zone Free of WMD, the convening of an international conference, agreed at the 2010 NPT RevCon, could not be achieved before the 2015 NPT RevCon. Furthermore, at the latter RevCon, a final document was not adopted due to a lack of consensus on the language regarding that international conference. Since then, few remarkable proposals or initiatives have appeared. In 2016, the UNGA resolution, titled "Establishment of a nuclear-weapon-free zone in the region of the Middle East,"[23] was adopted without a vote, as had happened in the past. However, few concrete measures are mentioned in the resolution.

Concerning Northeast Asia and South Asia, while initiatives for establishing NWFZs have been proposed by the private sectors in the respective regions, there is no indication that state parties in these regions are taking any serious initiative toward such a goal.[24] Meanwhile, in its report submitted to the 2015 NPT RevCon, Mongolia expressed a willingness to "[p]lay an active role in promoting the idea of establishing a nuclear weapon-free zone in north-east Asia."[25]

(2) IAEA Safeguards Applied to the NPT NNWS

A) Conclusion of IAEA Safeguards Agreements

Under Article III-1 of the NPT, "[e]ach Non-nuclear-weapon State Party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the International Atomic Energy Agency and the Agency's safeguards system, for the exclusive purpose of verification of the fulfillment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices." The basic structure and content of the safeguards agreement are specified in the Comprehensive Safeguards Agreement (CSA), known as INFCIRC/153, which each state negotiates with the IAEA and then signs and ratifies. As of December 2016, 12 NPT NNWS have yet to conclude CSAs with the IAEA.[26]

In accordance with a strengthened safeguards system in place since 1997, an NPT NNWS or any other state may also conclude with the IAEA an Additional Protocol to its safeguards agreement, based on a model document known as INFCIRC/540. As of December 2016, 122 NPT NNWS have ratified Additional Protocols. Cote d'Ivoire and Cameroon newly ratified them in 2016. The most important news in this regard was that Iran started provisional implementation of the Additional Protocol in January 2016.

A state's faithful implementation of the Additional Protocol, along with the CSA, allows the IAEA Secretariat to draw

[22] A/RES/53/77D, December 4, 1998.

[23] A/RES/71/29, December 5, 2016.

[24] Pakistan had proposed to establish a NWFZ in South Asia until May 1998 when it conducted nuclear tests.

[25] NPT/CONF.2015/8, February 25, 2015.

[26] This number includes Palestine, which acceded to the NPT in 2015. Those 12 countries have little nuclear material, or do not conduct nuclear-related activities.

a so-called "broader conclusion" that "all nuclear material in the State has remained in peaceful activities." This conclusion is that the Agency finds no indications of diversion of declared nuclear material from peaceful nuclear activities or any undeclared nuclear material or activities in that country. Subsequently, the IAEA implements so-called "integrated safeguards," which is defined as the "optimized combination of all safeguards measures available to the Agency under [CSAs] and [Additional Protocols], to maximize effectiveness and efficiency within available resources." As of the end of 2015, 67 NNWS are applied integrated safeguards.[27]

The current status of the signature and ratification of the CSAs and the Additional Protocols and the implementation of integrated safeguards by the NPT NNWS studied in this project is presented in the following table. In addition to the IAEA safeguards, EU countries accept safeguards conducted by the EURATOM, and Argentina and Brazil conduct mutual inspections through establishing the bilateral Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC).

In 2005, the IAEA modified what is called the Small Quantity Protocol (SQP) which until then held in abeyance most of the operative provisions of the IAEA's verification tools for states which have only very small quantities of nuclear material. In the resolution, "Strengthening the Effectiveness and Improving the Efficiency of Agency Safeguards" adopted in September 2016, the IAEA General Conference called on all States with unmodified SQPs to either rescind or amend them.[28] As of September 2016, 64 States have accepted SQPs in accordance with the modified text endorsed by the Board of Governors. Among the countries surveyed in this report, New Zealand amended and Nigeria withdrew the SQP. Saudi Arabia and the UAE maintain an unmodified SQP.

[27] IAEA, *IAEA Annual Report 2015*, September 2016, p. 96.

[28] GC(60)/RES/13, September 30, 2016.

Table 2-1: The status of the conclusion and implementation of the IAEA safeguards agreement by the NNWS party to the NPT

(as of October 2016)

	Australia	Austria	Belgium	Brazil	Canada	Chile	Egypt	Iran	Germany	Indonesia
CSA (Year)*	1974	1996	1997	1994	1972	1995	1982	1974	1977	1980
Additional Protocol (Year) *	1997	2004	2004		2000	2003		Signed**	2004	1999
Broader conclusion drawn	○	○	○		○	○			○	○
Integrated safeguards	○	○	○		○	○			○	○

	Japan	Kazakhstan	South Korea	Mexico	Netherlands	New Zealand	Nigeria	Norway	Philippines
CSA (Year)*	1977	1995	1975	1973	1977	1972	1988	1972	1974
Additional Protocol (Year) *	1999	2007	2004	2011	2004	1998	2007	2000	2010
Broader conclusion drawn	○	○	○		○	○		○	○
Integrated safeguards	○		○		○			○	

	Poland	Saudi Arabia	South Africa	Sweden	Switzerland	Syria	Turkey	UAE	North Korea***
CSA (Year)*	2007	2009	1991	1995	1978	1992	2006	2003	1992
Additional Protocol (Year) *	2007		2002	2004	2005		2006	2010	
Broader conclusion drawn	○		○	○			○		
Integrated safeguards	○			○					

* (Year) shows when the CSA or Additional Protocol has been enforced.
**Iran has accepted to provisionally apply the Additional Protcol.
*** North Korea has refused to accept comprehensive safeguards since it announced its withdrawal from the NPT in 1993.

Sources: IAEA, "Safeguards Statement for 2016,"https://www.iaea.org/sites/default/files/16/10/sg_agreements_comprehensive_status_list.pdf; IAEA, "Status List Conclusion of safeguards agreements, additional protocols and small quantities protocols Status as of 7 October 2016.

B) Compliance with IAEA Safeguards Agreements

North Korea

The IAEA Director-General summarized the current situation of North Korea's nuclear issues in relation to the implementation of the IAEA safeguards in August 2016, as follows:[29]

- "The continuation and further development of the DPRK's nuclear programme and related statements by the DPRK…are a major cause for concern. The DPRK's nuclear activities, including those in relation to the Yongbyon Experimental Nuclear Power Plant (5 MW(e)) reactor and the Radiochemical Laboratory, the use of the building which houses the reported enrichment facility and the construction at the LWR, are deeply regrettable. Such actions are clear violations of relevant UN Security Council resolutions, including resolution 2270 (2016). The DPRK's fourth nuclear test announced on 6 January 2016 is also in clear violation of UN Security Council resolutions and deeply regrettable."
- "The Director General continues to call upon the DPRK to comply fully with its obligations under relevant UN Security Council resolutions, to cooperate promptly with the Agency in the full and effective implementation of its NPT Safeguards Agreement and to resolve all outstanding issues, including those that have arisen during the absence of Agency inspectors from the DPRK. The Agency continues to maintain its readiness to play an essential role in verifying the DPRK's nuclear programme."

Iran

The IAEA verifies and monitors Iran's implementations of the JCPOA as well as the IAEA Safeguards Agreement. As mentioned above, IAEA Director-General reports have been regularly submitted to the Board of Governors per two or three months.

On the so-called "outstanding issues" (or possible military dimensions: PMD), Iran and the IAEA concluded a "Roadmap for Clarification of Past and Present Outstanding Issues"[30] on the same day when the JCPOA was agreed. Under this "Roadmap," environmental sampling was conducted at Parchin military base in September 2015. It was reported in June 2016 that the environmental samples identified chemically man-made particles of natural uranium, and that the Obama administration has concluded that the uranium particles were likely tied to Iran's past, covert nuclear weapons program.[31] On the other hand, the IAEA has not made a definitive conclusion since the number of particles concerned was not enough to judge the use of nuclear material at Parchin.[32] As of the end of 2016, the IAEA did not make any further reports on this issue.

According to its report in February 2016, the IAEA spent €15.2 million for monitoring and verification in relation to the Joint Plan of Action (JPOA) and for preparatory activities under the JCPOA, of which only one million euros was funded from the regular budget and the rest was done through extrabudgetary contributions from 31 countries. The IAEA also said that the estimated annual cost for implementing Iran's Additional Protocol and for

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[29] GOV/2015/49-GC(59)/22, August 26, 2015.

[30] "Road-map for the Clarification of Past and Present Outstanding Issues Regarding Iran's Nuclear Program," July 14, 2015, https://www.iaea.org/newscenter/pressreleases/iaea-director-generals-statement-and-road-map-clarification-past-present-outstanding-issues-regarding-irans-nuclear-program.

[31] Jay Solomon, "Uranium Provides New Clue on Iran's Past Nuclear Arms Work," *Wall Street Journal*, June 19, 2016, http://www.wsj.com/articles/uranium-provides-new-clue-on-irans-past-nuclear-arms-work-1466380760.

[32] David Albright, Serena Kelleher-Vergantini, and Andrea Stricker, "Parchin: Will the IAEA Verify the Absence of Nuclear Weapons Activities in Iran?" *Imagery Brief*, ISIS, June 20, 2016.

verifying and monitoring Iran's commitments under the JCPOA was €9.2 million per year.[33] It is analyzed that if verifications for Iran's nuclear-related activities need to cost about $10 million annually, approximately $4.9 million for monitoring measures stipulated in the JCPOA will need to be paid for by IAEA member states' extrabudgetary contributions, while the IAEA plans to allocate $5.9 million from its regular budget for the cost of implementing Iran's Additional Protocol.[34] The U.S. GAO also mentioned that one of the problems regarding verification of Iran's implementation of the JCPOA included the shortage of budget and staff (particularly inspectors) for conducting inspections and verifications, in addition to issues on Iran's cooperation regarding IAEA inspectors' access to sites and the possibility of detecting undeclared nuclear material and activities.[35] In this regard, Japan stated in December 2016 it would disburse €2 million through the IAEA for steady implementation of the JCPOA and nuclear safety initiatives in Iran.[36]

On verifying and monitoring under the JCPOA, the following issues are also pointed out by experts:[37]

- relative weakness of systems for detecting undeclared activities;
- difficulties to detect clandestine activities of designing and developing nuclear weapons;
- difficulties to distinguish technical from material violations, and unintended vs. intended violation;
- sensitivities to assessing Iran's research and development activities; and
- an increased burdens of verification and difficulties in detecting non-compliance if restrictions on Iran's nuclear activities are relaxed along with implementations of the JCPOA.

Syria

As for Syria, the IAEA Director-General judged in May 2011 that the facility at Dair Alzour, which was destroyed by an Israeli air raid in September 2007, was very likely a clandestinely constructed, undeclared nuclear reactor. In June 2011, the IAEA Board decided to report the matter to the UN Security Council on the basis "that Syria's undeclared construction of a nuclear reactor at Dair Alzour and failure to provide design information for the facility in accordance with Code 3.1 of Syria's Subsidiary Arrangements [we]re a breach of Articles 41 and 42 or Syria's NPT Safeguards Agreement, and constitute non-compliance with its obligations under its Safeguards Agreement with the Agency in the context of Article XII.C of the Agency's Statute."[38]

On the other hand, the IAEA reported that it had conducted physical inventory verification (PIV) at the Miniature Neutron Source Reactor—where it could not previously verify, despite known existence of nuclear material, because of the serious internal war in Syria—in Damascus in September 2015, and the IAEA found no indication of the diversion of declared nuclear material from peaceful activities.[39]

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[33] GOV/2016/8, February 26, 2016.

[34] Mark Hibbs, "Vigorous Verification in Iran," Carnegie Endowment for International Peace, June 28, 2016, http://carnegieendowment.org/2016/06/28/vigorous-verification-in-iran-pub-63946.

[35] U.S. Government Accountability Office, "Preliminary Observations on IAEA's Role in Verifying the Iran Agreement," *GAO Report to Congress*, February 2016.

[36] "Japan-Iran Foreign Ministers' Meeting and Working Dinner," Ministry of Foreign Affairs of Japan, December 7, 2016, http://www.mofa.go.jp/press/release/press4e_001396.html.

[37] Trevor Findlay, "IAEA Noncompliance Reporting and the Iran Case," *Arms Control Today,* Vol. 46, No. 1 (January/February 2016), p. 35; Olli Heinonen, "Concerns about a Reduction of Transparency in IAEA Reporting on Iran's Nuclear Program," *Research Memo*, Foundation for Defense of Democracies, November 28, 2016.

[38] GOV/2011/41, June 9, 2011.

[39] IAEA, *IAEA Annual Report 2015*, September 2016, p. 100.

(3) IAEA Safeguards Applied to NWS and Non-Parties to the NPT

A NWS is not required to conclude a CSA with the IAEA. However, to alleviate the concerns about the discriminatory nature of the NPT, the NWS have voluntarily agreed to apply safeguards to some of their nuclear facilities and fissile material that are not involved in military activities. All NWS have also concluded tailored Additional Protocols with the IAEA.

The *IAEA Annual Report 2015* (Annex) lists facilities in NWS under Agency safeguards or containing safeguarded nuclear material.[40] For these five NWS, the IAEA "concluded that nuclear material to which safeguards were applied in selected facilities remained in peaceful activities or had been withdrawn from safeguards as provided for in the agreements."[41] The IAEA does not publish the number of inspections conducted in the NWS. The safeguarded facilities include:

- China: A power reactor, a research reactor, and an enrichment plant
- France: A fuel fabrication plant, a reprocessing plant, and an enrichment plant
- Russia: A separate storage facility
- The United Kingdom: An enrichment plant and two separate storage facilities
- The United States: A separate storage facility

Each NWS reported on its application of IAEA safeguards at the 2015 NPT RevCon.

France reported that it "has offered to make certain civil nuclear material subject to IAEA safeguards…under a trilateral agreement between France, EURATOM and IAEA." It is also "subject to EURATOM safeguards inspections relating to all civilian nuclear material covered by the EURATOM Treaty." According to France's report, submitted to the 2014 NPT PrepCom, France received 336 inspections conducted by EURATOM, and 26 inspections by the IAEA, in 2013. The facilities subject to inspections included some part of the enrichment and reprocessing plant, and the Mixed Oxide (MOX) fuel fabrication plant. Regarding the Additional Protocol, the IAEA can conduct a complementary access in France, like the United Kingdom and the United States. In addition, France has also voluntarily agreed to transmit further information to the IAEA, such as: notification of imports and exports of nuclear material; notification of imports and exports of concentrates of uranium and thorium; and an annual statement of holdings of civil irradiated and unirradiated plutonium.[42]

According to the U.K. report submitted at the 2014 NPT PrepCom, "[a]ll civil nuclear material in the United Kingdom is subject to European Atomic Energy Community (EURATOM) safeguards, and to the terms of the [U.K.-EURATOM-IAEA] tripartite safeguards agreement under the NPT." The United Kingdom also conducts all enrichment and reprocessing activities under international safeguards, and "some of the plutonium stores at Sellafield and the gas centrifuge enrichment facilities at Capenhurst are designated for IAEA inspection."[43] According to its report submitted to the 2015 NPT RevCon, "[t]he agreement gives the United Kingdom the right to remove facilities and/or withdraw nuclear material from the scope of the agreement for reasons of national security. However, as part of the 1998 Strategic Defence Review, the United Kingdom agreed that any future withdrawals from safeguards would "be limited to small quantities of nuclear materials not suitable for explosive

[40] *IAEA Annual Report 2015*, GC(60)/9/Annex, Table A30(a).
[41] *IAEA Annual Report 2015*, September 2016, p. 96.
[42] NPT/CONF.2015/10, March 12, 2015.
[43] NPT/CONF.2015/PC.III/15, April 30, 2014.

purposes" and undertook to publish information on any such withdrawals."[44]

The United States reported that "[s]ince 1980, [it] has made eligible for IAEA safeguards approximately 300 civil nuclear facilities, including nuclear power reactors, research reactors, commercial fuel fabrication plants, uranium enrichment plants and other types of facilities." The United States also said that it has accepted approximately 800 IAEA inspections, and, since 1994, nearly 600 at five facilities containing material removed permanently from weapons programs, and that it covered the costs for such inspections through U.S. voluntary contribution to the IAEA. The United States is the only NWS that has hosted a complementary access visit by the IAEA. Two visits were conducted in 2010.[45]

Compared to the three NWS mentioned above, application of IAEA safeguards to nuclear facilities by China and Russia are more limited. No provision for complementary access visits is stipulated in their Additional Protocols. China reported that it has proposed 20 nuclear facilities to the IAEA for inspections, including six new facilities after 2010.[46] Russia also reported such numbers as more than 30.[47] Russia also announced that the International Uranium Enrichment Center (IUEC) was chosen to start applying IAEA safeguards in July 2010, and the latest inspection was conducted in August 2014.[48]

The three non-NPT states have concluded facility-specific safeguards agreements based on INFCIRC/66. These non-NPT states have accepted IAEA inspections of the facilities that they declare as subject to these agreements. According to the *IAEA Annual Report 2015*, the facilities placed under IAEA safeguards or containing safeguarded nuclear material in non-NPT states as of December 31, 2015 are as follows:[49]

- India: Seven power reactors, two fuel fabrication plants, two reprocessing plants, and a separate storage facility
- Israel: A research reactor
- Pakistan: Five power reactors and two research reactors

Regarding their activities in 2014, the IAEA "concluded that the nuclear material, facilities or other items to which safeguards were applied remained in peaceful activities."[50]

Concerning the protocols additional to non-NPT states' safeguards agreements (which differ significantly from the model Additional Protocol), the Indian-IAEA Additional Protocol entered into force on July 25, 2014. This Additional Protocol is similar to ones that the IAEA concluded with China and Russia, with provisions on providing information and protecting classified information but no provision on complementary access. No negotiation has yet begun for similar protocols with Israel or Pakistan.

Some NNWS call on the NWS for further application of the IAEA safeguards to their nuclear facilities. For instance, the Non-Proliferation and Disarmament Initiative (NPDI) made the following proposals in its working paper

[44] NPT/CONF.2015/29, April 22, 2015.
[45] NPT/CONF.2015/38, May 1, 2015.
[46] NPT/CONF.2015/32, April 27, 2015.
[47] NPT/CONF.2015/48, May 22, 2015.
[48] Ibid.
[49] *IAEA Annual Report 2015*, GC(60)/9/Annex, Table A30(a).
[50] *IAEA Annual Report 2015*, September 2016, p. 96.

submitted to the 2015 NPT RevCon:[51]

- Reviewing the operation of the voluntary-offer safeguards agreement and/or revisiting the voluntary-offer safeguards agreement so as to make safeguards applicable to all nuclear material designated by each nuclear-weapon State as no longer required for military purposes and relevant facilities where it that material is located, in a manner that neither excludes such material from the scope of the safeguards application nor reverses such material to military uses;
- Reviewing the existing scope of the additional protocol to add measures, if necessary, such as complementary access;
- Placing "excess" nuclear material under the IAEA verification so as to make it irreversible; and
- Exploring ways and means of financing the wider application of safeguards in NWS.

The NAM countries continue to demand that the NWS and non-NPT states should accept full-scope safeguards.[52] They also call for the establishment of safeguarded worldwide nuclear disarmament and the development of appropriate legally binding verification arrangements, within the context of IAEA, to ensure the irreversible removal of fissile material from nuclear weapons.[53] Furthermore, the NAM countries proposed that the NWS declare to IAEA all weapons-grade fissile material and place such material under the supervision of IAEA and that a standing committee be established to monitor and verify the nuclear disarmament steps undertaken by NWS.[54]

(4) Cooperation with the IAEA

One of the most important measures to strengthen the effectiveness of the IAEA safeguards system is to promote the universal application of the Additional Protocol. Among the countries surveyed in this project, Australia, Austria, Belgium, Canada, Chile, France, Germany, Indonesia, Japan, South Korea, Mexico, the Netherlands, New Zealand, Nigeria, Norway, the Philippines, Poland, Sweden, Switzerland, Turkey, UAE, the United Kingdom and the United States consider that the Additional Protocol is "an integral part" of the current IAEA safeguards system.[55] China also has promoted universality of the Comprehensive Safeguards Agreement and the Additional Protocol.[56]

Other countries, including Brazil, Russia and South Africa, consider that the conclusion of an Additional Protocol should be voluntary, not obligatory, although they acknowledge the importance of the Additional Protocol with regard to safeguards, as a major component of the safeguarding element of the nuclear non-proliferation regime. The NAM argues that "it is fundamental to make a clear distinction between legal obligations and voluntary confidence-building measures and that such voluntary undertakings shall not be turned into legal safeguards obligations."[57]

In the resolution, titled "Strengthening the Effectiveness and Improving the Efficiency of Agency Safeguards," adopted at the IAEA General Conference in 2016, the following points were stated, based on divergent views

[51] NPT/CONF.2015/WP.16, March 20, 2015
[52] NPT/CONF.2015/WP.3, March 9, 2015.
[53] Ibid.
[54] Ibid.
[55] See statements addressed by respective countries at the IAEA General Conferences and the NPT Review Conference.
[56] NPT/CONF.2015/PC.III/WP.41, May 6, 2014.
[57] NPT/CONF.2015/WP.6, March 9, 2015.

regarding additional protocols:[58]

- "Bearing in mind that it is the sovereign decision of any State to conclude an additional protocol, but once in force, the additional protocol is a legal obligation, encourages all States which have not yet done so to conclude and to bring into force additional protocols as soon as possible and to implement them provisionally pending their entry into force in conformity with their national legislation."
- "Notes that, in the case of a State with a comprehensive safeguards agreement supplemented by an additional protocol in force, these measures represent the enhanced verification standard for that State."

The IAEA has contemplated a state-level concept (SLC), in which the Agency considers a broad range of information about a country's nuclear capabilities and tailors its safeguards activities in each country accordingly, so as to make IAEA safeguards more effective and efficient. In the resolution, titled "Strengthening the Effectiveness and Improving the Efficiency of Agency Safeguards," adopted at the IAEA General Conference in 2016, important assurances about the SLC mentioned below were welcomed:[59]

- The SLC does not, and will not, entail the introduction of any additional rights or obligations on the part of either States or the Agency, nor does it involve any modification in the interpretation of existing rights and obligations;
- The SLC is applicable to all States, but strictly within the scope of each individual State's safeguards agreement(s);
- The SLC is not a substitute for the Additional Protocol and is not designed as a means for the Agency to obtain from a State without an Additional Protocol the information and access provided for in the Additional Protocol;
- The development and implementation of State-level approaches requires close consultation with the State and/or regional authority, particularly in the implementation of in-field safeguards measures; and
- Safeguards-relevant information is only used for the purpose of safeguards implementation pursuant to the safeguards agreement in force with a particular State—and not beyond it.

In the *IAEA Annual Report 2015*, the IAEA reported that it implemented state-level safeguards approaches for 54 states under integrated safeguards during 2015.[60]

The Vienna Group of Ten, including Australia, Austria, Canada, the Netherlands, New Zealand, Norway and Sweden, consider the SLC "as part of the continuing evolution of safeguards implementation necessary to increasing its effectiveness and efficiency."[61] The other Western countries also share such a view. While Brazil, Russia and South Africa had watched cautiously, they appreciated the IAEA's clarification that introducing the SLC would not pose additional obligations that would limit the rights of a state party to the Safeguards Agreement. On the other hand, Iran stated that the SLC "should not lead to discriminatory implementation of the respective measures and to undermining the sovereignty of Member States," and urged the IAEA "Secretariat to pursue further its faithful and regular constructive consultations with the Member States."[62]

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[58] GC(60)/RES/13, September 30, 2016.

[59] Ibid.

[60] *IAEA Annual Report 2015*, September 2016, p. 17.

[61] NPT/CONF.2015/WP.1, March 2, 2015.

[62] "Statement by Iran," IAEA General Conference, September 2016.

Regarding research and development of safeguards technologies, under its long-term plan,[63] the IAEA conducted the "Development and Implementation Support Programme for Nuclear Verification 2016-2017,"[64] in which 20 countries (including Australia, Belgium, Brazil, Canada, China, France, Germany, South Korea, the Netherlands, Russia, South Africa, Sweden, the United Kingdom and the United States) and the European Commission (EC) participated.

(5) Implementing Appropriate Export Controls on Nuclear-Related Items and Technologies

A) Establishment and implementation of national control systems

To assess this criterion, it is instructive to consider Japan's case. Japan serves as a member of all four multilateral export control regimes,[65] including the Nuclear Suppliers Group (NSG), and it has established legislative measures and other relevant national implementation systems.

Japan implements an advanced export control system enforcing two types of controls: catch-all control and list control. Under the Japanese export control system, all countries are subject to the WMD catch-all control, except for countries belonging to the four international export control regimes and having solid export controls in place, including WMD catch-all controls. Japan designates 27 such countries as "white countries," including Australia, Austria, Belgium, Canada, France, Germany, South Korea, the Netherlands, New Zealand, Norway, Poland, Sweden, Switzerland, the United Kingdom and the United States. Like Japan, these countries also have national implementation systems in place and have implemented effective export controls regarding nuclear-related items and technologies.

These countries have proactively made efforts to strengthen export controls. For example, Japan held the 23rd Asian Export Control Seminar in February 2016. The purpose of this annual seminar is to "assist export control officers in Asian countries and regions." Persons in charge of export control from 29 countries and regions, four international export control regimes, and some international organizations and universities participated in the 2016 Seminar.[66]

Among other countries surveyed in this project, Brazil, China, Kazakhstan, Mexico, Russia, South Africa and Turkey are members of the NSG. These countries have set up export control systems, including catch-all controls.

As pointed out in the previous *Hiroshima Reports*, concerns have been expressed about Russia's and China's implementation of export controls. In 2016, however, there were some reports suggesting that their respective implementation practices had improved, albeit in limited ways. It was reported that Russian Customs prevented the transfer of dual-use items to North Korea. China has reportedly taken efforts to coordinate with the international community and strengthen its export-control implementation mechanisms, including nuclear-related export controls, such as establishing a national control list, in line with the NSG and the Zangger Committee, and adopting

[63] IAEA, "IAEA Department of Safeguards Long-Term R&D Plan, 2012-2023," January 2013.

[64] IAEA, "Development and Implementation Support Programme for Nuclear Verification 2016-2017."

[65] Aside from the NSG, Australia Group (AG), Missile Technology Control Regime (MTCR), and Wassenaar Arrangement (WA).

[66] Participants include Australia, Canada, China, France, Germany, South Korea, the Philippines, India, Pakistan, Turkey, UAE, the United Kingdom and the United States. Information on the Seminar is posted on the website (http://supportoffice.jp/outreach/2015/asian_ec/).

catch-all controls. In addition, China's Ministry of Foreign Affairs and Ministry of Commerce are drafting a non-proliferation law and an export-control law, respectively.[67]

In the Middle East, the UAE is one of the few countries that have enacted comprehensive strategic trade control legislation, including a provision on catch-all controls. It has passed a number of laws for controlling export, re-export, transit and transshipment, and reportedly has taken steps to crack down on illicit trafficking, such as expelling 500 suspect companies in 2011.[68] However, it is considered that the UAE "lack[s] the necessary expertise, and possibly the financial resources, to institute an effective [export control] system."[69] Saudi Arabia's legal framework on export controls remains rudimentary and lacks, among other things, catch-all mechanisms.[70] Regarding Egyptian export control activities, no reliable information could be found since its February 2008 national report to the UNSCR 1540 Committee. According to a report submitted to the Committee in 2016, Egypt stated that it has made efforts for, inter alia, putting export control legislation in place and setting enforcement agencies.[71] Still, its export controls remain at insufficient level due to a lack of introduction of important elements including list control and catch-all control provisions.

In Southeast Asia, trading in sensitive items and technologies by the regional countries has been increasing along with economic developments. While some countries in the region have made efforts to set their respective export control systems in place, no Southeast Asian country, except Malaysia and Singapore, has necessarily established an adequate export control system. Among the countries in this region surveyed in this report, the Philippines, enacting a Strategic Trade Management Act (STMA) in November 2015, introduced list control and catch-all control. On the other hand, Indonesia has not yet established a control list of dual-use items/technologies, nor implemented catch-all controls. [72]

India, Israel and Pakistan have also set up national export control systems, including catch-all controls. India's quest for membership in the NSG is supported by some member states, but consensus on the matter was not reached in 2016. Israel has established national legislation and national implementation systems for its export controls, based on all four multilateral export control regimes.[73] Pakistan, according to its report to the UNSCR 1540 Committee, has made efforts to enhance its export control systems, including the introduction of a catch-all control system, after the revelation in 2004 of the proliferation activities of the nuclear black-market network led by A. Q. Khan.[74] Pakistan contends that its export control system is compatible with the guidelines of the

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[67] It is reported that these two laws would be enacted before 2020. Xiaoming Liu, "Upgrading to a New, Rigorous System: Recent Developments in China's Export Controls," *RUSI Occasional Paper*, March 2016.

[68] International Institute for Strategic Studies, "Making Sanctions Work: Problems and Prospects, Dubai, May 9-10, 2011," Workshop Report, May 2011.

[69] "Middle East and North Africa 1540 Reporting," Nuclear Threat Initiative, January 31, 2014, http://www.nti.org/analysis/ reports/middle-east-and-north-africa-1540-reporting/. See also Aaron Dunne, "Strategic Trade Controls in the United Arab Emirates: Key Considerations for the European Union," *Non-Proliferation Papers*, No. 12 (March 2012).

[70] "Middle East and North Africa 1540 Reporting," Nuclear Threat Initiative, January 31, 2014, http://www.nti.org/analysis/reports/ middle-east-and-north-africa-1540-reporting/.

[71] S/ AC.44/2016/3, May 10, 2016.

[72] Republic Act No. 10697, November 13, 2015. See also, Karla Mae G. Pabeliña, "The Strategic Trade Management Regime in the Philippines," *Strategic Trade Review*, Vol. 2, Issue 2 (Spring 2016), pp. 118-129; and Andy Rachmianto, "Indonesia's Approach to Strategic Trade Controls: The Perspective of a Developing and Archipelagic Country," *Strategic Trade Review*, Vol. 2, Issue 2 (Spring 2016), pp. 130-139.

[73] A/AC/44/2013/1, January 3, 2013.

[74] S/AC.44/2007/19, August 3, 2010.

multilateral export control regimes, including the NSG.[75] However, it is still unclear how robust or successfully implemented such export control systems are in practice.[76]

At the time of writing, the status of export control implementation by North Korea, Iran and Syria is not clear. Rather, cooperation among these countries in ballistic missile development remains a concern, as mentioned below. In addition, North Korea was involved in the past in constructing a graphite-moderated reactor in Syria to produce plutonium. More recently, as discussed below, North Korea is reported to have engaged in nuclear-related material transfers to Myanmar.

The international community has made efforts to prevent terrorists and other non-state actors from acquiring WMD-related items and technologies. For instance, the UNSCR 1540, adopted in 2004 with an aim to address the risks of procurement of WMD-related items and technologies by non-stated actors, stipulates legally binding obligations on each UN member state to enact its legislations on national export control and implement them.[77] In reflection to the 2016 Comprehensive Review of the Status of Implementation of the UNSCR 1540, the UN Security Council adopted the Resolution 2325 on December 15, 2016. This Resolution, aiming toward full and effective implementation of the UNSCR 1540, urges UN member states to make efforts of, inter alia, addressing the issues through adapting and updating with the evolving nature of risk of proliferation and rapid advances in science and technology, as well as supporting capacity-building in implementation of export controls.[78]

B) Requiring the conclusion of the Additional Protocol for nuclear export

Article III-2 of the NPT stipulates, "Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material, to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this Article." In the Final Document of the 2010 NPT RevCon, "[t]he Conference encourage[d] States parties to make use of multilaterally negotiated and agreed guidelines and understandings in developing their own national export controls" (Action 36). Under the NSG Guidelines Part I, one of the conditions for supplying materials and technology designed specifically for nuclear use is to accept the IAEA comprehensive safeguards. In addition, NSG member states agreed on the following principle in June 2013:[79]

> Suppliers will make special efforts in support of effective implementation of IAEA safeguards for enrichment or reprocessing facilities, equipment or technology and should, consistent with paragraphs 4 and 14 of the Guidelines, ensure their peaceful nature. In this regard suppliers should authorize transfers, pursuant to this paragraph, only when the recipient has brought into force a Comprehensive Safeguards Agreement, and an Additional Protocol based on the Model Additional Protocol or, pending this, is implementing appropriate safeguards agreements in cooperation with the IAEA, including a regional accounting and control arrangement for nuclear materials, as approved by the IAEA Board of Governors.

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[75] "Strategic Export Control System Robust, Effective: Pakistan," *The Nation*, December 15, 2016, http://nation.com.pk/national/15-Dec-2016/strategic-export-control-system-robust-effective-pakistan.

[76] Paul K. Kerr and Mary Beth Nikitin, "Pakistan's Nuclear Weapons: Proliferation and Security Issues," *CRS Report for Congress*, March 19, 2013, p. 24.

[77] S/RES/1540, April 28, 2004.

[78] S/RES/2325, December 15, 2016.

[79] INFCIRC/254/Rev.12/Part 1, November 13, 2013.

The NPDI and the Vienna Group of Ten have argued that conclusion and implementation of the CSA and the Additional Protocol should be a condition for new supply arrangements with NNWS.[80] Some of the bilateral nuclear cooperation agreements that Japan and the United States concluded recently with other capitals make the conclusion of the Additional Protocol a prerequisite for their cooperation with respective partner states.

On the other hand, the NAM countries continue to argue that supplier countries should "refrain from imposing or maintaining any restriction or limitation on the transfer of nuclear equipment, material and technology to other States parties with comprehensive safeguards agreements."[81] They also expressed their "concerns that some States parties have made conditions such as concluding and bringing into force an additional protocol on nuclear export in contravention to Article IV of the Treaty, and call[ed] upon those States parties to remove any such condition promptly."[82]

Enrichment and reprocessing in bilateral nuclear cooperation agreements

Enriching uranium and reprocessing spent fuel by NNWS is not prohibited under the NPT if their purpose is strictly peaceful and they are under the IAEA safeguards. Yet they are highly sensitive activities in light of nuclear proliferation. The spread of enrichment and reprocessing (E&R) technologies would mean that more countries would acquire the potential for manufacturing nuclear weapons. As mentioned above, the NSG member states are required to condition a recipient's implementation of the Additional Protocol when they transfer enrichment or reprocessing facilities, equipment or technology. However, most of the countries which have E&R capabilities do not necessarily place additional conditionality for such transfers. While the U.S.-UAE and U.S.-Taiwan Nuclear Cooperation Agreements stipulates a so-called "gold standard"—the recipients are obliged to forgo enrichment and reprocessing activities—other bilateral agreements concluded and updated by the United States do not stipulate similar obligations. Relatedly, under the updated U.S.-South Korean Nuclear Cooperation Agreement signed in July 2015, the United States does not give advance consent to enrich[83] or reprocess U.S.-origin fuel while both countries agreed to continue joint research on pyroprocessing—which South Korea sought to promote—under their consultation and agreement.

C) Implementation of the UNSCRs concerning North Korean and Iranian nuclear issues

With regard to Iranian and North Korean nuclear issues, the UN Member States are obliged to implement measures set out in the relevant resolutions adopted by the UN Security Council, including embargos on nuclear-, other WMD-, and ballistic missile-related items, material, and technologies. The Panels of Experts, established pursuant to UNSCRs 1874 (2009) and 1929 (2010), which reported to their relevant UN Security Council Sanctions Committees, published annual reports on their findings and recommendations about the implementation of these resolutions. After the conclusion of the JCPOA, the Iran Sanctions Committee and Panel of Experts ceased to exist,

[80] See, for example, NPT/CONF.2015/WP.1, March 2, 2015.

[81] NPT/CONF.2015/WP.6, March 9, 2015.

[82] "Statement by Iran, on behalf of the NAM," at the 2015 NPT Review Conference, Main Committee III, May 4, 2015.

[83] South Korea could enrich uranium only when enriched uranium is needed, despite the U.S. supply assurance, and both could consult and agree.

at the insistence of Iran, and the UN Security Council now has responsibility of oversight.[84]

North Korea

In response to North Korea's fourth nuclear test in January 2016, the UNSCR 2270 was adopted on March 2. Under this resolution, Security Council decided to ban the transfer of "all arms and related materiel, including small arms and light weapons and their related materiel," as well as "financial transactions, technical training, advice, services or assistance related to the provision, manufacture, maintenance or use of such arms and related materiel." The Resolution also prohibits transfer of "any items" to/from North Korea (except for food or medicine) if they "could directly contribute" to improve military capabilities of North Korea or other countries; and prohibits other countries to purchase coal, iron and iron ore from North Korea, with entailing exception provisions for "transactions that are determined to be exclusively livelihood purpose" and unrelated to generating revenue for North Korea's activities prohibited by relevant UNSCRs. Furthermore, the Security Council, noting that North Korea frequently misuses front companies and such like in order to violate measures imposed in relevant UNSCRs, directed the Committee to identify individuals and entities engaging in such practices, and, if appropriate, designate them to be subject to the sanction imposed by the related UNSCRs. This resolution applied an asset freeze to an additional 16 individuals, 12 entities, and 31 vessels controlled or operated by Ocean Maritime Management (OMM), as specified in each respective Annex.[85]

Then, in response to the fifth nuclear test, UNSCR 2321 was adopted on November 30, under which the Security Council introduced new measures, inter alia: expanding the list of prohibited dual-use items applicable to WMD-related activities; adding dual-use items for conventional arms in the list for arms embargo; limiting import of coal from the North Korea; prohibiting the North from exporting copper, nickel, silver and zinc; banning North Korea's export on statues; and prohibiting the supply, sale or transfer of new helicopters and vessels to the North Korea. The Resolution specified an additional 11 individuals subject to travel ban and asset freeze, and also an additional 10 entities for asset freeze.[86]

The Report of the Panel Experts noted that North Korea has procured sophisticated equipment, through exploiting different export control systems across countries in Southeast Asia, Africa and the Middle East. In regard to North Korea's nuclear related activities, the Report published by the Panel of Experts in 2016 covered the following issues, inter alia:[87]

- The North's Munitions Industry Department played a key role in the fourth nuclear test, including planning and preparation.
- The Panel reported in 2015 that North Korea participated in the activities of the Joint Institute for Nuclear Research (JINR) in Russia. According to the JINR, however, no North Korean has been affiliated with the Institute since March 31, 2015, and that the North's membership has been suspended until it was able to fully implement its obligations to the JINR.
- The Panel continued its investigation of the shipment in 2012 of aluminium alloy rods seized by Japan as nuclear-related items. Previously, the Panel noted that a North Korean entity using the label "KUMSOK"

[84] David Albright and Andrea Stricker, "JCPOA Procurement Channel: Architecture and Issues," Institute for Science and International Security, December 11, 2015, http://isis-online.org/uploads/isis-reports/documents/Parts_1_and_2_JCPOA_Procurement_Channel_Architecture_and_Issues_Dec_2015-Final.pdf.

[85] S/ RES/2270, March 20, 2016. On the OMM, see also *Hiroshima Report 2016*, pp. 102-103.

[86] S/ RES/2231, November 30, 2016.

[87] S/2016/157, February 24, 2016.

was likely to have manufactured the items, and it concluded that a Myanmar-based entity, Soe Min Htike Company, Ltd., was involved in the attempted transfer as the consignee of prohibited nuclear-related items.

North Korea's illicit procurement activities have caused great concern for the international community. Although the actual picture of such illegal activities by the North is not necessarily clear, North Korea has reportedly attempted various activities, including earning foreign currency to support nuclear weapons development by utilizing foreign networks. Some news articles highlighted the following alleged cases:

- Regarding vessels controlled by OMM on the sanction list under UNSCR 2270, some articles reported that ships including the Chong Chon Gang and Orion Star have carried cargo around Northeast Asia.[88]
- It was reported that North Korea has earned money from foreign shipping owners in exchange for allowing their vessels to be registered as North Korean. Some companies from Iran, UAE, and other countries in the Middle East operated North Korean flag vessels in violation of UNSCR 2270.[89]

Although each UN member state is requested to report to the Security Council on the measures taken for implementing UNSCR 2270, only 65 member countries submitted their national implementation reports, as of November 8. Regarding countries surveyed in this project (except North Korea), 27 countries have submitted their respective reports.[90]

Regarding sanctions against North Korea, China's behavior has been drawing attention because of its close relationship with North Korea. China announced formulation of a dual-use items list subject to an export ban, in response to UNSCR 2270. However, it had been observed that "questions have arisen about China's compliance with or enforcement of UNSCRs and even enabling of the DPRK's activities in allowing cross-border trade and transactions to and from North Korea."[91] Regarding the flow of restricted items via China, the following case, for instance, was reported in 2016:

- One of the planes displayed during North Korea's first air show on September was manufactured in New Zealand. The plane on display was for dual-use (military/civilian aviation). It was reported that the New Zealand maker sold the plane in December 2015 through its Chinese agent to a Chinese company, named Free Sky Aviation. It remains registered with the Chinese civil aviation authority. Moreover, the New Zealand company was given a false explanation that the plane would be used only for tourism in

[88] Elizabeth Shim, "North Korea Ships Under Sanctions Carrying on Activities," *United Press International*, May 13, 2016, http://www.upi.com/Top_News/World-News/2016/05/13/North-Korea-ships-under-sanctions-carrying-on-activities/9941463195188/; "N.K. Ships on Sanction List Pass S. Korean and Japanese Waters," *The Dong-A Ilbo*, November 29, 2016, http://english.donga.com/List/3/04/26/791215/1.

[89] "NK Makes Cash Laundering Ship Nationalities," *The Korea Times*, May 17, 2016, http://www.koreatimes.co.kr/www/news/nation/2016/05/485_204894.html; "Iran, UAE Using N.K. Ships in Breach of U.N. Bans: Report," *The Korea Herald*, May 17, 2016, http://www.koreaherald.com/view.php?ud=20160517000857; "Kita Chosen ga 'Senseki Bijinesu': Chuto ni kyoten, Gaika mokutekika, Kokuren ketsugi ihan no utagai,"[Noth Korea's 'Ship Nationalities Business': Based in Middle East, For Making Foreign Currency, In violation of UN Resolution], *Kyodo*, May 13, 2016, http://this.kiji.is/103699183328854023?c=39546741839462401. (in Japanese)

[90] The countries surveyed in this report that have yet to submit include India, Indonesia, Iran, Israel, Nigeria, the Philippines, Saudi Arabia and Syria. Security Council Committee Established Pursuant to Resolution 1718 (2006), Implementation Reports, https://www.un.org/sc/suborg/en/sanctions/1718/implementation-reports.

[91] Shirley A. Kan, "China and Proliferation of Weapons of Mass Destruction and Missiles: Policy Issue," *CRS Report*, January 5, 2015, p. 21.

North Korea and that there was "no formal link" with the North Korean military.[92]

On the other hand, in response to North Korea's activities in violation of the UNSCRs, China was reported to have made efforts for tightening sanctions, for instance:

- Hong Kong authorities reportedly refused entry to the freighter Gold Star 3 as it attempted to take on fuel and other goods. UNSCR 2270 bans 31 North Korean vessels owned by shipping company Ocean Maritime Management from foreign ports, including the Cambodian-registered Gold Star 3.[93]
- China reportedly denied entry of a North Korean diplomat in charge of arms deals who was attempting to enter through Beijing Capital International Airport on May 20. He was Jang Yong-son, a KOMID representative in Iran, who flew in from Tehran. Chinese officials sent him to Pyongyang."[94]
- In September, it was reported that police in Liaoning, China's Northeastern border province, have started investigating Hongxiang Industrial Development for alleged long-term involvement in "serious economic crimes" over the course of its trading activities.[95] Chinese authorities are said to be questioning the owner and founder of this company, Ma Xiaohong, for allegedly smuggling materials used for nuclear and missile development into North Korea.[96]

Iran

Nuclear-related sanctions under the previous UNSCRs against Iran were lifted in January 2016, based on IAEA confirmation of Iran's initial implementation of the JCPOA. Still, the following alleged cases of Iran's illicit nuclear-related procurement activities were reported in 2016.

- A U.S. citizen conspired to export a cobalt-nickel metallic powder from the United States to Iran via Turkey, without a license from U.S. Treasury Department's Office of Foreign Assets Control (OFAC). The metallic powder can be used in aerospace, missile production and nuclear application, and is strictly regulated by the U.S. Commerce Department. Exporting the metallic powder without an OFAC license is illegal.[97]
- It was reported that Iran's Atomic Energy Organization (AEOI) made an attempt to purchase tons of controlled carbon fiber without a prior notification to the procurement working group established under the JCPOA, but failed. A Washington-based institute wrote: "This attempt thus raises concerns over whether Iran intends to abide by its JCPOA commitments…Iran may seek to stockpile the carbon fiber so as to be able to build advanced centrifuge rotors far beyond its current needs under the JCPOA." The institute added that Iran might continue to make illegal efforts to acquire dual-use items including

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[92] Anna Fifield, "How Did North Korea Get Its Hands on a New Zealand Plane Made with American Parts?" *Washington Post*, October 3, 2016, https://www.washingtonpost.com/world/how-did-north-korea-get-its-hands-on-a-new-zealand-plane-made-with-american-parts/2016/10/03/105591d2-892e-11e6-8a68-b4ce96c78e04_story.html.

[93] "Hong Kong Turns Away N.Korean Ship," *The Chosunilbo*, March 11, 2016, http://english.chosun.com/site/data/html_dir/2016/03/11/2016031101496.html.

[94] "Vietnam, China Ban Blacklisted N.Korean Officials," *The Chosunilbo*, June 3, 2016, http://english.chosun.com/site/data/html_dir/2016/06/03/2016060301468.html.

[95] Chun Han Wong and Jay Solomon, "U.S. Move against Firm Suspected of Aiding North Korean Nuclear Program," *Wall Street Journal*, September 19, 2016, http://www.wsj.com/articles/u-s-china-move-against-firm-suspected-of-aiding-north-korean-nuclear-program-1474300834.

[96] "Hongxiang Industrial Development Circumvented Sanctions Using Apple Boxes," *Daily NK*, September 21, 2016, http://www.dailynk.com/english/read.php?cataId=nk01500&num=14089.

[97] Department of Justice, Office of Public Affairs, "CEO of International Metallurgical Company Pleads Guilty to Conspiring to Export Specialty Metals to Iran," June 14, 2016.

carbon fiber, a report estimated.[98]

- Germany's Federal Office for the Protection of the Constitution stated in its 2015 annual reported that Iran's "illegal proliferation-sensitive procurement activities in Germany registered by the Federal Office for the Protection of the Constitution persisted in 2015 at what is, even by international standards, a quantitatively high level. This holds true in particular with regard to items which can be used in the field of nuclear technology…Against this backdrop it is safe to expect that Iran will continue its intensive procurement activities in Germany using clandestine methods to achieve its objectives."[99]

Nuclear-related cooperation between concerned states

In addition to the (reported) illicit activities mentioned above, it was alleged that North Korea and Iran have been engaged in nuclear and missile development cooperation. Although bilateral cooperation has been well documented in the area of missiles, little evidence has been revealed in terms of allegations of their nuclear-related cooperation.[100]

There was also an unconfirmed report of alleged collaboration between North Korea and Pakistan in the nuclear field. The report, which surfaced in Indian newspapers, claimed that Pakistan supplied 'Monel' and 'Inconel' material to North Korea in violation of UN sanctions. According to the news articles, the Pakistan Energy Commission (PAEC) originally obtained the material from China.[101] However, a British study which examined the alleged case stated that "it was not possible to reach a conclusion about whether the transfers to DPRK occurred." This study concluded that "given the opacity of North Korean operations, and the difficulty in tracking trade to the DPRK, it is a particular challenge to find relevant links."[102] A study on Pakistan's continuous procurement for its nuclear and missile programs reported that "no evidence was found in the course of this study to suggest that Pakistan is involved in onward proliferation to the DPRK or elsewhere."[103]

D) Participation in the PSI

As of June 2016, a total of 105 countries—including 21 member states of the Operational Expert Group (Australia, Canada, France, Germany, Japan, South Korea, the Netherlands, New Zealand, Norway, Poland, Russia, Turkey, the United Kingdom, the United States and others) as well as Belgium, Chile, Israel, Kazakhstan, the Philippines, Saudi Arabia, Switzerland, Sweden, the UAE and others—have expressed their support for the principles and objectives of the Proliferation Security Initiative (PSI), and have participated and cooperated in PSI-related activities.[104]

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[98] David Albright and Andrea Stricker, "Iranian Atomic Energy Organization Attempted Carbon Fiber Procurement," Institute for Science and International Security, July 7, 2016.

[99] Federal Ministry of Interior of Germany, *2015 Annual Report on the Protection of the Constitution: Facts and Trends*, June 2016, p. 30.

[100] John Park and Jim Walsh, *Stopping North Korea, Inc.: Sanctions Effectiveness and Unintended Consequences* (Cambridge, MA: MIT Security Program, August 2016), p. 33.

[101] "Pakistan Continuing to Sell Nuclear Materials to North Korea, Reveal US Sources," *ANI*, June 22, 2016, http://www.business-standard.com/article/international/pakistan-continuing-to-sell-nuclear-materials-to-north-korea-reveal-us-sources-116062200646_1.html.

[102] Stephan Blancke, "Examining Allegations that Pakistan Diverted Chinese-Origin Goods to the DPRK: Proliferation Case Study Series," Project Alpha, Centre for Science and Security Studies, King's College London, August 2, 2016.

[103] Project Alpha, "Pakistan's Strategic Nuclear and Missile Industries: A Baseline Study for Non-Proliferation Efforts – Public Version," Centre for Science and Security Studies, King's College London, September 2016, p. 7.

[104] Bureau of International Security and Nonproliferation, U.S. Department of State, "Proliferation Security Initiative Participants," June 9, 2015, http://www.state.gov/t/isn/c27732.htm.

In January 2016, the Mid-level political meeting on the PSI was held in Washington, D.C., in which 70 countries participated. They "recognized the fact that the PSI is, and should remain, an important tool in the fight to prevent [WMD] proliferation." They also agreed to "work even harder over the next two years leading up to the 2018 [High-Level Political Meeting (HLPM)]to improve their individual and collective interdiction capabilities through regional and global activities, exercises, workshops, actual interdictions as they occur, and continuous reassessments of the proliferation environment."[105]

The interdiction activities actually carried out within the framework of the PSI are often based on information provided by intelligence agencies; therefore, most of them are classified. However, several cases were reported of interdictions involving shipments of WMD-related material to North Korea and Iran. Additionally, participating states have endorsed the PSI statement of interdiction principles and endeavored to reinforce their capabilities for interdicting WMD through exercises and outreach activities. In September 2016, Singapore hosted an interdiction exercise, named "Exercise Deep Sabre 2016."[106]

E) Civil nuclear cooperation with non-parties to the NPT

In September 2008, the NSG agreed to grant India a waiver, allowing nuclear trade with the state. Since then, some countries have sought to engage in civil nuclear cooperation with India, and several countries, including Australia, Canada, France, Kazakhstan, South Korea, Russia and the United States, have concluded bilateral civil nuclear cooperation agreements with India.

In November 2016, after long negotiations, the Japan-India Nuclear Cooperation Agreement was signed. According to its "Note on Views and Understanding":

> The representative of the Japanese delegation stated that the Statement delivered by Mr. Pranab Mukherjee, then External Affairs Minister of India on September 5, 2008 (hereinafter referred to as "the September 5 statement") constitutes an essential basis for cooperation between the two States under the Agreement.
>
> In implementing the provisions of Article 14 of the Agreement, the representative of the Japanese delegation stated that the Government of Japan may exercise its rights and initiate the procedures stipulated in the aforementioned article where there is any change in this basis.

In "the September 5 statement," India reiterated its commitment to "a voluntary, unilateral moratorium on nuclear testing." Therefore, should India conduct any nuclear test, Japan can exercise "the right to terminate this Agreement prior to its expiration by giving one year's written notice to the other Party" and cease further cooperation, in accordance with Article 14 of the Agreement. Japan's Prime Minister Shinzo Abe stated that this agreement was a legally binding framework for ensuring India's responsible behavior on peaceful use of nuclear energy, and encouraged India, which has not acceded to the NPT, to participate in the international nuclear non-proliferation regime. He also stated that concluding such an agreement is consistent with Japan's positions on

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[105] "Proliferation Security Initiative 2016 Mid-Level Political Meeting: Chairman's Summary," Washington, DC., January 27, 2016, http://www.state.gov/t/isn/rls/rm/2016/251822.htm.

[106] U.S. Department of State, "Exercise Deep Sabre 2016," Press Release, September 29, 2016, http://www.state.gov/t/isn/rls/other/263601.htm.

pursuing a world without nuclear weapons and promoting non-proliferation.[107]

Actual nuclear cooperation with India has not necessarily been promoted, except India's receipt of uranium from France, Kazakhstan and Russia, and its conclusion of agreements to receive uranium from Argentina, Australia, Canada, Mongolia and Namibia.[108] It has been pointed out that India's liability law—which obliges not only nuclear reactor operators but also nuclear suppliers to be liable in case of a nuclear accident—poses one of the obstacles to some foreign firms proceeding with actual civil nuclear cooperation (except supplying uranium) or concluding nuclear cooperation agreements with India. One of the areas of progress in this regard is that at the summit meeting in January 2015, the United States and India agreed to establish a "nuclear insurance pool." After India's ratification of the Convention on Supplementary Compensation for Nuclear Damage (CSC) in February 2016, India and the United States agreed at the bilateral summit meeting in June:[109]

- "The steps that the two Governments have taken in the last two years through the U.S.-India Contact Group, including by addressing the nuclear liability issue, inter alia, through India's ratification of the Convention on Supplementary Compensation for Nuclear Damage, have laid a strong foundation for a long-term partnership between U.S. and Indian companies for building nuclear power plants in India.
- "Culminating a decade of partnership on civil nuclear issues, the leaders welcomed the start of preparatory work on site in India for six AP 1000 reactors to be built by Westinghouse and noted the intention of India and the U.S. Export-Import Bank to work together toward a competitive financing package for the project.
- "Once completed, the project would be among the largest of its kind, fulfilling the promise of the U.S.-India civil nuclear agreement and demonstrating a shared commitment to meet India's growing energy needs while reducing reliance on fossil fuels. Both sides welcomed the announcement by the Nuclear Power Corporation of India Ltd, and Westinghouse that engineering and site design work will begin immediately and the two sides will work toward finalizing the contractual arrangements by June 2017."

In the NSG, debates on whether India should be invited as a member, or not, have not yet been concluded. The United States and certain other states continued to support India's participation, and some states, which have resisted, softened their stance.[110] However, the NSG participating countries could not achieve consensus on India's participation at the meeting in June 2016 because of objections by China, as well as Austria, New Zealand, South Africa and Turkey.[111] Neither could they reach an agreement at the subsequent NSG Plenary on June 23-24. China, the main opponent, has argued that applicant countries must be parties to the NPT, which "is a pillar, not something that China set. It is universally recognized by the international community."[112] NSG members again

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[107] "On Japan-India Nuclear Cooperation Agreement," Ministry of Foreign Affairs of Japan, November 11, 2016, http://www.mofa.go.jp/mofaj/files/000203060.pdf. (in Japanese)

[108] Adrian Levy, "India Is Building a Top-Secret Nuclear City to Produce Thermonuclear Weapons, Experts Say," *Foreign Policy*, December 16, 2015, http://foreignpolicy.com/2015/12/16/india_nuclear_city_top_secret_china_pakistan_barc/.

[109] "The United States and India: Enduring Global Partners in the 21st Century," Joint Statement, June 7, 2016, https://www.whitehouse.gov/the-press-office/2016/06/07/joint-statement-united-states-and-india-enduring-global-partners-21st.

[110] "Resistance to India Joining Nuclear Suppliers Group Softens," *Reuters*, June 9, 2016, http://www.reuters.com/article/us-india-nuclear-idUSKCN0YV13Z.

[111] "China Scuttles India's Bid to Enter NSG," *Deccan Herald*, June 14, 2015, http://www.deccanherald.com/content/483410/china-scuttles-indias-bid-enter.html.

[112] James Pearson, "China Rejects Bending Rule for India to Join Nuclear Club," *Reuters*, June 24, 2016, http://www.reuters.com/article/us-india-nuclear-china-idUSKCN0ZA0IF.

could not decide on the matter at their November meeting.

It is reported that China will not accept India's participation in the NSG unless Pakistan is also accepted to join.[113] Pakistan has argued that it is qualified to be included in the NSG, as a state behaving responsibly regarding nuclear safety and security.

Meanwhile, China has been criticized for its April 2010 agreement to export two nuclear power reactors to Pakistan, which may constitute a violation of the NSG guidelines. China has claimed an exemption for this transaction under the "grandfather clause" of the NSG guidelines (i.e. it was not applicable as China became an NSG participant after the start of negotiations on the supply of the reactors). China will also supply enriched uranium to Pakistan for running those reactors.[114] Their construction started in November 2013 in Karachi. Because all other Chinese reactors that were claimed to be excluded from NSG guidelines under the grandfather clause were built at Chashma, there is a question about whether the exemption can also apply to the Karachi plant.[115]

The NAM countries have been critical of civil nuclear cooperation with non-NPT states, including India and Pakistan, and continue to argue that exporting states should refrain from transferring nuclear material and technologies to those states which do not accept IAEA comprehensive safeguards.

(6) Transparency in the Peaceful Use of Nuclear Energy

A) Efforts for transparency

In addition to accepting IAEA full-scope safeguards, as described earlier, a state should aim to be fully transparent about its nuclear-related activities and future plans, in order to demonstrate that it has no intention of developing nuclear weapons. A state that concludes an Additional Protocol with the IAEA is obliged to provide information on its general plans for the next ten-year period relevant to any nuclear fuel cycle development (including nuclear fuel cycle-related research and development activities). Most countries actively promoting the peaceful use of nuclear energy have issued mid- or long-term nuclear development plans, including the construction of nuclear power plants.[116] The international community may be concerned about the possible development of nuclear weapon programs when states conduct nuclear activities without publishing their nuclear development plans (e.g., Israel, North Korea and Syria), or are engaged in nuclear activities which seem inconsistent with their plans (e.g., allegedly, Iran).

From the standpoint of transparency, communications received by the IAEA from certain member states concerning their policies regarding the management of plutonium, including the amount of plutonium held, are also important. Using the format of the Guidelines for the Management of Plutonium (INFCIRC/549) agreed in 1997, the five NWS, Belgium, Germany, Japan and Switzerland annually publish data on the amount of civil unirradiated plutonium under their control. By September 2016, all nine countries declared their civilian plutonium holdings as

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[113] "China and Pakistan Join Hands to Block India's entry into Nuclear Suppliers Group," *Times of India*, May 12, 2016, http://timesofindia.indiatimes.com/india/China-and-Pakistan-join-hands-to-block-Indias-entry-into-Nuclear-Suppliers-Group/articleshow/52243719.cms.

[114] "Pakistan Starts Work on New Atomic Site, with Chinese Help," *Global Security Newswire*, November 27, 2013, http://www.nti.org/gsn/article/pakistan-begins-work-new-atomic-site-being-built-chinese-help/.

[115] Bill Gertz, "China, Pakistan Reach Nuke Agreement," *Washington Free Beacon*, March 22, 2013, http://freebeacon.com/ china-pakistan-reach-nuke-agreement/.

[116] The World Nuclear Association's website (http://world-nuclear.org/) provides summaries of the current and future plans of civil nuclear programs around the world.

of December 2015. France, Germany and the United Kingdom had reported its holdings of not only civil plutonium but also HEU. Japan's report submitted to the IAEA, mentioned above, was based on the annual report "The Current Situation of Plutonium Management in Japan" released by the Japan Atomic Energy Commission.[117]

Australia, Austria, Brazil, Canada, Chile, Egypt, Iran, Kazakhstan, South Korea, Mexico, the Netherlands, New Zealand, Nigeria, Norway, the Philippines, Poland, Saudi Arabia, South Africa, Sweden, Turkey and the UAE have published the amount of fissile material holdings, or at least have placed their declared nuclear material under IAEA safeguards. From this, it may be concluded that these states have given clear evidence of transparency about their civil nuclear activities.

B) Multilateral approaches to the fuel cycle

Several countries have sought to establish multilateral approaches to the fuel cycle, including nuclear fuel banks, as one way to dissuade NNWS from adopting indigenous enrichment technologies. Austria, Germany, Japan, Russia, the United Kingdom, the United States and the EU, as well as six countries (France, Germany, the Netherlands, Russia, the United Kingdom and the United States) jointly, have made their respective proposals.

In August 2015, Kazakhstan and the IAEA signed an agreement to establish an LEU fuel bank, which is expected to start operation in 2017,[118] and will physically reserve up to 90 tons of LEU, sufficient to run a 1,000 MW light-water reactor.[119] This is the first fuel bank under the support of the international organization: the IAEA will bear the costs of purchase and delivery of LEU; and Kazakhstan will meet the cost of LEU storage.[120] In May 2016, the IAEA and the Ulba Metallurgical Plant concluded a partnership agreement on construction of an LEU storage facility, which is scheduled to be ready for operation by September 2017.[121]

[117] Office of Atomic Energy Policy, Cabinet Office, "The Status Report of Plutonium Management in Japan—2015," July 27, 2016, http://www.aec.go.jp/jicst/NC/iinkai/teirei/siryo2016/siryo24/siryo1_e.pdf.

[118] "IAEA and Kazakhstan Agree to Create Nuclear Fuel Bank," *World Nuclear News*, August 27, 2015, http://world-nuclear-news.org/UF-IAEA-and-Kazakhstan-agree-to-create-nuclear-fuel-bank-27081501.html. While fuel bank systems have already been established respectively by Russia, the United Kingdom and the United States, it was the first case established under support by the international organization.

[119] IAEA, "IAEA and Kazakhstan Sign Agreement to Establish Low Enriched Uranium Bank," August 27, 2015, https://www.iaea.org/newscenter/news/iaea-moves-ahead-establishing-low-enriched-uranium-bank- kazakhstan.

[120] "Kazakhstan Signs IAEA 'Fuel Bank' Agreement," *World Nuclear News*, May 14, 2015, http://world-nuclear-news.org/UF-Kazakhstan-signs-IAEA-fuel-bank-agreement-14051502.html.

[121] Marta Ferrari, "IAEA LEU Bank: New Agreement Opens the Way for Construction of Storage Facility," IAEA, June 1, 2016, https://www.iaea.org/newscenter/news/new-agreement-opens-the-way-for-construction-of-iaea-leu-storage-facility.

Chapter 3. Nuclear Security[1]

The most prominent events related to nuclear security in 2016 were the fourth Nuclear Security Summit held in Washington D.C. in March, which was the final round of the summit process led by U.S. President Barack Obama, and the second IAEA's "International Conference on Nuclear Security : Commitments and Actions" (hereinafter reffered to as IAEA Nuclear Security Conference) held in Vienna in December, which was expected to lead multilateral fora to deal with nuclear security issues.[2] On May 8, the Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM),[3] whose ratification had been pending for a long time, finally entered into force. However, there were still some CPPNM member states which had not ratified the amendment. Thus, the ratifier member states discussed implementation of the amended treaty in the context of strengthening global nuclear security architecture and policy approaches to enhance effectiveness of the treaty.[4] In March 2016, simultaneous terrorist attacks occurred in Belgium, and police investigations after the incident revealed the devastating fact that the terrorists also may have attempted to attack nuclear facilities. In terms of nuclear security, this case made an impact on the international community and it can be said that each country should seriously consider and learn from the case. In this sense, 2016 was a major turning point in the development of nuclear security, which could imply the direction of future nuclear security.

In the field of international politics, the Nuclear Security Summit in Washington D.C. was significant in that the initiative on this issue, introduced by the retiring president Obama was nearly implemented. As was pointed out in the previous Hiroshima Report, the Nuclear Security Summit focused on each country's efforts to prevent nuclear terrorism, which are not usually disclosed to the public. Through participation in the Summits, states disseminated statements and their national progress reports on strengthening nuclear security, jointly issued "basket proposals" and adopted joint communiqués. Such procedures help enhance transparency and foster political cooperation among the participating countries. These mechanisms enabled participating states to objectively review their own progress in strengthening domestic nuclear security for the last two years, as well as the progress of other countries. Also, the Nuclear Security Summits, which included side events and relevant conferences, established a forum for discussion and cooperation in the area of nuclear security, as was rightly pointed out in the joint communiqués of the Washington Summit in 2016.[5]

Furthermore, the Nuclear Security Summit process had a considerable influence in terms of drawing the attention of the international community. It is noteworthy that, through the meetings to exchange views among senior officials, participating states could clarify their shared prioritized agendas.

In fact, as was indicated by the 2016 Nuclear Security Summit secretariat, several common themes emerged when

[1] This chapter is written by Sukeyuki Ichimasa.

[2] Aabha Dixit, "Continue to Effectively Strengthen Global Nuclear Security: International Conference on Nuclear Security Concludes," IAEA News, December 13, 2016, https://www.iaea.org/newscenter/news/continue-to-effectively-strengthen-global-nuclear-security-international-conference-on-nuclear-security-concludes.

[3] Vincent Fournier, "New Nuclear Security Agreement will Reduce Risk of Nuclear Terrorism," IAEA News, May 8, 2016, https://www.iaea.org/newscenter/news/new-nuclear-security-agreement-will-reduce-risk-of-nuclear-terrorism.

[4] Vincent Fournier, "Exchanging Views on the Implementation of the Convention on the Physical Protection of Nuclear Material and its Amendment," IAEA News, September 28, 2016, https://www.iaea.org/newscenter/news/exchanging-views-on-the-implementation-of-the-convention-on-the-physical-protection-of-nuclear-material-and-its-amendment.

[5] "Nuclear Security Summit 2016 Communiqués," 2016 Washington Nuclear Security Summit, April 1, 2016, https://static1.squarespace.com/static/568be36505f8e2af8023adf7/t/56fef01a2eeb810fd917abb9/1459548186895/Communiqu%C3%A9.pdf.

remaining issues and future challenges of nuclear security were discussed.[6] More than 40 countries have engaged in capacity building, through training and exercises provided by the Centers of Excellence (COE). More than 30 countries updated national laws, regulations, or structures relating to nuclear security. More than 20 countries held or invited IAEA's peer review missions, either bilaterally or through the International Physical Protection Advisory Service (IPPAS). Three countries – China, India, and Jordan –pledged to strengthen their nuclear security implementation through subscribing to the 2014 Joint Statement on Strengthening Nuclear Security Implementation (INFCIRC/869), which made the total number of the supporters 38. 18 countries took steps to increase the security of radioactive sources. 17 countries were involved in removal or disposal of nuclear materials, or minimization of highly enriched uranium (HEU). 16 countries ratified nuclear security relevant treaties or took particular steps to implement them. 15 countries carried out physical security upgrades or acquired security or detection equipment, and 12 countries joined or launched new international or regional structures to support nuclear security cooperation. Also, 12 countries indicated their financial contributions to support bilateral or international cooperation in nuclear security. 10 countries noted steps taken to support or implement the United Nations Security Council Resolution (UNSCR) 1540.[7]

At the Washington Nuclear Security Summit in 2016, 21 "Gift Basket" joint statements were released by concerned states, which covered around 19 critical issues on nuclear security. Judging from the increased number in comparison with the past Nuclear Security Summits in The Hague (14 Gift Baskets)[8] and Seoul (13 Gift Baskets)[9], it is obvious that the less stringent multilateral "Gift Basket" approach was well established through the Nuclear Security Summit process. Through these efforts of the international community towards strengthening nuclear security, which rested on the basis of every country's national responsibility, it could be said that a moderate international regime seemed to emerge.

In November 2014, Russia made a political statement that it would not attend the Washington Nuclear Security Summit on the grounds of dissatisfaction with Washington's concept for preparing the summit.[10] This decision by Russia concerned the member states. However, eventually, Russia joined the joint statement of the P5 Conference[11] in September 2016, which underscored the P5's commitment to prevent nuclear terrorism and their support for measures to strengthen overall nuclear security, and recalled the series of Nuclear Security Summits.[12]

Of course, risks associated with nuclear terrorism have not vanished even after the last four nuclear security summits. However, the summit process made senior officials of each country pay more attention to the risks. Although the process itself ended in 2016, nuclear security summits should be valued for their results: that the

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[6] "Highlights of National Progress Reports," 2016 Washington Nuclear Security Summit, April 5, 2016, http://www.nss2016.org/news/2016/4/5/highlights-from-national-progress-reports-nuclear-security-summit.

[7] Ibid.

[8] "2014 Gift Baskets," 2016 Washington Nuclear Security Summit, http://www.nss2016.org/2014/giftbaskets.

[9] Kenneth N. Luongo and Michelle Cann, "Nuclear Security: Seoul, the Netherlands, and Beyond," U.S.-Korea Institute, 2013, https://web.archive.org/web/20140310234432/http://uskoreainstitute.org/wp-content/uploads/2013/10/USKI-NSS-Report_Full.pdf, p. 18.

[10] "Comment by the Information and Press Department on US media reports that Russia does not intend to take part in preparations for the 2016 Nuclear Security Summit," Ministry of Foreign Affairs of the Russian Federation, November 5, 2014, http://www.mid.ru/bdomp/brp_4.nsf/english/FDB1C2C6F7427FE4C3257D88004155B5.

[11] Maria Looney, "The 'P5' Conferences: Past Meetings and Policy Considerations for Geneva 2013," *Backgrounder*, April 17, 2013, http://www.basicint.org/sites/default/files/p5_backgrounder_2013_final_3.pdf, p. 1.

[12] U.S. Department of State, "Joint Statement from the Nuclear-Weapons States at the 2016 Washington, DC P5 Conference," September 16, 2016, https://www.state.gov/r/pa/prs/ps/2016/09/261994.htm.

concerned states made such efforts and, looking ahead, with continual commitments to strengthen nuclear security. This is the reason why "a next step" for the maintenance and further development of the international regime on nuclear security has been a focus of constant attention of the international community.

In this sense, the emergence of the Nuclear Security Contact Group, which is based on INFCIRC/899, and its role among the international nuclear security architecture, attracted renewed attention. It is a program to sustain activities and plans on nuclear security after the 2016 Nuclear Security Summit. The group addressed continuing and evolving nuclear security challenges. It aims for advancing implementation of nuclear security commitments and building strengthened, sustainable and comprehensive global nuclear security architecture.[13] In the Washington Nuclear Security Summit in 2016, the Nuclear Security Contact Group, which is composed of representatives of 40 member states and two international organizations (INTERPOL and United Nations), also issued a Joint Statement on Sustaining Action to Strengthen Global Nuclear Security.[14]

As was mentioned in the *Hiroshima Report 2016*, the Nuclear Threat Initiative (NTI) proposed four recommendations to provide a path to sustain high-level political attention on improving nuclear security after the summit process ends.[15] In this case, the Nuclear Security Contact Group could fall under the heading of NTIs "core group of countries," which must keep nuclear security high on agendas through continued meetings for ambitious programs. In this way, states can continue building consensus on a global system for nuclear security, assess implementation of nuclear security commitments, and have a forum for reporting and accountability. Apparently, it is important for the Nuclear Security Contact Group and the IAEA to clearly identify and play a specific role according to the characteristics of each organization. In fact, there have been raising expectations of multilateral coordination for nuclear security among the member states, such as organizing IAEA Nuclear Security Conferences and relevant activities with other international organizations.

In this regard, it should be noted that the area of IAEA missions on nuclear security area has been expanding in recent years. At the IAEA Nuclear Security Conference in 2016, a number of member states mentioned the IAEA's tasks in this area and offered financial assistance for the Agency. In fact, the long list of IAEA nuclear-security-relevant activities in 2016 clearly shows the significant influence of the IAEA's tasks in this field. In detailed terms, according to the list, 379 events in total were held in the context of nuclear security, which included 26 IAEA international review missions such as the IPPAS/INSSP relevant events, 31 technical visits, 73 training events, 60 technical guidance related events, 97 other workshops, 71 expert consultancy meetings and technical conferences, and 21 other meetings.[16]

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[13] INFCIRC/899, November 2, 2016, https://www.iaea.org/sites/default/files/publications/documents/infcircs/2016/infcirc899.pdf.

[14] The following are member states of the Nuclear Security Contact Group; Argentina, Armenia, Australia, Belgium, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Georgia, Germany, Hungary, India, Italy, Japan, Jordan, Kazakhstan, Lithuania, Mexico, Morocco, the Netherlands, New Zealand, Nigeria, Norway, South Korea, Romania, Poland, Singapore, Spain, Sweden, Switzerland, Thailand, Ukraine, UAE, United Kingdom, United States, and Vietnam. The White House Office of the Press Secretary, "Joint Statement on Sustaining Action to Strengthen Global Nuclear Security," April 1, 2016, https://www.whitehouse.gov/the-press-office/2016/04/01/joint-statement-sustaining-action-strengthen-global-nuclear-security.

[15] NTI, "Nuclear Security Summit 2016," NTI Nuclear Security Index Website, ntiindex.org/overview-highlights/nuclear-security-summit-2016/.

[16] IAEA, "Meeting Calendar," IAEA Website, http://www-ns.iaea.org/meetings/default.asptme=ns&yr=2016&s=10&l=79&submit.x=5&submit.y=7.

The second ministerial-level IAEA Nuclear Security Conference in 2016, was also a meaningful event. The Ministerial Declaration at this conference pointed out the positive impact of the IAEA's increasing efforts on this field, while noting that much work still needs to be done by the IAEA,[17] for example: facilitating international cooperation through the IAEA; playing a central role in organizing information exchange meetings with other organizations; taking initiatives on nuclear security; responding to requests for assistance from states which are trying to establish effective and sustainable national nuclear security regimes; providing support to such states, such as guidance development, advisory services, and capacity building; continuing efforts to promote universalization of the Amendment to the Convention on the Physical Protection on Nuclear Material; facilitating technical exchanges of knowledge, experiences and good practices on the use and security of high activity radioactive sources; strengthening nuclear security culture; offering education and training opportunities in nuclear security; and organizing IAEA Nuclear Security Conferences every three years.

In view of the factors mentioned above, this report surveys the following items to evaluate the implementation of nuclear security-related measures of each country. In order to assess the nuclear security risks of each, this report considers: indicators of the presence of nuclear material that is "attractive" for malicious intent, facilities to produce such material, and related activities. It also examines the accession status to nuclear security-related international conventions, the implementation status of existing nuclear security measures and proposals to enhance them, and official statements related to nuclear security approaches, in order to evaluate the nuclear security performance and status of each county.

(1) The Amount of Fissile Material Usable for Weapons

According to the IAEA definition, a nuclear security threat is "a person or group of persons with motivation, intention and capability to commit criminal or intentional unauthorized acts involving or directed at nuclear material, other radioactive material, associated facilities or associated activities or other acts determined by the State to have an adverse impact on nuclear security."[18] Also, the IAEA recommends that the State's physical protection requirements for nuclear material and nuclear facilities should be based on a Design Basis Threat (DBT), specifically for unauthorized removal of Category I nuclear material, sabotage of nuclear material and nuclear facilities that have potentially high radiological consequences. Also, the State should decide whether to use a threat assessment or DBT for other nuclear material and nuclear facilities.[19] The Agency also states that: "The determination of a national threat to radioactive material in use, storage and transport and associated facilities is a key step in establishing the required security measures."[20]

The latest version of the IAEA's "Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities" (INFCIRC/225/Rev.5) was revised and published in 2011. In this revised edition, the IAEA recommends that requirements for physical protection should be based on a graded approach, taking into account the current evaluation of the threat, the relative attractiveness, the nature of the nuclear material and potential

[17] "Ministerial Declaration, International Conference on Nuclear Security: Commitments and Actions," December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/english_ministerial_declaration.pdf.

[18] IAEA Nuclear Security Series No.20, "Objective and Essential Elements of a State's Nuclear Security Regime," 2013, http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1590_web.pdf.

[19] IAEA Nuclear Security Series No.13, "Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)," 2011, p. 13.

[20] IAEA Nuclear Security Series No.14, "Nuclear Security Recommendations on Radioactive Material and Associated Facilities," 2011, pp. 13-14.

consequences associated with the unauthorized removal of nuclear material and with the sabotage against nuclear material or nuclear facilities.[21] The IAEA also suggests that the physical protection system should be designed to deny unauthorized access of persons or equipment to the targets, minimize opportunity of insiders, and protect the targets against possible stand-off attacks consistent with the State's threat assessment or DBT.[22] The objectives of the State's physical protection regime, which is an essential component of the State's nuclear security regime, should be to protect against unauthorized removal, locate and recover missing nuclear material, protect against sabotage, and mitigate or minimize effects of sabotage.[23]

The nuclear material itself is the primary factor for determining the physical protection measures against unauthorized removal. Therefore, categorization based on the different types of nuclear material in terms of element, isotope, quantity and irradiation is the basis for a graded approach for protection against unauthorized removal of "attractive" nuclear material that could be used in a nuclear explosive device, which itself depends on the type of nuclear material, isotopic composition, physical and chemical form, degree of dilution, radiation level, and quantity.[24] In accordance with the IAEA's definitions:

- Category I consists of 2 kg or more of unirradiated plutonium, 5 kg or more of unirradiated uranium enriched to 20% uranium-235 or more and 2 kg or more of unirradiated uranium-233.
- Category II consists of less than 2 kg but more than 500 g of unirradiated plutonium, less than 5 kg but more than 1 kg of unirradiated uranium enriched to 20% uranium-235 or more, 10 kg or more of unirradiated uranium enriched to 10% uranium-235 but less than 20% uranium-235, and, less than 2 kg but more than 500 g of unirradiated uranium-233.
- Category III consists of 500 g or less but more than 15g of un-irradiated plutonium, 1 kg or less but more than 15g, less than 10kg but more than 1 kg/10 kg or more of un-irradiated uranium enriched to 20% uranium-235 or more, unirradiated uranium enriched to 10% uranium-235 but less than 20% uranium-235, unirradiated uranium enriched above natural, but less than 10% uranium-235, and 500 g or less but more than 15 g of un-irradiated uranium-233.[25]

Generally, plutonium with an isotopic concentration of plutonium 239 of 80% or more is more attractive than other plutonium isotopes from a standpoint of manufacturing nuclear explosive devices by terrorists. Also, weapons-grade HEU is usually enriched to 90% or higher levels of U-235. Both of these high-grade nuclear materials require high-level protection measures. In assessing the importance of preventing illegal transfers, countries that do not possess weapon-grade HEU or plutonium but have a nuclear reactor with a reprocessing facility or a uranium enrichment facility appear to be most at risk. The existence of the above-mentioned facilities in a country enhances the level of nuclear security risk that the country faces, and the exact number of those will be the subject of assessment for state's effort on enhancing nuclear security. Table 3-1 shows the latest evaluations made by the International Panel on Fissile Material (IPFM) in its "Global Fissile Material Report 2016," and by other relevant research bodies, of such fissile material holdings.

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[21] IAEA Nuclear Security Series No.13, "Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Rev.5)," 2011, paragraph 3.37.

[22] Ibid., paragraph 5.14.

[23] Ibid., paragraph 2.1.

[24] Ibid., paragraph 4.5.

[25] Ibid., paragraph 4.6, table 1.

As it has been widely acknowledged, more than 90% of global HEU and weapon grade plutonium stockpile is possessed by the United States and Russia, and that, along with all the rest of the fissile material possessed by several countries, it presents attractive targets to a terrorist. While the global stockpile of fissile material usable for weapons has been occupying the attention of the international community and civil society, there is little officially disclosed information about stockpiles of HEU and weapon grade plutonium by individual states, due to its sensitivity. In spite of these constraints, in principle, it is necessary to emphasize the importance of transparency of nuclear material holdings.

In accordance with the NTI's "Civilian HEU Dynamic Map,"[26] the estimated holdings of HEU and plutonium of some countries other than the ones in Table 3-1 are estimated as follows:

- Countries assumed to retain 1 ton of HEU (category I is 5 kg and more): Kazakhstan (10,470-10,820 kg), and Canada (1,035 kg* new)
- Countries assumed to retain 1 kg and more but less than 1 ton of HEU (category I is 5 kg and more): Australia (2 kg), Iran (8 kg), the Netherlands (730-810 kg), Nigeria (less than 1 kg*), Norway (1-9 kg), South Africa (700-750 kg (unspecified)), and Syria (less than 1 kg).

  *: Updated figures in 2016.

In this connection, Indonesia and Poland officially declared to remove all the remaining HEU and plutonium in 2016.[27]

For reference information, estimated holdings of HEU and plutonium of some countries not in the list of this survey are as follows:

- Countries assumed to retain 1 kg and more but less than 1 ton of HEU: Belarus (80-280 kg), Italy (100-119 kg), Ghana (less than 1 kg).[28]

[26] NTI, "Civilian HEU Dynamic Map," NTI Website, October 2016, http://www.nti.org/gmap/other_maps/heu/.
[27] Ibid.
[28] Ibid.

Table 3-1: Stockpiles of fissile material usable for weapons (estimates in 2016)

[Metric Tons]

	China	France	Russia	U.K.	U.S.	India
HEU	**18 ± 4**	**(max) 30.6**	**679**	**21.2**	**599***	**3.2 ±1.1**
Stockpile available for weapons		26, or maximum 10±2*, minimum 6±2*	650	19.8	253	
Naval (fresh)			20		152	
Naval (irradiated)					31	
Civilian Material		4.6	9	1.4	20	4.5*
Excess (mostly for blend-down)					146.6	
Weapon Pu	**1.8***	**6**	**128 ±8**	**3.2**	**87.6**	**5.7***
Military stockpile	1.8	6	88	3.2	38.3	0.4
Excess military material			34	0	49.3	
Additional strategic stockpile			**6**			**0.4***
Civilian use Pu	0.025*	61.9	52.8*	103.3		0.4*
Civilian stockpile, stored in country (Dec. 2010)		61.9	52.8*	103.3		0.59*
Civilian stockpile, stored outside country (Dec. 2010)						

	Israel	Pakistan	Belgium	Germany	Japan	Switzerland	N. Korea	Others
HEU	**0.3**	**3.1 ± 0.4**	**0.7-0.727***	**0.95**	**1.2-1.8***	**0**	**0.042**	**15**
Stockpile available for weapons								
Naval (fresh)								
Naval (irradiated)								
Civilian Material							0.042	15
Excess (mostly for blend-down)								
Weapon Pu	**0.86**	**0.19**					**0.03**	
Military stockpile	0.86	0.19					0.03	
Excess military material								
Additional strategic stockpile								
Civilian use Pu			0.9	2.1	47.8	< 0.05		52.8*
Civilian stockpile, stored in country (Dec. 2010)				2.1	10.8			
Civilian stockpile, stored outside country (Dec. 2010)					37			

Sources: International Panel on Fissile Materials, "Fissile Materials Stocks," International Panel on Fissile Materials, July 29, 2016; International Panel on Fissile Materials, "Global Fissile Material Report 2015: Nuclear Weapon and Fissile Material Stockpiles and Production," International Panel on Fissile Materials, December 2015; Zia Mian and Alexander Glaser, "Global Fissile Material Report 2015: Nuclear Weapon and Fissile Material Stockpiles and Production," International Panel on Fissile Materials, May 8, 2015; Civilian HEU Dynamic Map, October 2016, http://www.nti.org/gmap/other_maps/heu/; Document distributed at the 24th session of the Japan Atomic Energy Commission, July 27, 2016, http://www.aec.go.jp/jicst/NC/iinkai/teirei/siryo2016/siryo24/siryo1.pdf.
*: Updated figures in 2016.

In assessing the importance of preventing illegal transfers, countries that do not possess plutonium or weapon-grade HEU but have a nuclear reactor with a reprocessing facility or a uranium enrichment facility appear to be most at risk. As for unauthorized removal, using nuclear or other radioactive material also constitutes a security risk.

The IAEA's database on world research reactors shows that 230 out of a total of 774 research reactors are currently in operation (146 in developed countries, 84 in developing countries). Another 19 reactors (9 in developed countries, 10 in developing countries) are temporarily shut down, 9 reactors (5 in developed countries, 4 in developing countries) are under construction, 10 reactors (3 in developed countries, 7 in developing countries) are scheduled for construction, 135 reactors (115 in developed countries, 20 in developing countries) have been shut down, 356 reactors (331 in developed countries, 25 in developing countries) are decommissioned, and construction of 8 reactors (4 in developed countries, 4 in developing countries) have been canceled.[29]

It has been pointed out that many of the research reactors that have been shut down, but not decommissioned, still have spent HEU fuel on-site. Also, it has been reported that over 20,665 spent fuel assemblies from research reactors are enriched to levels above 20% and 9,534 of these stored fuel assemblies are enriched to levels at or above 90%.[30] In terms of geographical distribution: 10,627 spent HEU fuel assemblies, which are over half of the total, are currently stored in Eastern Europe, 572 are located in Africa and Middle East, 3,492 in Asia, 4,273 in Western Europe, 85 in Latin America and 1,614 in North America.[31] Therefore, in terms of managing nuclear security risks around reactors, measures against illegal transfer are always going to be indispensable, whether the reactors are in operation, temporarily shut down or decommissioned.

Table 3-2 outlines the presence of nuclear power plants, research reactors, uranium enrichment facilities, and reprocessing facilities in surveyed countries, as risk indicators of unauthorized removal for a nuclear explosive device, or possession of nuclear material usable for weapons.

In this regard, IAEA recommends that a state defines the risk based on the amount, forms, composition, mobility, and accessibility of nuclear and other radioactive material and takes prospective measures against the defined risk.[32] As for sabotage within a plant, the IAEA also recommends that a state "establishes its threshold(s) of unacceptable radiological consequences" and identifies the vital areas where risk associated materials, devices, and functions are located are designated "in order to determine appropriate levels of physical protection taking into account existing nuclear safety and radiation protection."[33]

In terms of fissile material attractiveness, the issue of radiological security has also received a central focus and full weight of global nuclear security discussion in most recent years. It could be said that the Nuclear Security Series No.11 "Security of Radioactive Sources,"[34] issued by the IAEA in 2009, and the Nuclear Security Summits

[29] IAEA, "Research Reactor Data Base," IAEA Website, https://nucleus.iaea.org/RRDB/RR/ReactorSearch.aspx?rf=1.

[30] Ibid.

[31] Ibid.

[32] IAEA Nuclear Security Series No. 14, "Nuclear Security Recommendations on Radioactive Material and Associated Facilities," 2011, http://www-pub.iaea.org/MTCD/publications/PDF/Pub1487_web.pdf.

[33] Ibid., p. 14.

[34] IAEA Nuclear Security Series No. 11, "Security of Radioactive Sources," 2009, http://www-pub.iaea.org/MTCD/publications/PDF/Pub1387_web.pdf.

process, have heightened the state's awareness on the issues of radiological security. In fact, on the occasion of the Washington Nuclear Security Summit in 2016, 28 countries and INTERPOL jointly released a "Gift Basket" statement on strengthening the security of high activity sealed radioactive sources, reflecting the IAEA's code of conduct on the safety and security of radioactive sources.[35] The Ministerial Declaration at the IAEA Nuclear Security Conference reaffirmed its commitment to maintain effective security of radioactive sources throughout their life cycle, consistent with the Code of Conduct on the Safety and Security of Radioactive Sources.[36] France prepared a gift basket submitted to the Nuclear Security Summit 2016 in the field of radioactive sources[37] and also carried out substantial operations of securing and repatriation of radioactive sources abroad, in order to secure them in liaison with the IAEA.[38] From 2000 to March 2016, a total of 54 high-activity radioactive sources have been either evacuated from third States to France or secured on site in the recipient states with French expertise and/or assistance.[39] China organized and conducted a number of control activities including radioactive source security checks.[40] In India, an e-licensing platform (e-LORA) to facilitate end-to-end licensing of facilities using radiation sources has been operationalized.[41] Pakistan's physical security at a number of nuclear medical centers has been upgraded in order to prevent the malicious use of radioactive sources, consistent with the IAEA Code of Conduct on Safety and Security of Radioactive Sources.[42] Germany hosted a workshop entitled Safety and Security of Radioactive Sources in September 2016. As a result of the discussions at the workshop, Germany called upon the IAEA to explore possibilities to bring the Agency's Security Recommendations into an internationally legally binding form.[43] The Philippines has installed security alarm systems for facilities with high-risk radioactive sources, through the support of the United States Department of Energy. The Philippines also implemented security upgrades in hospitals and other relevant facilities with radioactive sources.[44]

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[35] "Joint Statement Strengthening the Security of High Activity Sealed Radioactive Sources (HASS)," 2016 Washington Nuclear Security Summit, March 11, 2016, https://static1.squarespace.com/static/568be36505f8e2af8023adf7/t/57050be927d4bd14a1daad3f/1459948521768/Joint+Statement+on+the+Security+of+High+Activity+Radioactive+Sources.pdf.

[36] "Ministerial Declaration, International Conference on Nuclear Security: Commitments and Actions," December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/english_ministerial_declaration.pdf.

[37] "National Progress Report: France," 2016 Washington Nuclear Security Summit, March 31, 2016, http://www.nss2016.org/document-center-docs/2016/3/31/national-progress-report-france.

[38] "Déclaration nationale: France," Conférence sur la Sécurité Nucléaire,Décembre 5 au 9, 2016, https://www.iaea.org/sites/default/files/16/12/statement_france_dec_2016.pdf.

[39] "National Progress Report: France," 2016 Washington Nuclear Security Summit, March 31, 2016, http://www.nss2016.org/document-center-docs/2016/3/31/national-progress-report-france.

[40] Statement of China at the IAEA International Conference on Nuclear Security by Shi Zhongjun, Permanent Representative of the People's Republic of China to the UN and other International Organization in Vienna, December 6, 2016, https://www.iaea.org/sites/default/files/16/12/china_statement_dec_2016_en.pdf.

[41] Statement of India at the IAEA Ministerial Conference on Nuclear Security by M.J. Akbar, Minister of State for External Affairs, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/india_statement_dec_2016.pdf.

[42] Statement of Pakistan at the IAEA International Conference on Nuclear Security by Aizaz Ahmed Chaudhry, Foreign Secretary, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/pakistan_statement_final_dec_2016.pdf.

[43] Statement of Germany at the IAEA International Conference on Nuclear Security by Rita Schwarzelühr-Sutter, Minister of State, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/germany_statement_dec_2016.pdf.

[44] Statement of the Philippines at the IAEA International Conference on Nuclear Security by Rowena Cristinal L. Guevara, Undersecretary for Research and Development, Department of Science and Technology, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/philippines_statement_dec_2016.pdf.

Table 3-2：Nuclear fuel cycle facilities

	China	France	Russia	U.K.	U.S.	India	Israel	Pakistan	Australia	Austria	Belgium	Brazil
Nuclear Power Plant	○	○	○	○	○	○		○			○	○
Research Reactor	○	○	○	○	○	○	○	○	○	○	○	○
Uranium Enrichment Facility	○	○	○	○	○	○[a]	?	○[a]				○
Reprocessing Facility	○	○	○[b]	○	○	○[b]	○[a]	○[a]				

	Canada	Chile	Egypt	Germany	Indonesia	Iran	Japan	Kazakhstan	South Korea	Mexico	Netherlands	New Zealand
Nuclear Power Plant	○			○		○	○	○	○	○	○	
Research Reactor	○	○	○	○	○	○	○	○	○	○	○	
Uranium Enrichment Facility				○		○	○				○	
Reprocessing Facility							△[h]					

	Nigeria	Norway	Philippines	Poland	Saudi Arabia	South Africa	Sweden	Switzerland	Syria	Turkey	UAE	North Korea
Nuclear Power Plant						○	○	○			△[e]	
Research Reactor	○	○		○	△[g]	○	△[f]	○	○	○		○[a]
Uranium Enrichment Facility						△[c]						△[g]
Reprocessing Facility												△[ai]

○: Currently operated, △: Un-operated

a) Military use/ b) Military and civilian use/ c) Under decommissioning/ d) Under shut down/
e) Under construction/ f) Under shut down and decommissioning/
g) Under construction, the actual status is unknown/ h) Under test operation/ i) Stand-by

Sources: IAEA, Research Reactor Database, IAEA Website, https://nucleus.iaea.org/RRDB/RR/ReactorSearch.aspx?filter=0; IAEA, Nuclear Fuel Cycle Information System, IAEA Website, http://infcis.iaea.org/NFCIS/About.cshtml; International Panel on Fissile Materials, "Global Fissile Material Report 2015."

(2) Status of Accession to Nuclear Security and Safety-Related Conventions, Participation in Nuclear Security-Related Initiatives, and Application to Domestic Systems

A) Accession status to nuclear security-related conventions

In this section, the accession status of each country to the following nuclear security and safety-related conventions that are mentioned in the Nuclear Security Summit communiqué[45] is examined, namely: Convention on the Physical Protection of Nuclear Material (CPPNM); Amendment to CPPNM (CPPNM Amendment); International Convention for the Suppression of Acts of Nuclear Terrorism (Nuclear Terrorism Convention); Convention on Nuclear Safety (Nuclear Safety Convention); Convention on Early Notification of a Nuclear Accident; Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management; and Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency.

The CPPNM became effective in 1987. As of December 6, 2016, 155 countries have signed and 44 countries have ratified this treaty.[46] The CPPNM requires its party states to take appropriate protection measures for international transfer of nuclear material used for peaceful purposes, and not permit its transfer in the case that such measures are not in place. It also calls for the criminalization of acts including unauthorized receipt, possession, use, transfer, alteration, disposal or dispersal of nuclear material, and which causes damage to any person or property, as well as theft or robbery of nuclear material.

The CPPNM Amendment became effective in May 8, 2016 with the deposit of the instrument of ratification by Nicaragua, which brought the number of adherences to 102 States Parties to the CPPNM—the threshold required for the agreement to come into effect.[47] As of December 20, 2016, 107 states have approved the Amendment.[48] The Amendment makes it legally binding for States to establish, implement and maintain an appropriate physical protection regime applicable to nuclear material and nuclear facilities under their jurisdiction. It provides for the criminalization of new and extended specified acts, and requires countries to put in place measures to protect nuclear material and nuclear facilities against sabotage. In this sense, the Amendment expands the existing offences identified in the CPPNM, including the theft and robbery of nuclear material, and establishes new ones, such as the smuggling of nuclear material and the actual or threatened sabotage of nuclear facilities. A number of the offences were also expanded to include substantial damage to the environment. As the significant legally binding international undertaking in the area of physical protection of nuclear material, ratification of the Amendment should be continuously promoted.

The Nuclear Terrorism Convention, which entered into force in 2007, requires party states to criminalize acts of possession and use of radioactive material or nuclear explosive devices with malicious intent, and against those seeking to use and damage nuclear facilities in order to cause radioactive dispersal. The convention and the CPPNM Amendment are mutually necessary to support a legal framework of the nuclear security at this stage.

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[45] "Nuclear Security Summit 2016 Communiqués," 2016 Washington Nuclear Security Summit, April 1, 2016.

[46] Convention on the Physical Protection of Nuclear Material, December 6, 2016, http://www.iaea.org/Publications/Documents/Conventions/cppnm_status.pdf.

[47] Anthony Wetherall and Vincent Fournier, "Key Nuclear Security Agreement to Enter Into Force on 8 May," IAEA News, April 8, 2016, https://www.iaea.org/newscenter/news/key-nuclear-security-agreement-to-enter-into-force-on-8-may; Amendment to the Convention on the Physical Protection of Nuclear Material, December 20, 2016, https://www.iaea.org/Publications/Documents/Conventions/cppnm_amend_status.pdf.

[48] Ibid.

The Nuclear Safety Convention became effective in 1996. This treaty is aimed at ensuring and enhancing the safety of nuclear power plants. Party states of this Convention are required to take legal and administrative measures, report to the review committee established under this convention, and accept peer review in order to ensure the safety of nuclear power plants under their jurisdiction.

The Convention on Early Notification of a Nuclear Accident entered into force in 1986. It obligates its party states to immediately report to the IAEA when a nuclear accident has occurred, including the type, time, and location of the accident and relevant information.

The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management became effective in 2001. It calls for its member states to take legal and administrative measures, report to its review committee, and undergo peer review by other parties, for the purpose of ensuring safety of spent fuel and radioactive waste.

The Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency entered into force in 1987. This convention establishes the international framework that enables equipment provision and dispatch of experts with the goals of preventing and/or minimizing nuclear accidents and radioactive emergencies.

Some, if not all, of these nuclear safety-related conventions can be interpreted as providing protective measures for nuclear security purposes, and thus could be listed as nuclear security-related international conventions. Table 3-3 summarizes the signature and ratification status of each country to these conventions.

Table 3-3: Signature and ratification status for major nuclear security- and safety-related conventions

	China	France	Russia	U.K.	U.S.	India	Israel	Pakistan	Australia	Austria	Belgium	Brazil
CPPNM	○	○	○	○	○	○	○	○	○	○	○	○
CPPNM Amendment	○	○	○	○	○	○	○	○*	○	○	○	△*
Nuclear Terrorism Convention	○	○	○	○	○*	○	△		○	○	○	○
Nuclear Safety Convention	○	○	○	○	○	○	△	○	○	○	○	○
Convention on Early Notification of a Nuclear Accident	○	○	○	○	○	○	○	○	○	○	○	○
Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	○	○	○	○	○				○	○	○	○
Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency	○	○	○	○	○	○	○	○	○	○	○	○

	Canada	Chile	Egypt	Germany	Indonesia	Iran	Japan	Kazakhstan	South Korea	Mexico	Netherlands	New Zealand
CPPNM	○	○	△*	○	○		○	○	○	○	○	○
CPPNM Amendment	○	○	△*	○	○		○	○	○*	○	○	○*
Nuclear Terrorism Convention	○	○	△	○	○		○	○	○	○	○	○*
Nuclear Safety Convention	○	○	△	○	○		○	○	○	○	○	
Convention on Early Notification of a Nuclear Accident	○	○	○	○	○	○	○	○	○	○	○	○
Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	○	○		○	○		○	○	○		○	
Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency	○	○	○	○	○	○	○	○	○	○	○	○

	Nigeria	Norway	Philippines	Poland	Saudi Arabia	South Africa	Sweden	Switzerland	Syria	Turkey	UAE	North Korea
CPPNM	○	○	○	○	○	○	○	○		○	○	
CPPNM Amendment	○	○	△*	○	○		○	○		○	○	
Nuclear Terrorism Convention	○	○	△	○	○	○	○	○	△	○	○	
Nuclear Safety Convention	○	○	△	○	○	○	○	○	△	○	○	
Convention on Early Notification of a Nuclear Accident	○	○	○	○	○	○	○	○	△	○	○	△
Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	○	○	△	○	○	○	○	○			○	
Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency	○	○	○	○	○	○	○	○	△	○	○	△

○: Ratification, acceptance, approval, and accession
△: Signature
*: Updated figures in 2016.

B) INFCIRC/225/Rev.5

In 2011, the IAEA published a fifth revision of the "Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Rev.5)". In comparison with the INFCIRC/225/Rev.4, this latest revision introduces new measures on nuclear security: inter alia, creation of limited access areas, graded approaches, the enhancement of defense-in-depth, and protection against "Stand-off Attack" and airborne threat, counter measures against insider threat, development of nuclear security culture as a preventive measure against security breaches by insiders, and the provision of redundancy measures to ensure the functions of the central response station during an emergency. Implementation of the protective measures in accordance with the recommendation made by this fifth revision has been encouraged internationally, with a view to establishing a stronger nuclear security system. Furthermore, this revision stipulates a number of state responsibilities on establishing a contingency plan, including interfaces with safety, as appropriate, ensuring that operator prepares contingency plans to effectively counter the threat assessment or DBT taking actions of the response forces into consideration, evaluating effectiveness of the physical protection system through exercises, and determining the trustworthiness policy.

As clearly identified in the Seoul nuclear security summit communiqué,[49] all participating states are urged to make efforts to take up measures recommended in the INFCIRC/225/Rev.5. For instance, according to the communiqué of the Nuclear Security Summit in The Hague,[50] participating states attach great value to the IAEA's support for national efforts to improve nuclear security. Also, the communiqué mentions that the IAEA's nuclear security guidance, contained in the IAEA Nuclear Security Series of publications, provides the basis for effective nuclear security measures at national level. That is the reason why the participating states encourage all states to utilize this guidance as appropriate.[51] In 2016, although the importance of the INFCIRC/225/Rev.5 was not directly mentioned in the communiqué of Washington Nuclear Security Summit, Japan, the Netherland, the Philippines and South Korea referred it in their progress reports.[52]

In this regard, the application status of the recommended measures of INFCIRC/225/Rev.5 can serve as a significant indicator to assess the nuclear security system of this report's surveyed countries. This report refers to official statements made available in the IAEA Nuclear Security Conference in 2016 and the Washington Nuclear Security Summit, as well as other opportunities to evaluate the national nuclear security stance and performance of each state.

Application Status of Each Country of the Measures Recommended in INFCIRC/225/Rev.5[53]

In 2016, two major nuclear security related events, the fourth Nuclear Security Summit and IAEA Nuclear Security Conference took place. Therefore, information related to the domestic application of measures recommended in INFCIRC/225/Rev.5 and its follow-up work on implementation was generally voluminous among the surveyed countries. Since the IAEA published INFCIRC/225/Rev.5 in 2011, many surveyed countries have already stated

[49] "Seoul Communiqué," 2012 Seoul Nuclear Security Summit, March 27, 2012.

[50] "Hague Communiqué," 2014 Hague Nuclear Security Summit, March 25, 2014.

[51] Ibid.

[52] "Highlights of National Progress Reports," 2016 Washington Nuclear Security Summit, April 5, 2016, http://www.nss2016.org/news/2016/4/5/highlights-from-national-progress-reports-nuclear-security-summit.

[53] Progress statements made in the Hague Nuclear Security Summit, http://www.nss2016.org/2016-progress-reports/.

their satisfaction with recommended measures and marked general progress, while identifying challenges on domestic implementation. The following section summarizes the states' efforts that were announced on the occasion of the Washington Nuclear Security Summit and the IAEA Nuclear Security Conference in 2016, taken by some countries to accommodate the recommended measures of INFCIRC/225/Rev.5. In this respect, it should be noted that some countries have not specified when the satisfaction with recommended measures was carried out.

In the field of the development of legal instruments, China adopted a State Security Law and Anti-Terrorism Law in 2015.[54] In 2016, China was in the process of legislating the Atomic Energy Law, the Nuclear Safety Law and Nuclear Security Regulations.[55] India said the security of nuclear and radiological material was constantly ensured through robust oversight by India's Atomic Energy Regulatory Board (AERB), and the Nuclear Safety Regulatory Authority (NSRA) Bill had been proposed, in order to give a statutory basis to its regulator.[56] Pakistan said it regularly reviewed and updated national nuclear security regime, which was based on national legislative, regulatory and administrative measures.[57] Belgium said it set up a strict regulatory framework, aimed at improving nuclear security infrastructure, including an extensive system of clearances.[58] Brazil approved new anti-terrorism legislation in 2016 that criminalizes terrorist acts with nuclear or radioactive materials.[59] Iran said it strengthened the "Regulatory Commission on Nuclear and Radiation Facilities and Activities in Iran" in order to substantiate its legislative and regulatory framework for the 3S (Safety, Safeguards and Security), as well as to manage effectively the regulatory authorization and control in areas such as physical protection.[60] In Mexico, the Federal Penal Code was amended to criminalize and punish terrorist acts, sabotage and theft of radioactive materials, nuclear fuel, sources of radiation and instruments that emit radiation.[61] New Zealand enacted the Radiation Safety Act (2016), which completely overhauled and updated its domestic legislative framework dealing with the safety and security of nuclear and radioactive material.[62] Turkeys Penal Code has been updated and revised continually to take into account its nuclear security related international obligations.[63]

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[54] "National Progress Report: China," 2016 Washington Nuclear Security Summit, March 31, 2016, http://www.nss2016.org/document-center-docs/2016/3/31/national-progress-report-china-1.

[55] Statement of China at the IAEA International Conference on Nuclear Security by Shi Zhongjun, Permanent Representative of the People's Republic of China to the UN and other International Organization in Vienna, December 6, 2016, https://www.iaea.org/sites/default/files/16/12/china_statement_dec_2016_en.pdf.

[56] Statement of India at the IAEA Ministerial Conference on Nuclear Security by M.J. Akbar, Minister of State for External Affairs, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/india_statement_dec_2016.pdf.

[57] Statement of Pakistan at the IAEA International Conference on Nuclear Security by Aizaz Ahmed Chaudhry, Foreign Secretary, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/pakistan_statement_final_dec_2016.pdf.

[58] Statement of Belgium at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/belgium_statement_dec_2016.pdf.

[59] Statement of Brazil at the IAEA International Conference on Nuclear Security by Marcel Biato, Permanent Representative of Brazil to the IAEA, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/brazil_statement_dec_2016.pdf.

[60] Statement of Iran at the IAEA International Conference on Nuclear Security, Ali Akbar Salehi, Vice-President, Head, Atomic Energy Organization of Iran, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/iran_statement_dec_2016.pdf.

[61] Statement of Mexico at the IAEA International Conference on Nuclear Security, Embajadora Alicia Buenrostro Massieu, Permanent Representative of Mexico to the IAEA, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/mexico_statement_dec_2016.pdf.

[62] Statement of New Zealand at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/new_zealand_statement_dec_2016.pdf.

[63] Statement of Turley at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/turkey_statement_dec_2016.pdf.

In the area of strengthening physical protection measures, Israel said it has followed the IAEA guidance regarding the security of nuclear facilities, and the protection of materials used in nuclear research and applications.[64] In Brazil, the "Brazilian Nuclear Program Protection System" (SIPRON) supervises and coordinates actions of several governmental agencies and entities aimed at ensuring the appropriate capacity for prompt response to nuclear emergency situations and for the protection of its nuclear materials and installations.[65] The Philippines has worked continuously on the physical protection system of the Philippines Research Reactor-1 with the assistance of Canada. The programe is expected to be completed in early of 2017.[66] Poland adopted the National Anti-terrorist Program in 2014, and a special task-force group for developing proposals to strengthen the anti-terrorist security of the nuclear research reactor "Maria" was established as a part of the inter-ministerial team for terrorist threat. The group formulated a number of recommendations.[67]

As for the measures against sabotage, the United States stated its increasing focus on detection countermeasures, in cooperation with the IAEA, around key high-population density urban areas, as part of a more robust defense-in-depth approach to national level nuclear detection architectures.[68] Israel has conducted periodic national preparedness and response exercises, with the participation of international observers and partners.[69] Pakistan has established a purpose-raised standalone, specially trained and equipped nuclear security force with land, air, and sea-borne components, supported by dedicated intelligence and early warning system.[70] Belgium stated that it has started to set up a new directorate of the Federal Police tasked with providing a permanent armed response capacity at nuclear sites. In the meantime, the Belgian military has been deployed at its nuclear sites to provide this armed response capacity, until the new directorate is fully operational.[71]

With regard to cyber-terrorism, a joint U.S.-U.K. civil nuclear exercise, building on the successful "Resilient Shield" exercise, was held in November 2015 between U.S. and U.K. financial sectors, designed to test government and industry responses to cyber security threats.[72] China reported it has been continuously enhancing related legislations, strengthening management on information security of industrial control system and cyber security

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[64] Statement of Israel at the IAEA International Conference on Nuclear Security by Zeev Snir, Head, Israel Atomic Energy Committee, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/israel_statement_dec_2016.pdf.

[65] Statement of Brazil at the IAEA International Conference on Nuclear Security by Marcel Biato, Permanent Representative of Brazil to the IAEA, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/brazil_statement_dec_2016.pdf.

[66] Statement of the Philippines at the IAEA International Conference on Nuclear Security by Rowena Cristinal L. Guevara, Undersecretary for Research and Development, Department of Science and Technology, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/philippines_statement_dec_2016.pdf.

[67] Statement of Poland at the IAEA International Conference on Nuclear Security by Andrzej J. Piotrowski, Undersecretary of State, Ministry of Energy of the Republic of Poland, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/poland_statement_dec_2016.pdf.

[68] Statement of the United States at the IAEA International Conference on Nuclear Security by Ernest Moniz, United States Secretary of Energy, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/usa_statement_dec_2016.pdf.

[69] Statement of Israel at the IAEA International Conference on Nuclear Security by Zeev Snir, Head, Israel Atomic Energy Committee, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/israel_statement_dec_2016.pdf.

[70] Statement of Pakistan at the IAEA International Conference on Nuclear Security by Aizaz Ahmed Chaudhry, Foreign Secretary, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/pakistan_statement_final_dec_2016.pdf.

[71] Statement of Belgium at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/belgium_statement_dec_2016.pdf.

[72] The White House Office of the Press Secretary, "Fact Sheet: Cyber Security of Industrial Control and Plant Systems at Nuclear Facilities," 2016 Washington Nuclear Security Summit, April 6, 2016, http://www.nss2016.org/document-center-docs/2016/4/1/fact-sheet-joint-statement-on-cyber-security.

in the internet industry, and enhancing capability to ensure information security and cyber security of its nuclear industry.[73] In 2016, China organized and conducted nuclear-facility-specific cyber security checks.[74] France stated that a law on cyber security that applies to the critical infrastructures, including nuclear facilities, was adopted in late 2013 and will contribute to a reinforcement of the requirements on cyber security.[75] U.K. has delivered two workshops on industrial control systems for international participants.[76] India stated that it will continue to evolve technology against nuclear terrorism, to guard against cyber intrusion and sabotage.[77] Germany announced plans to host an international workshop on computer security in 2018.[78]

In terms of transport security, Japan expressed its intention to have the "gift basket" on transport security as an IAEA INFCIRC and to re-open it for welcoming new co-sponsorships.[79] Mexico reported the creation of a Regulation for the safe transport of radioactive material, which may enter into force during 2017.[80] The Philippines stated that its national competent authority now requires licensees to submit a transport security plan before transporting their radioactive material.[81]

In the field of protection measures against insider threats, Belgium said it has set up a strict regulatory framework, aimed at improving nuclear security infrastructure, including an extensive system of clearances.[82] In 2016, in order to strengthen measures against insider threats of nuclear facilities, Japan revised related regulations that obligate nuclear operators to confirm the human reliability.[83] Although it is not included in the list of this survey, Finland's Radiation and Nuclear Safety Authority has recently revised its security regulations for nuclear operators, requiring the development of preventive measures against insider threats.[84]

In terms of nuclear security culture, China announced that the National Energy Administration and China Atomic

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[73] "National Progress Report: China," 2016 Washington Nuclear Security Summit, March 31, 2016, http://www.nss2016.org/document-center-docs/2016/3/31/national-progress-report-china-1.

[74] Statement of China at the IAEA International Conference on Nuclear Security by Shi Zhongjun, Permanent Representative of the People's Republic of China to the UN and other International Organization in Vienna, December 6, 2016, https://www.iaea.org/sites/default/files/16/12/china_statement_dec_2016_en.pdf.

[75] "National Progress Report: France," 2016 Washington Nuclear Security Summit, March 31, 2016, http://www.nss2016.org/document-center-docs/2016/3/31/national-progress-report-france.

[76] Statement of UK at the IAEA International Conference on Nuclear Security by Baroness Neville-Rolfe, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/uk_statement_dec_2016.pdf.

[77] Statement of India at the IAEA Ministerial Conference on Nuclear Security by M.J. Akbar, Minister of State for External Affairs, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/india_statement_dec_2016.pdf.

[78] Statement of Germany at the IAEA International Conference on Nuclear Security by Rita Schwarzelühr-Sutter, Minister of State, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/germany_statement_dec_2016.pdf.

[79] Statement of Japan at the IAEA Ministerial Conference on Nuclear Security by Kentaro Sonoura, State Minister for Foreign Affairs, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/japan_statement_dec_2016.pdf.

[80] Statement of Mexico at the IAEA International Conference on Nuclear Security, Embajadora Alicia Buenrostro Massieu, Permanent Representative of Mexico to the IAEA, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/mexico_statement_dec_2016.pdf.

[81] Statement of the Philippines at the IAEA International Conference on Nuclear Security by Rowena Cristinal L. Guevara, Undersecretary for Research and Development, Department of Science and Technology, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/philippines_statement_dec_2016.pdf.

[82] Statement of Belgium at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/belgium_statement_dec_2016.pdf.

[83] *The Denki Shinbun*, September 8, 2016, http://www.shimbun.denki.or.jp/news/energy/20160908_03.html.

[84] Miklos Gaspar, "Security Culture: One for All, and All for One," IAEA News, December 2, 2016, https://www.iaea.org/newscenter/news/security-culture-one-for-all-and-all-for-one.

Energy Authority jointly published the Policy Statement on Nuclear Security Culture, which calls on the nuclear industry and wider society to strengthen nuclear security culture.[85] Canada announced plans to seek endorsement of a Joint Statement in support of certified training for managers and personnel involved in nuclear security, provided by the Academy of the World Institute for Nuclear Security (WINS), in terms of fostering a sustainable nuclear security culture through training and certifying professionals.[86] Nigeria reported its national strategy for building human resources for the reinforcement of a robust national nuclear security regime, and its intention to imbed security and safety culture as an intrinsic component in the training of nuclear professionals.[87]

Table 3-4: Application status and efforts for recommended measures of INFCIRC/225/Rev.5

	China	France	Russia	U.K.	U.S.	India	Israel	Pakistan	Australia	Austria	Belgium	Brazil
Application Status and Efforts for Recommended Measures	○	○	○	○	○	○	○*	○	○		○	○

	Canada	Chile	Egypt	Germany	Indonesia	Iran	Japan	Kazakhstan	South Korea	Mexico	Netherlands	New Zealand
Application Status and Efforts for Recommended Measures	○	○		○	○	○*	○	○	○	○	○	○

	Nigeria	Norway	Philippines	Poland	Saudi Arabia	South Africa	Sweden	Switzerland	Syria	Turkey	UAE	North Korea
Application Status and Efforts for Recommended Measures	○*		○*	○*		○	○	○		○	○	

"○" is shown for only the countries for which the related information is available or that have made official remarks about their effort for INFCIRC/225/Rev.5.
*: Updated figures in 2016.

[85] "National Progress Report: China," 2016 Washington Nuclear Security Summit, March 31, 2016, http://www.nss2016.org/document-center-docs/2016/3/31/national-progress-report-china-1.

[86] Statement of Canada at the IAEA International Conference on Nuclear Security, Mark Bailey, Permanent Representative of Canada to the IAEA, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/canada_statement_dec_2016.pdf.

[87] Statement of Nigeria at the IAEA International Conference on Nuclear Security by Hon Geoffrey Onyeama, Minister of Foreign Affairs, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/statement_nigeria_dec_2016.pdf.

(3) Efforts to Maintain and Improve the Highest Level of Nuclear Security

A) Minimization of HEU in civilian use

In 2009, U.S. president Barack Obama announced a new international effort to secure all vulnerable nuclear material around the world within four years in his "Prague speech."[88] In 2010, as a new initiative by the Obama administration, the first Nuclear Security Summit was held in Washington, and this diplomatic effort continued as the biennial Nuclear Security Summit process. Both of the Nuclear Security Summits and the triennial IAEA Nuclear Security Conferences since 2013 established a forum to exchange views on various issues pertaining to nuclear security. In these processes, the overall perception of nuclear security risks on fissile material, which had been widely used in the civil nuclear programs, was increased.

Currently, HEU has been utilized for civilian purposes through its use in research reactors and isotope production reactors. However, as is often highlighted as "two sides of the same coin," it is the case that HEU can also be used for manufacturing nuclear explosive devices. If it is removed from regulatory control without authorization, such as by theft, it becomes possible that non-state actors as well as states can produce nuclear explosive devices. To address this particular concern, the United States in 2004 introduced the Global Threat Reduction Intiative (GTRI) inaugurated to manage the return of Russian and U.S.-origin HEU located in civilian sites to the country of origin, and conversion of research reactors to operate with low enriched uranium (LEU).

Throughout the Nuclear Security Summit process, minimization of HEU in civilian use was treated as one of the top priority issues. The 2014 Hague Nuclear Security Summit Communiqué stipulates to keep state stockpiles of separated plutonium to the minimum level consistent with national requirements.[89] In accordance with the Fact Sheet on "The Nuclear Security Summits: Securing the World from Nuclear Terrorism", issued by the U.S. White House on the occasion of the Washington Nuclear Security Summit in 2016, more than 50 facilities in 30 countries had successfully completed the removal, or confirmed the downblending, of HEU and plutonium. [90] This work has resulted in the entire continent of South America and wide swaths of central Europe now completely free of these materials. Once Indonesia completes disposal of its HEU through downblending to LEU, Southeast Asia will join these regions as being free of all such material.[91]

In terms of risk management, it is undesirable to have stockpiles of proliferated "attractive" fissile material. Although it might become a controversial discussion on its outcome assessment, the recent efforts made in minimizing HEU and plutonium use in civilian purposes constitutes a further welcome step, as long as such steps are consistent with each country's national requirements. In this regard, the "Joint Statement on In Larger Security: A Comprehensive Approach to Nuclear Security" was issued at the Washington Nuclear Security Summit in March 2016.[92] Also, it is worth noting that at the IAEA Nuclear Security Conference in 2016, some countries pointed out another

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[88] Remarks by President Barack Obama in Prague as Delivered, The White House Office of the Press Secretary, April 5, 2009, https://www.whitehouse.gov/the-press-office/remarks-president-barack-obama-prague-delivered.

[89] "Hague Communiqué," 2014 Hague Nuclear Security Summit, March 25, 2014.

[90] The White House Office of the Press Secretary, "Fact Sheet: The Nuclear Security Summits: Securing the World from Nuclear Terrorism," March 29, 2016, https://obamawhitehouse.archives.gov/the-press-office/2016/03/29/fact-sheet-nuclear-security-summits-securing-world-nuclear-terrorism.

[91] The White House Office of the Press Secretary, "Fact Sheet: Downblending in Indonesia," April 06, 2016, http://www.nss2016.org/document-center-docs/2016/4/1/fact-sheet-downblending-in-indonesia.

[92] "Joint Statement on In Larger Security: A Comprehensive Approach to Nuclear Security," 2016 Washington Nuclear Security Summit, April 5, 2016, http://www.nss2016.org/document-center-docs/2016/4/1/gift-basket-from-brazil.

aspect of minimizing HEU and plutonium use. The main points of argument were roughly as follows: assurance for highest level of protection of nuclear materials in military use should be necessary;[93] reduction of the number of nuclear weapons would improve nuclear security a lot,[94] and minimization efforts should cover both civilian and military stocks.[95] It can be said that these are points that should not be disregarded in considering the direction of discussions over nuclear security in the future.

In the above regard, at the Washington Nuclear Security Summit, IAEA Nuclear Security Conference, and on other occasions, the following updates on commitments to minimizing HEU and plutonium use were made:

- China reported it was committed to conversion of the remaining Miniature Neutron Source Reactors (MNSR) at Shenzhen University from HEU to low-enriched uranium (LEU) fuel.[96] Also, the core of the HEU research reactor in Chinese Institute of Atomic Energy was discharged in September 2015, and conversion of this reactor to using LEU was completed in 2016.[97]
- France committed to close the high-performance research reactor Orphée, which is fueled using HEU, by 2019.[98]
- The United States announced that it was embarking on an effort to dilute and dispose of approximately 6 metric tons of excess plutonium from the Savannah River Site, in addition to the 34 metric tons of material it has committed to dispose under the U.S.-Russia plutonium management and disposition agreement.[99]
- India has contributed to measures to minimize HEU use by removing the enriched uranium based fuel in its oldest research reactor "APSARA" and said it strictly observed the principle of reprocess to reuse, whereby reprocessing of spent fuel and commissioning of fast reactors is intended to preclude any build-up of a plutonium stockpile.[100]

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[93] Statement of Australia at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/australia_statement_dec_2016.pdf; Statement of Mexico at the IAEA International Conference on Nuclear Security, Embajadora Alicia Buenrostro Massieu, Permanent Representative of Mexico to the IAEA, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/mexico_statement_dec_2016.pdf; Statement of New Zealand at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/new_zealand_statement_dec_2016.pdf.

[94] Statement of Austria at the IAEA International Conference on Nuclear Security, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/austria_statement_dec_2016.pdf; Statement of Brazil at the IAEA International Conference on Nuclear Security by Marcel Biato, Permanent Representative of Brazil to the IAEA, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/brazil_statement_dec_2016.pdf; Statement of Egypt at the IAEA International Conference on Nuclear Security by Hisham Badr, Assistant Foreign Minister for Multilateral Affairs and International Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/egypt_statement_dec_2016.pdf.

[95] Statement of South Africa at the IAEA International Conference on Nuclear Security by Tebogo Seokolo, Permanent Representative of South Africa to the IAEA, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/south_africa_statement_dec_2016.pdf; Statement of Switzerland at the IAEA International Conference on Nuclear Security by Doris Leuthard, Vice-President of the Swiss Confederation, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/switzerland_statement_dec_2016_0.pdf.

[96] "Highlights of National Progress Reports," 2016 Washington Nuclear Security Summit, April 5, 2016, http://www.nss2016.org/news/2016/4/5/highlights-from-national-progress-reports-nuclear-security-summit.

[97] "National Progress Report: China," 2016 Washington Nuclear Security Summit, March 31, 2016, http://www.nss2016.org/document-center-docs/2016/3/31/national-progress-report-china-1.

[98] "Highlights of National Progress Reports," 2016 Washington Nuclear Security Summit, April 5, 2016, http://www.nss2016.org/news/2016/4/5/highlights-from-national-progress-reports-nuclear-security-summit.

[99] Statement of the United States at the IAEA International Conference on Nuclear Security by Ernest Moniz, United States Secretary of Energy, December 5, 2016,https://www.iaea.org/sites/default/files/16/12/usa_statement_dec_2016.pdf.

[100] Statement of India at the IAEA Ministerial Conference on Nuclear Security by M.J. Akbar, Minister of State for External Affairs, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/india_statement_dec_2016.pdf.

- Australia has contributed to minimize holdings of HEU, including by use of LEU for the production of medical radioisotopes, by significantly expanding its production of medical radioisotopes for the global market, and using LEU for both fuel and targets. The new nuclear medicine plant, which adopts the same technology, at the Australian Nuclear Science and Technology Organisation (ANSTO) will become operational in 2017.[101]
- Belgium reported that the Belgian research center SCK-CEN is leading an international cooperation effort with the aim of qualifying high-density LEU-fuels, which can be used in different high performance research reactors throughout the world. The conversion of the research reactor BR2 to LEU will occur as soon as the appropriate high-density fuel has been qualified for these purposes. The conversion of the processing facility of the National Institute for Radioelements (IRE) for medical radio-isotopes is very advanced and runs on schedule.[102]
- Canada reported that it is in the final stages of concluding a project with the IAEA to help secure disused radioactive sources in five Latin American countries, through the removal of radioactive sources of Canadian and other origins.[103]
- Indonesia has completed the process of downblending HEU to LEU in August 2016. The LEU has now been used in the production of radio-isotopes and in the operation of its nuclear research reactors.[104]
- Kazakhstan and the IAEA signed an agreement on the establishment of an international LEU Bank in Kazakhstan in August 2015. The LEU Bank will be launched in the second half of 2017. Also, the transition into LEU fuel of the research reactor VVR-K and critical stand has been completed in Almaty. Kazakhstan announced that they are currently studying the possibility of transfer of fuel in two research reactors into LEU.[105]
- Nigeria reported that conversion of the reactor core of the Nigeria Research Reactor-1 (NIRR-1) from using HEU to LEU fuel is in progress.[106]
- Norway announced plans to host an international conference in 2018, to review progress on the measures set out in the Nuclear Security Summit Gift Basket on Minimizing and Eliminating the Use of HEU in Civilian Applications.[107]
- Japan and the United States jointly announced that they have completed the removal of all HEU and plutonium fuels from the Fast Critical Assembly (FCA) in Japan. Also, all HEU fuels from the Kyoto University Critical Assembly (KUCA) will be removed to the United States within the framework for

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[101] Statement of Australia at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/australia_statement_dec_2016.pdf.

[102] Statement of Belgium at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/belgium_statement_dec_2016.pdf.

[103] Statement of Canada at the IAEA International Conference on Nuclear Security, Mark Bailey, Permanent Representative of Canada to the IAEA, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/canada_statement_dec_2016.pdf.

[104] Statement of Indonesia at the IAEA International Conference on Nuclear Security by Rachmat Budiman, Permanent Representative of Indonesia to the UN and other International Organizations in Vienna, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/indonesia_statement_dec_2016.pdf.

[105] Statement of Kazakhstan at the IAEA International Conference on Nuclear Security by Kairat Sarybay, Permanent Representative of Kazakhstan to the UN and other International Organizations in Vienna, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/kazakhstan_statement_dec_2016.pdf.

[106] Statement of Nigeria at the IAEA International Conference on Nuclear Security by Hon Geoffrey Onyeama, Minister of Foreign Affairs, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/statement_nigeria_dec_2016.pdf.

[107] Statement of Norway at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/norway_statement_dec_2016.pdf.

cooperation.[108]

According to the NTI's "Nuclear Security Index 2016," momentum on reducing the amount of dangerous nuclear materials worldwide, and on better securing existing stocks, has slowed. Only one state with 1 kg or more of weapons-usable nuclear materials, namely Uzbekistan, has removed its materials in the past two years, in comparison with seven states that had removed their materials in the two years before the 2014 NTI Index was published.[109] IPFM also pointed out that more than 27 countries still possessed HEU for civilian purposes as of September 24, 2015.[110] In this sense, minimization of excessive HEU in civilian use remains an issue across the globe. As was pointed at the beginning of this section, HEU and plutonium in military use was also fingered by some countries as a matter of the minimization challenges.

B) Prevention of illicit trafficking

Nuclear detection, nuclear forensics, research and development of new technologies to strengthen enforcement capacity of law enforcement machinery and customs departments, and participation in the IAEA's Illicit Trafficking Data Base (ITDB) have been regarded as important measures for preventing illicit trafficking of nuclear materials. In particular, the IAEA ITDB is the database on incidents related to unauthorized possession, illicit trafficking, illegal dispersal of radioactive material, and discovery of nuclear and other radioactive material out of regulatory control. The ITDB has been regarded not only as an essential component of the information platform supporting the IAEA's Nuclear Security Plan 2014-2017,[111] but also in terms of statistics, which bring to light the real existence of a nuclear security threat.

As of December 31, 2015, 131 States had participated in the ITDB program.[112] According to the latest *IAEA Annual Report 2015*, States confirmed 226 incidents during 2015.[113] On the other hand, the IAEA Nuclear Security Report[114] specifies the following details. During the reporting period, States reported, or otherwise confirmed to the ITDB program, a total of 180 incidents. Of these, 111 occurred between July 1, 2015 and June 30, 2016, and the remaining cases had occurred prior to July 1, 2015 but were not reported by that date. Of the 180 reported incidents, 14 involved illicit possession of, and attempts to sell, nuclear material or radioactive sources, with five of these incidents involving nuclear material. There were 43 reported cases of theft or loss of radioactive sources, five of which involved the theft of Category 2 radioactive sources. A total of 123 reported incidents involved other unauthorized activities. Two of the reports involved HEU.

As of the year-end 2015, the ITDB contained a total of 2,889 confirmed incidents reported by participating States.

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[108] "Joint Statement on U.S.-Japan Cooperation," 2016 Washington Nuclear Security Summit, March 31, 2016, http://www.nss2016.org/document-center-docs/2016/4/1/joint-statement-on-us-japan-cooperation.

[109] NTI Nuclear Security Index, "Theft / Sabotage: Building a Framework for Assurance, Accountability, and Action (3rd Edition), " January 2016, ntiindex.org/wp-content/uploads/2013/12/NTI_2016-Index_FINAL.pdf, p. 7.

[110] IPFM, "Materials: Highly-Enriched Uranium," IPFM Website, http://fissilematerials.org/materials/heu.html.

[111] IAEA, "ITDB: Incident and Trafficking Database," https://www.iaea.org/sites/default/files/16/12/16-3042_ns_to_itdb_web-20160105.pdf.

[112] IAEA, "Incident and Trafficking Database (ITDB) 2016 Fact Sheet," IAEA Website, https://www-ns.iaea.org/downloads/security/itdb-fact-sheet.pdf.

[113] IAEA, *IAEA Annual Report 2015*, GC(60)/9, https://www.iaea.org/About/Policy/GC/GC60/GC60Documents/English/gc60-9_en.pdf, pp. 90-91.

[114] IAEA, *Nuclear Security Report 2016*, GOV/2015/42-GC(59)/12, July 13, 2015, https://www.iaea.org/About/Policy/GC/GC60/GC60Documents/English/gc60-11_en.pdf, p. 5.

Of these 2,889 confirmed incidents, 454 incidents involved unauthorized possession and related criminal activities, 762 incidents involved reported theft or loss and 1,622 incidents involved other unauthorized activities and events. In the remaining 71 cases, the reported information was not sufficient to determine the category of incident.[115]

In light of protecting sensitive information, detailed information on incidents and illicit trafficking is not published. Therefore, as it is not possible to assess the involvement of the surveyed countries, this report considers only their respective participation status.

Preventive measures against illicit trafficking of nuclear and other radiological material include the development of legal instruments for export control and enforced detection capability, such as the installation of sensing devices for radiological material at national borders and reinforcing nuclear forensic capabilities. The following describe some of efforts taken from 2015 to 2016 as preventive measures against illicit trafficking of nuclear and other radiological material:

- China has been pushing forward the construction of the National Base for Research and Development of Nuclear and Radiological Safety and Security Monitoring Technologies, and strengthening such capabilities. Also, China has signed cooperation documents with the U.S. and Russia on preventing illicit trafficking of nuclear and other radioactive material, and conducted a joint exercise with Russia on preventing illicit trafficking of nuclear and other radioactive material on borders in October 2015.[116]
- The United States expressed its intention to foster practical implementation and sustainment of nuclear forensics capabilities in several key areas, through developing and implementing an expert testimony training program for nuclear forensic scientists, to establish practices for how to describe nuclear forensics conclusions in judicial proceedings, and to further cultivate expertise.[117]
- India announced plans to establish a counter nuclear smuggling team in 2015, which enables it to promote a coordinated multi-agency approach to deal with the threat of individuals or group of individuals acquiring nuclear or radioactive material for malicious purposes.[118]
- Pakistan has deployed vehicular and pedestrian radiation detection equipment at entry and exit points to deter, detect and prevent illicit trafficking of nuclear and radioactive materials.[119]
- Indonesia announced plans to install radiation portal monitors in their main ports.[120]
- The Philippines reported plans to introduce systematically enhanced detection capabilities, through supporting the U.S. Megaports initiative, for special nuclear and other radioactive materials in containerized cargo transiting the global maritime shipping network. As part of this initiative, the

[115] IAEA, Incident and Trafficking Database (ITDB) 2016 Fact Sheet.

[116] "National Progress Report: China," 2016 Washington Nuclear Security Summit, March 31, 2016, http://www.nss2016.org/document-center-docs/2016/3/31/national-progress-report-china-1.

[117] The White House Office of the Press Secretary, "Fact Sheet: Joint Statement on Forensics in Nuclear Security," April 6, 2016, http://www.nss2016.org/document-center-docs/2016/4/1/fact-sheet-joint-statement-on-forensics-in-nuclear-security.

[118] Statement of India at the IAEA Ministerial Conference on Nuclear Security by M.J. Akbar, Minister of State for External Affairs, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/india_statement_dec_2016.pdf.

[119] Statement of Pakistan at the IAEA International Conference on Nuclear Security by Aizaz Ahmed Chaudhry, Foreign Secretary, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/pakistan_statement_final_dec_2016.pdf.

[120] Statement of Indonesia at the IAEA International Conference on Nuclear Security by Rachmat Budiman, Permanent Representative of Indonesia to the UN and other International Organizations in Vienna, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/indonesia_statement_dec_2016.pdf.

Philippines installed 20 radiation portal monitors at the Port of Manila and at Cebu International Port.[121]

- Poland reported that the Polish Border Guard continued the process of improving its counter-smuggling capabilities in cooperation with the U.S. Department of Energy, with regard to nuclear materials. A number of relevant trainings and exercises have been conducted.[122]
- UAE hosted the first Inter-Arab Nuclear Detection and Response Exercise "FALCON" in Abu Dhabi, in February 2016.[123]

In terms of the international and regional organization's efforts, INTERPOL reported to begin providing long-term technical resources and training in the counter-nuclear smuggling area to Jordan, backed by Canada and Jordan. It also announced a plan to replicate the program in Mexico soon.[124] In accordance with its General Assembly resolution of 2011 "On raising awareness of INTERPOL'S CBRNE Programme," the Radiological and Nuclear Terrorism Prevention Unit (RNTPU) of INTERPOL's CBRNE Sub-Directorate is the focal point of the counter-terrorism activities of INTERPOL in the area of nuclear and radiological threats. On the occasion of the Washington Nuclear Security Summit in 2016, INTERPOL announced plans to provide a forum for collecting operational data, providing investigative support, driving actions and building confidence between national law enforcement communities, and coordinating law enforcement aspects of addressing criminal and terrorist offences involving nuclear or other radioactive material.[125]

Table 3-5 shows the implementation status regarding the minimization of HEU for peaceful purposes, the participation status for the ITDB and measures for the prevention of illegal transfer of nuclear material and other radiological materials, based on official statements made at the Washington Nuclear Security Summits, IAEA Nuclear Security Conference in 2016, and any other opportunities.

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[121] Statement of the Philippines at the IAEA International Conference on Nuclear Security by Rowena Cristinal L. Guevara, Undersecretary for Research and Development, Department of Science and Technology, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/philippines_statement_dec_2016.pdf.

[122] Statement of Poland at the IAEA International Conference on Nuclear Security by Andrzej J. Piotrowski, Undersecretary of State, Ministry of Energy of the Republic of Poland, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/poland_statement_dec_2016.pdf.

[123] Statement of UAE at the IAEA International Conference on Nuclear Security by Hamad Alkaabi, Permanent Representative of UAE to the UN and other International Organizations in Vienna, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/uae_statement_dec_2016.pdf.

[124] Statement at the Nuclear Security Summit 2016 in Washington by Jürgen Stock, Secretary General of the INTERPOL, April 1, 2016.

[125] Nuclear Security Summit 2016 Action Plan in Support of the International Criminal Police Organization, April 1, 2016, https://static1.squarespace.com/static/568be36505f8e2af8023adf7/t/56feeecb4d088e7781f9e4be/1459547851866/Action+Plan+-+INTERPOL_FINAL.pdf.

Table 3-5: The implementation status of the minimization of HEU for peaceful purposes and measures for the prevention of illegal transfer

	China	France	Russia	U.K.	U.S.	India	Israel	Pakistan	Australia	Austria	Belgium	Brazil
HEU minimization for peaceful purposes	○	○	○	○	○	○	○		○	○	○	○
Participation in the ITDB	○	○	○	○	○	○	○	○	○	○	○	○
Preventive measures against illegal transfer	○	○	○	○	○	○	○	○	○	○	○	○

	Canada	Chile	Egypt	Germany	Indonesia	Iran	Japan	Kazakhstan	South Korea	Mexico	Netherlands	New Zealand
HEU minimization for peaceful purposes	○	○		○			○	○	○	○	○	○
Participation in the ITDB	○	○		○	○	○	○	○	○	○	○	○
Preventive measures against illegal transfer	○	○	○	○	○*		○	○	○	○	○	○

	Nigeria	Norway	Philippines	Poland	Saudi Arabia	South Africa	Sweden	Switzerland	Syria	Turkey	UAE	North Korea
HEU minimization for peaceful purposes	○	○	○	○		○	○	○	○	○		
Participation in the ITDB	○	○	○	○	○	○	○	○		○	○	
Preventive measures against illegal transfer	○	○	○	○		○	○	○		○	○	

"○" is provided to the countries for which public information on the effort in these areas is obtained.

*: Updated figures in 2016.

C) Acceptance of international nuclear security review missions

The IPPAS provides recommendations to improve the physical protection system of nuclear material, associated facilities, and transport systems of the state, upon the request of a member state. In IPPAS missions, an IPPAS team, consisting of physical protection experts organized by the IAEA, visits government organizations and nuclear facilities in a state, reviews the physical protection system of the facility in detail, and conducts hearing investigations, in order to assess whether or not the reviewed physical protection system is in line with the recommendations of the IAEA INFCIRC/225, and to provide advice where necessary for its improvement. As was pointed in the previous issue of this report,[126] acceptance of the IAEA missions is a valuable opportunity for the member states to have an authoritative third-party peer review of its national nuclear security system. Moreover, such review missions provide some sort of public certification for a receiving state of its efforts to enhance nuclear security related capabilities. Then, as global recognition of the value of international peer review mission increases, and also the number of requests increase from the member states to receive the IPPAS mission, the IAEA requires a new foundation to satisfy these requests. In accordance with the list of the IAEA's nuclear security relevant activities in 2016, there are 26 events related to the international review missions.[127] Based on the revised version of the "IPPAS Guidelines"[128] formulated in November 2014, IPPAS team evaluates host country's nuclear security efforts while comparing with the recommendations of the INFCIRC/225/Rev.5 and other international best practices.

First of all, about 2 weeks of the IPPAS mission are carried out in the host country, following the steps of official request by the member states to the IAEA, preparation meeting, information meeting, and the IPPAS mission team selection. After that, the IPPAS mission team and host country holds a "draft report exit meeting" and then, the host country submits comments on the draft IPPAS report. Eventually, the IAEA files a final IPPAS report to the host country. Six to nine months after the submission of the final report, the IAEA conducts follow-up activities. Then, two to three years after the previous IPPAS mission, the IPPAS follow-up mission begins.[129]

In 2016, the IAEA held IPPAS preparatory meetings in Turkey (January), China (February) and Sweden (March). The IAEA conducted IPPAS review meetings in Serbia (October), Tajikistan (October) and Jordan (October). Since the United Kingdom and Poland completed their reception of IPPAS missions in February, Malaysia (April), Albania (May), Montenegro (August), Turkey (October) and UAE (October) have also completed and received the agency's review on national nuclear security practices. During the above-mentioned period, the IAEA also held an IPPAS mission follow-up meeting in Sweden (October) and international seminar to share experience and best practices from conducting IPPAS missions (November).[130] Looking ahead, France has announced its decision to

[126] Center for the Promotion of Disarmament and Non-Proliferation, The Japan Institute of International Affairs ed., *2015 Edition Hiroshima Report: Evaluation of Achievement in Nuclear Disarmament, Non-Proliferation and Nuclear Security in 2014*, Hiroshima Prefecture, March 2015, http://www.pref.hiroshima.lg.jp/uploaded/attachment/169520.pdf, p. 93.

[127] "Meetings on Nuclear Safety and Security," IAEA Website, http://www-ns.iaea.org/meetings/default.asp?tme=ns&yr=2016&s=10&l=79&submit.x=5&submit.y=7.

[128] International Physical Protection Advisory Service (IPPAS) Guidelines, 2014, http://www-pub.iaea.org/MTCD/publications/PDF/SVS-29_web.pdf.

[129] International Physical Protection Advisory Service (IPPAS), IAEA Website, http://www-ns.iaea.org/security/ippas.asp?s=4&l=26.

[130] "Meetings on Nuclear Safety and Security," IAEA Website, http://www-ns.iaea.org/meetings/default.asp?tme=ns&yr=2016&s=10&l=79&submit.x=5&submit.y=7.

host the IPPAS follow-up mission in 2017.[131] New Zealand has also stated its decision to host the IPPAS follow-up mission in 2018.[132]

Apart from the IPPAS mission, the IAEA also provides the International Nuclear Security Advisory Service (INSServ) and the Integrated Nuclear Security Support Plan (INSSP), for the sake of developing nuclear security system and capability. The INSServ provides recommendations to improve a broad spectrum of nuclear security activities of the state, by reviewing its nuclear security system and requirements. INSSP provides a platform for nuclear security work to be implemented over a period of time, thus ensuring sustainability. INSSP review missions enable the IAEA, the state concerned, and any donors financing the work, to plan and coordinate activities from both a technical and a financial point of view—optimizing the use of resources and avoiding duplications.

In 2016, the IAEA conducted coordination meetings for INSSP implementation with Libya (February) and Lebanon (July); INSSP finalization meetings in Burundi (May) and Comoros (August); INSSP review meetings in Nigeria (March), Mari (March), Central African Republic (April), Paraguay (August) and Rwanda (September); and INSSP finalization meetings in Congo (May) and Afghanistan (November).[133] The United States has announced its intention to host the INSServ mission in 2017.[134]

D) Technology development —nuclear forensics

Since 2010, the Nuclear Security Summit process has endorsed capacity building and international collaboration in the area of nuclear forensics.[135] On the occasion of the Washington Nuclear Security Summit in 2016, 30 signatory countries issued a Joint Statement on Forensics in Nuclear Security.[136] In accordance with the "IAEA Nuclear Security Series No.2-G (Rev.1) Nuclear Forensics Support (2006)"[137] definition, nuclear forensics is the technological method for the investigation of nuclear and other radiological material that has been removed without authorization from regulatory control and seized by a law enforcement authority of state. Following the increased threat perception of nuclear terrorism, technological development of nuclear forensics has been required so as to complement existing efforts to strengthen nuclear security.

In particular, analysis on intercepted illicit nuclear or radioactive material and any associated material to provide evidence for nuclear attribution is the subject matter of nuclear forensics. Therefore, nuclear forensic analysis

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[131] "Déclaration nationale: France," Conférence sur la Sécurité Nucléaire, Décembre 5 au 9, 2016, https://www.iaea.org/sites/default/files/16/12/statement_france_dec_2016.pdf; "Highlights of National Progress Reports," 2016 Washington Nuclear Security Summit, April 5, 2016, http://www.nss2016.org/news/2016/4/5/highlights-from-national-progress-reports-nuclear-security-summit.

[132] Statement of New Zealand at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/new_zealand_statement_dec_2016.pdf.

[133] "Meetings on Nuclear Safety and Security," IAEA Website, http://www-ns.iaea.org/meetings/default.asp?tme=ns&yr=2016&s=10&l=79&submit.x=5&submit.y=7.

[134] Statement of the United States at the IAEA International Conference on Nuclear Security by Ernest Moniz, United States Secretary of Energy, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/usa_statement_dec_2016.pdf.

[135] The White House, Office of the Press Secretary, "Work Plan of the Washington Nuclear Security Summit," April 13, 2010.

[136] "Joint Statement on Forensics in Nuclear Security," 2016 Washington Nuclear Security Summit, April 5, 2016, http://www.nss2016.org/document-center-docs/2016/4/1/joint-statement-on-forensics-in-nuclear-security.

[137] IAEA Nuclear Security Series No.2-G (Rev.1), "Nuclear Forensics Support," 2006, http://www-pub.iaea.org/books/IAEABooks/10797/Nuclear-Forensics-in-Support-of-Investigations.

includes the characterization of the material and correlation with its production history.[138]

As for a case of multilateral cooperation on nuclear forensics, the Nuclear Forensics International Technical Working Group (ITWG) was established in 1996 under the auspices of the G8 Non-Proliferation Expert Group (NPEG), for the purpose of addressing the issue of illegal transfers following the end of the Cold War. The ITWG serves as the platform to support the technological development and sharing of nuclear forensic methods. From 2014 to 2016, ITWG has pursued a number of activities. These include conducting comparative nuclear material exercises that socialize nuclear forensic techniques and identify best practices. In addition, ITWG conducted exercises that clarify the uses and utility of national nuclear forensic libraries in helping identify the origin of nuclear or other radioactive material found outside regulatory control.[139] The ITWG has been focusing on the promotion of nuclear forensic best practice through the development of guidelines for forensic analysis of nuclear, radioactive, and radiologically contaminated materials, and published "Guidelines for Evidence Collection in a Radiological or Nuclear Contaminated Crime Scene (2011)"[140] and "Proposed Framework for National Nuclear Forensics Libraries and International Directories (2011)."[141] Recently, ITWG has developed and propagated conceptual, technical, and analytic guidelines documents on a range of topics that include alpha and gamma spectroscopy, x-ray diffraction and related techniques.[142]

France has co-organized the annual meeting of the nuclear forensics ITWG and a forensics exercise CMX-5 in 2016 in Lyon.[143] During the meeting, participants reviewed outcomes from a 2015 ITWG exercise called "Galaxy Serpent" and preparations for a comparative material exercise (CMX-5). Guidelines on characteristic parameters of uranium dioxide (UO2) fuel pellets and on production date determination was also approved at the ITWG.[144]

Another international cooperation initiative, the Nuclear Forensic Working Group (NFWG) has been established under the framework of the Global Initiative to Combat Nuclear Terrorism (GICNT), and actively organized a number of workshops and tabletop exercises.[145] In this regard, Australia hosted a GICNT nuclear emergency planning and response workshop and exercise "Kangaroo Harbour" in May 2016, which demonstrated best practices in issuing and responding to notifications and assistance requests to increase nuclear detection, nuclear

[138] Ibid., p. 3.

[139] "EU-US Nuclear Forensics International Technical Working Group (ITWG) Joint Statement," 2016 Washington Nuclear Security Summit, April 1, 2016, http://www.nss2016.org/document-center-docs/2016/4/1/eu-us-nuclear-forensics-international-technical-working-group-itwg-joint-statement.

[140] ITWG "Guideline," ITWG Website, http://www.nf-itwg.org/sites/default/files/pdfs/ITWG_Guideline_for_RN_Evidence_Collection_FINAL.pdf.

[141] ITWG, "Nuclear Forensics Libraries," ITWG Website, http://www.nf-itwg.org/sites/default/files/pdfs/National_Nuclear_Forensic_Libraries_TOR_FINAL.pdf.

[142] EU-US Nuclear Forensics International Technical Working Group (ITWG) Joint Statement, 2016 Washington Nuclear Security Summit, April 1, 2016, http://www.nss2016.org/document-center-docs/2016/4/1/eu-us-nuclear-forensics-international-technical-working-group-itwg-joint-statement.

[143] "Highlights of National Progress Reports," 2016 Washington Nuclear Security Summit, April 5, 2016, http://www.nss2016.org/news/2016/4/5/highlights-from-national-progress-reports-nuclear-security-summit.

[144] "Nuclear Forensics Practitioners Strengthen Best Practices and International Cooperation," EU Science Hub - The European Commission's Science and Knowledge Service website, June 22, 2016, https://ec.europa.eu/jrc/en/news/nuclear-forensics-practitioners-strengthen-best-practices-and-international-cooperation.

[145] "Key Multilateral Events and Exercises," GICNT website, http://www.gicnt.org/documents/GICNT_Past_Multilateral_Events_June2015.pdf.

forensics and emergency response involving the threat and use of radioactive materials in a terrorist attack.[146] Israel reported the establishment of a national forensics laboratory to collaborate with the parties to the GICNT.[147] The Netherlands Forensic Institute (NFI) organized a five-year project named "The Hague Innovations Pathway 2014-2019 on Forensics in Nuclear Security" around the time of the Hague Nuclear Security Summit in 2014.[148] This project has been working to organize a knowledge platform, to enhance the discussion and commitment amongst experts and policymakers, a survey of good practices to investigate nuclear security incidents, a "nuclear forensics lexicon" and an education and training curriculum for experts, responders and policymakers that deal with nuclear security incidents. In 2015, the NFI organized an international conference and mock trial on nuclear forensics under the framework of the GICNT.[149] This event addressed the role of nuclear forensics experts in the investigation and prosecution of nuclear security incidents, the admissibility of nuclear forensics expert evidence into judicial proceedings, and the importance of pre-incident coordination and communication among scientists, law enforcement, and prosecutors.[150]

On the occasion of the Washington Nuclear Security Summit in 2016, the United States issued two policy proposals in the area of nuclear forensics. The first of the proposals was an expert testimony training program for nuclear forensic scientists, to establish practices for how to describe nuclear forensics conclusions in judicial proceedings. In this connection, the United States offered a training curriculum to assist the inclusion of nuclear forensics capabilities in national response frameworks.[151] Secondly, in order to promote cooperation between governments when investigating the origins of material found outside of regulatory control, the United States offered a new process as a model for receiving other governments' queries about nuclear and other radioactive material that may had been produced, used, or stored within the United States The United States. Department of State has been nominated as the national Point of Contact (POC) for the U.S. National Nuclear Forensics Library (NNFL) and the U.S. announced its readiness to receive queries through diplomatic channels.[152]

As part of the countermeasures against nuclear terrorism, the importance of nuclear forensics is definitely increasing. However, public information on the nuclear forensics capabilities of each country has been limited. For reference, the table on the nuclear forensics capabilities of the surveyed countries posted in the back number of this report is listed below. (see table 3-6, which is based on the reports made at the ITWG-17 in 2012).[153]

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[146] "National Progress Report: Australia," 2016 Washington Nuclear Security Summit, March 31, 2016, http://www.nss2016.org/document-center-docs/2016/3/31/national-progress-report-australia-1.

[147] Statement of Israel at the IAEA International Conference on Nuclear Security by Zeev Snir, Head, Israel Atomic Energy Committee, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/israel_statement_dec_2016.pdf.

[148] Netherlands Forensic Institute, "The Hague Innovation Pathway 2014-2019 on Forensics in Nuclear Security: Based on Discussions from the NSS 2014 Nuclear Forensics Gift Basket Event," January 22-23, 2014, http://english.forensischinstituut.nl/Images/nf-innovations-pathway_tcm120-555846.pdf.

[149] "National Progress Report: The Netherlands," 2016 Washington Nuclear Security Summit, March 31, 2016, http://www.nss2016.org/document-center-docs/2016/3/31/national-progress-report-the-netherlands-1.

[150] Ibid.

[151] The White House Office of the Press Secretary, "Fact Sheet: Joint Statement on Forensics in Nuclear Security," April 6, 2016, http://www.nss2016.org/document-center-docs/2016/4/1/fact-sheet-joint-statement-on-forensics-in-nuclear-security.

[152] "The United States is Prepared to Accept International Queries to its National Nuclear Forensics Library," 2016 Washington Nuclear Security Summit, April 6, 2016, http://www.nss2016.org/modelqueryprocess/?rq=forensics.

[153] Center of the Promotion of Disarmament and Non-Proliferation, the Japan Institute for International Affairs, *Hiroshima Report:Evaluation of Achievement in Nuclear Disarmament, Non-Proliferation and Nuclear Security: 2014*, Hiroshima Prefecture, March 2014, p. 82.

Table 3-6: Nuclear forensics capabilities that were reported at the ITWG-17

	Uranium	Plutonium	Other radioactive material*	Evidence contaminated by radiological material
Categorization	France	France		
	U.K.	U.K.		
	U.S.	U.S.		U.S.
	Australia			
	Canada	Canada	Canada	Canada
	Japan		Japan	
	South Korea	South Korea	South Korea	
	Sweden	Sweden	Sweden	
	Switzerland		Switzerland	
Characterization	France	France		
	U.K.	U.K.	U.K.	
	U.S.	U.S.	U.S.	U.S.
	Canada	Canada	Canada	Canada
	Japan	Japan	Japan	
	South Korea	South Korea	South Korea	
	Switzerland	Switzerland	Switzerland	
	EC-JRC(ITU)	EC-JRC(ITU)	EC-JRC(ITU)	EC-JRC(ITU)
Interpretation	France	France		
	U.S.	U.S.	U.S.	U.S.
	Canada	Canada		Canada
	Japan	Japan	Japan	
	Switzerland	Switzerland		
	EC-JRC(ITU)	EC-JRC(ITU)	EC-JRC(ITU)	EC-JRC(ITU)

*: Irradiated fuel, Th, Cm, Cs, Am, Industrial radiation source, Sealed source

E) Capacity building and support activities

Around the time when the Nuclear Security Summit process started, in many states and regions, capacity in nuclear security also began to be built-up and international cooperation efforts for nuclear security were actively promoted. These activities included those to develop teaching and training in nuclear security, for example, by setting up training courses in that field, and to establish COE for experts from these states and regions to improve their capacity in nuclear security. In particular, it is remarkable that many states concerned with this issue established COEs.

In this regard, trends in 2016 on the development of COEs for nuclear security are as follows. The China-U.S. COE came into being in Beijing in March 2016 and has hosted a number of international and regional seminars and training courses.[154] India's Global Centre for Nuclear Energy Partnership (GCNEP) has conducted more than 30 international and regional programs involving more than 300 participants from around 30 countries.[155] Indonesia established the COE on Nuclear Security and Emergency Preparedness (I-CoNSEP), Center for Security Culture and Assessment, Graduate programs in nuclear security in cooperation with the IAEA.[156] Japan announced that the Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN) has received more than 3,100 experts for training courses over the past five years and also facilitates cooperation among the other COEs.[157] Kazakhstan announced plans to construct a National Nuclear Security Training Center in Almaty before the end of 2016, with the support of the IAEA and United States.[158] South Korea's International Nuclear Non-proliferation and Security Academy (INSA) has been promoting capacity building and strengthening nuclear security culture since 2014.[159] Nigeria has finalized the institutional and technical framework for the establishment of a National Nuclear Security Center (NNSC) in Abuja.[160] The Philippines stated its intention to establish a Nuclear Security Support Center (NSSC) at the Philippine Nuclear Research Institute, which is to be pursued in coordination with a Nuclear Training Center.[161]

In spite of the above-mentioned remarkable developments, it has also been pointed out that there is a problem of overlap and duplication in the activities of these COEs, with similar objectives and targets. Some carry out training activities in the same region without prior coordination. With the aim of avoiding such redundancies, improving the institutional network through the IAEA and facilitating exchange of experts, information as well as training

[154] Statement of China at the IAEA International Conference on Nuclear Security by Shi Zhongjun, Permanent Representative of the People's Republic of China to the UN and other International Organization in Vienna, December 6, 2016, https://www.iaea.org/sites/default/files/16/12/china_statement_dec_2016_en.pdf.

[155] Statement of India at the IAEA Ministerial Conference on Nuclear Security by M.J. Akbar, Minister of State for External Affairs, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/india_statement_dec_2016.pdf.

[156] Statement of Indonesia at the IAEA International Conference on Nuclear Security by Rachmat Budiman, Permanent Representative of Indonesia to the UN and other International Organizations in Vienna, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/indonesia_statement_dec_2016.pdf.

[157] Statement of Japan at the IAEA Ministerial Conference on Nuclear Security by Kentaro Sonoura, State Minister for Foreign Affairs, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/japan_statement_dec_2016.pdf.

[158] Statement of Kazakhstan at the IAEA International Conference on Nuclear Security by Kairat Sarybay, Permanent Representative of Kazakhstan to the UN and other International Organizations in Vienna, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/kazakhstan_statement_dec_2016.pdf.

[159] "Strengthening of nuclear security regime in the ROK after the nuclear security summit," IAEA International Conference on Nuclear Security: Commitment and Actions, December 7, 2016.

[160] Statement of Nigeria at the IAEA International Conference on Nuclear Security by Hon Geoffrey Onyeama, Minister of Foreign Affairs, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/statement_nigeria_dec_2016.pdf.

[161] Statement of the Philippines at the IAEA International Conference on Nuclear Security by Rowena Cristinal L. Guevara, Undersecretary for Research and Development, Department of Science and Technology, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/philippines_statement_dec_2016.pdf.

material, various initiatives among experts have been pursued.

To maintain and further facilitate communication across the COEs, the International Network for Nuclear Security Training and Support Centres (NSSC Network) was established in 2012 under the leadership of the IAEA. Pakistan's Centre of Excellence on Nuclear Security (PCENS) hosted the annual meeting of the NSSC Network in March 2016, which was the first time that IAEA held a NSSC Network meeting outside its headquarters in Vienna.[162] In accordance with the Joint Statement on Nuclear Training and Support Centers, published on the occasion of the Washington Nuclear Security Summit in 2016, an intention was pointed toward further strengthening the NSSC Network through promoting other Nuclear Security Training and Support Centers, and for countries not yet members of the Network to join. Also, the Joint Statement emphasizes support for establishing regional networks to promote best practices, exchange training experiences, share curricula and other activities on a regional basis and by making use of the NSSC Network as a mechanism to promote peer-review exchanges. In terms of sustainability of the NSSC Network, the Joint Statement highlighted the importance of broadening and strengthening international cooperation with the United Nations, the G8GP, the GICNT and other actors. Collaboration with the International Nuclear Security Education Network (INSEN) and continuous engagement of the scientific communities, industry and civil society through constant dialogue on the importance of nuclear security was also recognized as a necessity in the Joint Statement.[163]

F) IAEA Nuclear Security Plan and Nuclear Security Fund

The fourth Nuclear Security Plan covering the period 2014-2017, which is the latest at this writing, was approved in August 2013 and has been executed.[164] For the sake of successful implementation of this plan, since 2002, when the IAEA established the Nuclear Security Fund (NSF) as a voluntary funding mechanism to prevent, detect, and respond to nuclear terrorism, the Agency has been calling on member states to make voluntary contributions to the Fund. According to the *IAEA Annual Report 2015*, total revenue of the NSF amounted to €30.40 million in 2014.[165] It shows a €6.00 million increase over that of the previous year.

In this regard, China donated $1.15 million to the NSF through 2015.[166] France contributed $1.2 million since 2014.[167] United Kingdom announced to make a further contribution of at least £5.5 million before the end of March 2017.[168] United States has given $1.8 million in 2016.[169] India announced another contribution of $ 1 million.[170]

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[162] "Pakistan's Nuclear Security Regime," Ministry of Foreign Affairs Government of Pakistan, http://www.mofa.gov.pk/documents/PNSR.pdf, p.5.

[163] "Joint Statement on Nuclear Training and Support Centres," 2016 Washington Nuclear Security Summit, April 5, 2016, http://www.nss2016.org/document-center-docs/2016/4/1/joint-statement-on-nuclear-training-and-support-centres-gb.

[164] IAEA, "Nuclear Security Plan 2014–2017 (GOV/2013/42-GC(57)/19)," August 2, 2013.

[165] IAEA, *IAEA Annual Report 2015*, GC(60)/9, p. 91.

[166] "Highlights of National Progress Reports," 2016 Washington Nuclear Security Summit, April 5, 2016, http://www.nss2016.org/news/2016/4/5/highlights-from-national-progress-reports-nuclear-security-summit.

[167] Ibid.

[168] Statement of United kingdom at the IAEA International Conference on Nuclear Security by Baroness Neville-Rolfe, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/uk_statement_dec_2016.pdf.

[169] Statement of the United States at the IAEA International Conference on Nuclear Security by Ernest Moniz, United States Secretary of Energy, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/usa_statement_dec_2016.pdf.

[170] Statement of India at the IAEA Ministerial Conference on Nuclear Security by M.J. Akbar, Minister of State for External Affairs, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/india_statement_dec_2016.pdf.

Australia contributed over AU$2.4 million to the NSF since its inception.[171] Belgium has yearly contributed for a total of more than $ 2 million to the NSF since 2010.[172] Canada announced it voluntarily contributed more than $ 31.2 million since 2004.[173] Kazakhstan's contributions to the NSF and the Peaceful Use Initiative have exceeded €1 million.[174] New Zealand has contributed over NZ$1.6 million to support international efforts to improve nuclear security and secure radioactive materials since 2013, which includes contributions to the NSF and other relevant activities.[175] Sweden announced an additional Swedish contribution of €50,000 to the NSF on the occasion of the IAEA Nuclear Security Conference in 2016.[176]

G) Participation in international efforts

The international efforts on nuclear security that this report draws attention to are not limited to the IAEA Nuclear Security Conference, the Nuclear Security Summit that ended the process in 2016, UNSCR 1540[177] and various contributions made by INTERPOL. In the present circumstances, various other multilateral frameworks relevant to nuclear security are operating around the world. The establishment of a "Global Partnership against the Spread of Weapons and Materials of Mass Destruction" (G8GP) was agreed at the G8 Kananaskis Summit in 2002. It committed the G7 to raising up to $20 billion over the next 10 years to fund nonproliferation projects, principally in Russia but also in other nations. The so-called "10 plus 10 over 10" initiative calls for the United States to contribute $10 billion, and the other original G7 nations a combined $10 billion to help the projects.[178] The Global Partnership has totally allocated well over $21 billion in funding for this effort as of April 2016.[179] In addition to the G8 member states (including France, Germany, Japan, the U.K., the U.S. and Russia), donor participants (Australia, South Korea, Sweden, Switzerland, etc.) have participated in the G8GP and carried out various projects. Of particular note are projects concerning denuclearization cooperation in Russia, which includes destruction of chemical weapons, secure dismantling and transport of decommissioned nuclear powered submarines, improved detection of nuclear and radiological materials, re-employment of former WMD scientists and technicians to civilian program, removal and safe transportation of nuclear material in Kazakhstan. The membership of the G8GP expanded to 29 states as

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[171] Statement of Australia at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/australia_statement_dec_2016.pdf.

[172] Statement of Belgium at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/belgium_statement_dec_2016.pdf.

[173] Statement of Canada at the IAEA International Conference on Nuclear Security, Mark Bailey, Permanent Representative of Canada to the IAEA, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/canada_statement_dec_2016.pdf.

[174] Statement of Kazakhstan at the IAEA International Conference on Nuclear Security by Kairat Sarybay, Permanent Representative of Kazakhstan to the UN and other International Organizations in Vienna, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/kazakhstan_statement_dec_2016.pdf.

[175] Statement of New Zealand at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/new_zealand_statement_dec_2016.pdf.

[176] Sveriges Anforande till IAEA Ministerkonferens om Nuclear Security, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/sweden_statement_dec_2016.pdf.

[177] Joint Statement on Promoting Full and Universal Implementation of UNSCR 1540 (2004), 2016 Washington Nuclear Security Summit, April 5, 2016, http://www.nss2016.org/document-center-docs/2016/4/1/joint-statement-on-1540-committee.

[178] NTI, "Global Partnership against the Spread of Weapons and Materials of Mass Destruction ("10 Plus 10 over 10 Program")," September 16, 2015, http://www.nti.org/treaties-and-regimes/global-partnership-against-spread-weapons-and-materials-mass-destruction-10-plus-10-over-10-program/.

[179] The White House Office of the Press Secretary, "Fact Sheet: U.S. Participation in the Global Partnership against the Spread of Weapons and Materials of Mass Destruction," April 1, 2016, https://www.whitehouse.gov/the-press-office/2016/04/01/fact-sheet-us-participation-global-partnership-against-spread-weapons.

of April 2016.[180] On the occasion of the Washington Nuclear Security Summit in 2016, an action plan was issued in support of the G8GP to enhance national nuclear security regimes through coordinating and funding for nuclear and radiological security, and other measures to strengthen the global partnership.[181]

The G8 Summit in St. Petersburg in 2006 agreed to establish the GICNT, as proposed by Russia and the United States. The GICNT now includes participation from 86 partner countries (including Australia, China, France, Germany, India, Israel, Japan, South Korea, Pakistan, Russia, Sweden, Switzerland, the U.K. and the U.S.) and five international organizations as official observers.[182] All partner nations have voluntarily committed to implementing the GICNT Statement of Principles (SOP), a set of broad nuclear security goals encompassing a range of deterrence, prevention, detection, and response objectives.[183] The eight principles contained within the SOP aim to improve accounting, control, and protection of nuclear/radiological material, enhance security of civilian nuclear facilities, detect and suppress illicit trafficking of nuclear/radiological material, assure denial of safe haven and resources from terrorists seeking to acquire or use nuclear/radiological material, and so on. Since the first meeting in Morocco in 2006, GICNT has held plenary meetings in 2007, 2008, 2009, 2010, 2011, 2013 and 2015. Moreover, since 2010, the Implementation and Assessment Group (IAG) was established as a working arm of the GICNT partnership. IAG has several priority functional areas with working groups, such as Nuclear Detection Working Group (NDWG, chaired by Finland), Nuclear Forensic Working Group (NFWG, chaired by Australia) and Response and Mitigation Working Group (RMWG, chaired by Morocco).[184]

In 2016, a meeting to celebrate the 10th year anniversary of GINCT was held in The Hague. At the meeting, participating countries reaffirmed the GINCT's active efforts in having organized more than 80 multilateral activities since 2006, and having provided opportunities for countries to share information, expertise, and best practices in a voluntary, non-binding framework.[185] Australia conducted a GICNT workshop in 2016 on information-sharing with regard to preparing for and responding to a potential terrorist act using nuclear or radiological material.[186] India

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[180] The following are partner states (surveyed states are underlined). Core partners: the U.S., Canada, Germany, France, Italy, the U.K., Japan, Russia, EU. Other partner states: Australia, Belgium, Czech Republic, Denmark, Finland, Hungary, Ireland, Kazakhstan, South Korea, Mexico, the Netherlands, New Zealand, Norway, the Philippines, Poland, Spain, Sweden, Switzerland, Ukraine. Partner states that are considering participation in it: Argentina, Austria, Brazil, Chile, China, India, Kuwait, Morocco, Qatar, Saudi Arabia, Singapore, South Africa, Turkey, UAE, Jordan. Kelsey Davenport, "Global Partners to Pick Up Summit Work," *Arms Control Today*, March 2016, https://www.armscontrol.org/ACT/2016_03/News/Global-Partners-to-Pick-Up-Summit-Work; Member States, Global Partnership Against the Spread of Weapons and Materials of Mass Destruction ("10 plus 10 Over 10 Program"), June 23, 2016, http://www.nti.org/learn/treaties-and-regimes/global-partnership-against-spread-weapons-and-materials-mass-destruction-10-plus-10-over-10-program/; "Policy Paper 2010 to 2015 Government Policy: Weapons Proliferation," Government of U.K. website, May 8, 2015, https://www.gov.uk/government/policies/countering-weapons-proliferation/supporting-pages/global-partnership; The White House Office of the Press Secretary, "Fact Sheet: U.S. Participation in the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction," April 1, 2016, https://www.whitehouse.gov/the-press-office/2016/04/01/fact-sheet-us-participation-global-partnership-against-spread-weapons.

[181] "Nuclear Security Summit 2016 Action Plan in Support of the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction," 2016 Washington Nuclear Security Summit, April 1, 2016, https://static1.squarespace.com/static/568be36505f8e2af8023adf7/t/56feeef34d088e7781f9e5ef/1459547891584/Action+Plan+-+GP_FINAL.pdf.

[182] "GICNT Partner Nations and Official Observer Organizations," November 2016, http://www.gicnt.org/documents/GICNT_Partner_Nation_List_Nov2016.pdf.

[183] "Overview," GICNT Website, http://www.gicnt.org/index.html.

[184] "Fact Sheet," GICNT Website, June 2015, http://www.gicnt.org/content/downloads/sop/GICNT_Fact_Sheet_June2015.pdf.

[185] "10th Anniversary Meeting: Chairman's Summary," GICNT website, June 15-16, 2016, http://www.gicnt.org/documents/GICNT-10th-Anniversary-Meeting-Chairmans-Summary-FINAL.pdf.

[186] Statement of Australia at the IAEA International Conference on Nuclear Security, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/australia_statement_dec_2016.pdf.

announced its intention to host the IAG meeting in New Delhi in February 2017.[187] Japan announced plans to host the plenary meeting of GICNT along with the United States and Russia co-chairs in 2017.[188] Pakistan announced its intention to host a GICNT event in the near future to further contribute to this initiative.[189]

In this report, it is expected that the acceptance of international nuclear security review missions such as IPPAS by the IAEA; the national efforts for nuclear forensics; and the commitment to nuclear security capacity-building and support will contribute to enhancing surveyed countries' nuclear security-related capabilities and performances, and make more effective their respective nuclear security systems. Furthermore, the contributions to the IAEA NSF, and participation in the G8GP and the GICNT are indicators of the desire of states to enhance their commitment to nuclear security and can be used to undertake an overall evaluation of each country's nuclear security system. Table 3-7 below shows the participation status in and effort for these nuclear security initiatives.

[187] Statement of India at the IAEA Ministerial Conference on Nuclear Security by M.J. Akbar, Minister of State for External Affairs, December 5-6, 2016, https://www.iaea.org/sites/default/files/16/12/india_statement_dec_2016.pdf.

[188] Statement of Japan at the IAEA Ministerial Conference on Nuclear Security by Kentaro Sonoura, State Minister for Foreign Affairs, December 5, 2016, https://www.iaea.org/sites/default/files/16/12/japan_statement_dec_2016.pdf.

[189] Statement of Pakistan at the IAEA International Conference on Nuclear Security by Aizaz Ahmed Chaudhry, Foreign Secretary, December 5-9, 2016, https://www.iaea.org/sites/default/files/16/12/pakistan_statement_final_dec_2016.pdf.

Table 3-7: The participation status in and effort for nuclear security initiatives

	China	France	Russia	U.K.	U.S.	India	Israel	Pakistan	Australia	Austria	Belgium	Brazil
IPPAS	△	○		○	○				○			
Nuclear Forensics	○	○	○	○	○		○	○	○		○	
Capacity Building & Support Activities	○	○	○	○	○	○		○	○	○		○
Nuclear Security Fund	○	○	○	○	○	○	○	○	○	○	○	
G8 Global Partnership	△	○	○	○	○	△			○	△	○	△
GICNT	○	○	○	○	○	○	○	○	○	○	○	

	Canada	Chile	Egypt	Germany	Indonesia	Iran	Japan	Kazakhstan	South Korea	Mexico	Netherlands	New Zealand
IPPAS	○	○	○		○	○	○	○	△	○	○	○
Nuclear Forensics	○	○		○			○		○		○	
Capacity Building & Support Activities	○	○		○	○		○	○	○		○	
Nuclear Security Fund	○			○		○	○	○*	○		○	○
G8 Global Partnership	○			○			○	○	○	○	○	○
GICNT	○	○		○			○	○	○	○	○	○

	Nigeria	Norway	Philippines	Poland	Saudi Arabia	South Africa	Sweden	Switzerland	Syria	Turkey	UAE	North Korea
IPPAS	○*	○	○	○*			○	○		○	○*	
Nuclear Forensics		○				○	○	○		○		
Capacity Building & Support Activities	○	○	○*		○	○	○*	○			○	
Nuclear Security Fund		○					○			○		
G8 Global Partnership		○	○	○	△	△	○	○		△	△	
GICNT		○	○	○			○	○		○	○	

IPPAS: "△" is assigned for the countries that are planning to accept IPPAS or have held a related workshop.
G8 Global Partnership: "△" is assigned for the countries that are considering of the participation in it.

*: Updated figures in 2016.

Part II Evaluation

Country-by-Country Analysis

Introduction—Evaluation Points and Criteria

In this "Evaluation" part, the performances of the 36 countries surveyed in this project on three areas, that is, nuclear disarmament, non-proliferation and nuclear security, are evaluated numerically, based upon study and analysis compiled in the "Report" section.

Evaluation of the four groups—nuclear-weapon states (NWS), non-parties to the Nuclear Non-Proliferation Treaty (NPT), non-nuclear-weapon states (NNWS), and one particular state (North Korea)—is made separately because of their different characteristics. Since different sets of criteria are applied to different groups of countries, full points differ according to the group each country belongs to. Then, as a measure to visualize a comparison of 36 countries' relative performances, each country's performances in each area is shown on a chart in percentage terms.

[Full Points for each group of countries]

Groups / Areas	(1) NWS	(2) Non-NPT Parties	(3) NNWS	(4) Other
	China France Russia U.K. U.S.	India Israel Pakistan	Australia, Austria, Belgium, Brazil, Canada, Chile, Egypt, Germany, Indonesia, Iran, Japan, Kazakhstan, South Korea, Mexico, the Netherlands, New Zealand, Nigeria, Norway, the Philippine, Poland, Saudi Arabia, South Africa, Sweden, Switzerland, Syria, Turkey, UAE	North Korea*
Nuclear Disarmament	94	91	35	91
Nuclear Non-Proliferation	47	43	61	61
Nuclear Security	41	41	41	41

* North Korea declared its suspension from the NPT in 1993 and its withdrawal in 2003, and conducted nuclear tests in 2006, 2009 2013 and 2016 (twice). However, there is no agreement among the states parties on North Korea's official status.

Following is point and scale of measurement of each evaluation criteria.

[Nuclear Disarmament]

Evaluation criteria	Maximum points	Scale of measurement
1. Status of Nuclear Forces (estimates)	**-20**	
Status of nuclear forces (estimates)	(-20)	-5 (～50); -6 (51～100); -8 (101～200); -10 (201～400); -12 (401～1000); -14 (1001～2000); -16 (2001～4000); -17 (4001～6000); -19 (6001～8000); -20 (8001～)
		(not applicable to the NNWS)
2. Commitment to Achieve a World without Nuclear Weapons	**14**	
A) Voting behavior on UNGA resolutions on nuclear disarmament proposals by Japan, NAC and NAM	(6)	On each resolution: 0 (against); 1 (abstention) ; 2 (in favor)
B) Voting behavior on UNGA resolutions calling for commencement of negotiations on a legal prohibition of nuclear weapons	(3)	On each resolution: 0 (against); 0.5 (abstention); 1 (in favor)
C) Announcement of significant policies and important activities	(3)	Add 1 point for each policy, proposal and other initiatives having a major impact on the global momentum toward a world without nuclear weapons (maximum 3 points).

Evaluation criteria	Maximum points	Scale of measurement
D) Humanitarian consequences of nuclear weapons	(2)	On each resolution: 0 (against); 0.5 (abstention); 1 (in favor). (Added points)× 2/3
3. Reduction of Nuclear Weapons	**22**	
A) Reduction of nuclear weapons	(15)	・Add 1～10 points in accordance with the decuple rate of reduction from the previous year for a country having declared the number of nuclear weapons. ・For a country having not declared it, add some points using the following formula: (the previous target – the latest target)÷the estimated number of nuclear weapons×10. ・Add 1 (engaging in nuclear weapons reduction over the past 5 years); add 1 (engaging in nuclear weapons reduction under legally-binding frameworks such as New Strategic Arms Reduction Treaty); add 1 (announcing further reduction plan and implementing it in 2015) ・Give a perfect score (15 points) in case of the total abolition of nuclear weapons. (not applicable to the NNWS)
B) A concrete plan for further reduction of nuclear weapons	(3)	0 (no announcement on a plan of nuclear weapons reduction); 1 (declaring a rough plan of nuclear weapons reduction); 2 (declaring a plan on the size of nuclear weapons reduction); 3 (declaring a concrete and detailed plan of reduction) (not applicable to the NNWS)
C) Trends on strengthening/modernizing nuclear weapons capabilities	(4)	0 (modernizing/reinforcing nuclear forces in a backward move toward nuclear weapons reduction; 2～3 (modernizing/reinforcing nuclear forces which may not lead to increasing the number of nuclear weapons; 4 (not engaging in nuclear modernization/reinforcement) (not applicable to the NNWS)
4. Diminishing the Role and Significance of Nuclear Weapons in National Security Strategies and Policies	**8**	
A) The current status of the roles and significance of nuclear weapons	(-8)	-7～-8 (judged based on the declaratory policy) (not applicable to the NNWS)
B) Commitment to “sole purpose,” no first use, and related doctrines	(3)	0 (not adopting either policy); 2 (adopting a similar policy or expressing its will to adopt either policy in the future); 3 (already adopting either policy) (not applicable to the NNWS)
C) Negative security assurances	(2)	0 (not declaring); 1 (declaring with reservations); 2 (declaring without reservations) (not applicable to the NNWS)
D) Signing and ratifying the protocols of the treaties on nuclear-weapon-free zones	(3)	Add 0.5 point for the ratification of one protocol; a country ratifying all protocols marks 3 points (not applicable to countries expect NWS)
E) Relying on extended nuclear deterrence	(-5)	(not applicable to the NWS and Non-NPT Parties) (applied solely to the NNWS) -5 (a country relying on the nuclear umbrella and participating in nuclear sharing); -3 (a country relying on the nuclear umbrella); 0 (a country not relying on the nuclear umbrella)

Evaluation criteria	Maximum points	Scale of measurement
5. De-alerting or Measures for Maximizing Decision Time to Authorize the Use of Nuclear Weapons	**4**	
De-alerting or measures for maximizing decision time to authorize the use of nuclear weapons	(4)	0～1 (maintaining a high alert level); 2 (maintaining a certain alert level); 3 (de-alerting during peacetime); add 1 point for implementing measures for increasing the credibility of (lowered) alert status (not applicable to the NNWS)
6. CTBT	**11**	
A) Signing and ratifying the CTBT	(4)	0 (not signing); 2 (not ratifying); 4 (ratifying)
B) Moratoria on nuclear test explosions pending CTBT's entry into force	(3)	0 (not declaring); 2 (declaring); 3 (declaring and closing the nuclear test sites) (not applicable to the NNWS)
C) Cooperation with the CTBTO Preparatory Commission	(2)	0 (no cooperation or no information); 1～2 (paying contributions, actively participating in meetings, and actively engaging in the outreach activities for the Treaty's entry into force)
D) Contribution to the development of the CTBT verification systems	(2)	Add 1 point for establishing and operating the IMS; add another 1 point for participating in the discussions on enhancing the CTBT verification capabilities
E) Nuclear testing	(-3)	-3 (conducting nuclear test explosions in the past 5 years); -1 (conducting nuclear tests without explosion or the status is unclear); 0 (not conducting any nuclear tests) (not applicable to the NNWS)
7. FMCT	**10**	
A) Commitment, efforts, and proposals toward immediate commencement of negotiations on an FMCT	(5)	Add 1 (expressing a commitment); add 1～2 (actively engaging in the promotion of early commencement); add 1～2 (making concrete proposals on the start of negotiations)
B) Moratoria on the production of fissile material for use in nuclear weapons	(3)	0 (not declaring); 1 (not declaring but not producing fissile material for nuclear weapons); 2 (declaring); 3 (declaring and taking measures for the cessation of the production as declared) (not applicable to the NNWS)
C) Contribution to the development of verification measures	(2)	0 (no contribution or no information); 1 (proposing a research on verification measures); 2 (engaging in R&D for verification measures)
8. Transparency in Nuclear Forces, Fissile Material for Nuclear Weapons, and Nuclear Strategy/Doctrine	**6**	
Transparency in nuclear forces, fissile material for nuclear weapons, and nuclear strategy/doctrine	(6)	Add 1～2 (disclosing the nuclear strategy/doctrine); add 1～2 (disclosing the status of nuclear forces); add 1～2 (disclosing the status of fissile material usable for nuclear weapons (not applicable to the NNWS)
9. Verifications of Nuclear Weapons Reductions	**7**	
A) Acceptance and implementation of verification for nuclear weapons reduction	(3)	0 (not accepting or implementing); 2 (limited acceptance and implementation); 3 (accepting and implementing verification with comprehensiveness and completeness); deduct 1～2 points in case of non-compliance or problems in implementation (not applicable to the NNWS)

Evaluation criteria	Maximum points	Scale of measurement
B) Engagement in research and development for verification measures of nuclear weapons reduction	(1)	0 (not engaging or no information); 1 (engaging in R&D)
C) The IAEA inspections to fissile material declared as no longer required for military purposes	(3)	0 (not implementing), 1 (limited implementation); 3 (implementing); add 1 point if a country engages in the efforts for implementing or strengthening the implementation, except in the case of already implementing (not applicable to the NNWS)
10. Irreversibility	**7**	
A) Implementing or planning dismantlement of nuclear warheads and their delivery vehicles	(3)	0 (not implementing or no information); 1 (perhaps implementing but not clear); 2～3 (implementing) (not applicable to the NNWS)
B) Decommissioning/conversion of nuclear weapons-related facilities	(2)	0 (not implementing or no information); 1 (implementing in a limited way); 2 (implementing extensively) (not applicable to the NNWS)
C) Measures for fissile material declared excess for military purposes, such as disposition or conversion to peaceful purposes	(2)	0 (not implementing or no information); 1 (implementing in a limited way); 2 (implementing); 3 (implementing extensively) (not applicable to the NNWS)
11. Disarmament and Non-Proliferation Education and Cooperation with Civil Society	**4**	
Disarmament and non-proliferation education and cooperation with civil society	(4)	Add 1 (participating in the joint statement); add 1-2 (implementing disarmament and non-proliferation education); add 1～2 (cooperating with civil society). Maximum 4 points
12. Hiroshima Peace Memorial Ceremony	**1**	
Hiroshima Peace Memorial Ceremony	(1)	0 (not attending); 0.5 (not attending in 2015 but has attended more than once during the past 3 years); 1 (attending)

[Nuclear Non-Proliferation]

Evaluation criteria	Maximum points	Scale of measurement
1. Acceptance and Compliance with Nuclear Non-Proliferation Obligations	**20**	
A) Accession to the NPT	(10)	0 (not signing or declaring withdrawal); 3 (not ratifying); 10 (in force)
B) Compliance with Articles I and II of the NPT and the UNSC resolutions on non-proliferation	(7)	・0 (non-complying with Article 1 or 2 of the NPT); 3～4 (having not yet violated Article 1 or 2 of the NPT but displaying behaviors that raise concerns about proliferation, or not complying with the UNSC resolutions adopted for relevant nuclear issues); 5 (taking concrete measures for solving the non-compliance issue); 7 (complying). ・As for the non-NPT states (maximum 3 points) : 2 (not complying with the UNSC resolutions adopted for relevant nuclear issues); 3 (other cases)
C) Nuclear-Weapon-Free Zones	(3)	1 (signing the NWFZ treaty); 3 (ratifying the treaty)

Evaluation criteria	Maximum points	Scale of measurement
2. IAEA Safeguards Applied to the NPT NNWS	**18**	
A) Signing and ratifying a Comprehensive Safeguards Agreement	(4)	0 (not signing); 1 (not ratifying); 4 (in force)
B) Signing and ratifying an Additional Protocol	(5)	0 (not signing); 1 (not ratifying); 3 (provisional application); 5 (in force)
C) Implementation of the integrated safeguards	(4)	0 (not implementing); 2 (broader conclusion) 4 (implementing)
D) Compliance with IAEA Safeguards Agreement	(5)	0 (not resolving the non-compliance issue); 2 (taking concrete measures for solving the non-compliance issue); 5 (complying)
3. IAEA Safeguards Applied to NWS and Non-Parties to the NPT	**7**	
A) Application of the IAEA safeguards (Voluntary Offer Agreement or INFCIRC/66) to their peaceful nuclear in facilities	(3)	0 (not applying); 2 (applying INFCIRC/66); 3 (applying Voluntary Offer Agreement)
B) Signing, ratifying, and implementing the Additional Protocol	(4)	0 (not signing); 1 (not ratifying); 3 (in force); add 1 point if widely applied to peaceful nuclear activities
4. Cooperation with the IAEA	**4**	
Cooperation with the IAEA	(4)	Add 1 (contributing to the development of verification technologies); add 1～2 (contributing to the universalization of the Additional Protocol); add 1 (other efforts)
5. Implementing Appropriate Export Controls on Nuclear-Related Items and Technologies	**15**	
A) Establishment and implementation of the national control systems	(5)	0 (not establishing); 1 (establishing but insufficient); 2 (establishing a system to a certain degree); 3 (establishing an advanced system, including the Catch-all); add 1～2 (if continuing to implement appropriate export controls); deduct 1～2 (not adequately implementing)
B) Requiring the conclusion of the Additional Protocol for nuclear export	(2)	0 (not requiring or no information); 1 (requiring for some cases); 2 (requiring)
C) Implementation of the UNSCRs concerning North Korean and Iranian nuclear issues	(3)	0 (not implementing or no information); 2 (implementing); 3 (actively implementing); deduct 1～3 (depending on the degree of violation)
D) Participation in the PSI	(2)	0 (not participating); 1 (participating); 2 (actively participating)
E) Civil nuclear cooperation with non-parties to the NPT	(3)	0 (exploring active cooperation); 1～2 (contemplating cooperation, subject to implementing additional nuclear disarmament and non-proliferation measures); 3 (showing a cautious attitude or being against it)
6. Transparency in the Peaceful Use of Nuclear Energy	**4**	
A) Reporting on the peaceful nuclear activities	(2)	0 (not reporting or no information); 1 (reporting but insufficiently); 2 (reporting)
B) Reporting on plutonium management	(2)	0 (not reporting or no information); 1 (reporting); 2 (reporting on not only plutonium but also uranium); add 1 (ensuring a high level of transparency in plutonium although not being obliged to report)

[Nuclear Security]

Evaluation criteria	Maximum points	Scale of measurement
1. The Amount of Fissile Material Usable for Weapons	**-16**	
The amount of fissile material usable for weapons	(-16)	Firstly, -3 (if possessing fissile material usable for nuclear weapons). Then, deduct if: ・ HEU: -5 (>100t); -4 (>20t); -3 (>10t); -2 (>1t); -1 (possessing less than 1t) ・Weapon-grade Pu: -5 (>100t); -4 (>20t); -3 (>10t); -2 (>1t); -1 (possessing less than 1t) ・Reactor-grade Pu: -3 (>10t); -2 (>1t); -1 (possessing less than 1t)
2. Status of Accession to Nuclear Security and Safety-Related Conventions, Participation in Nuclear Security Related Initiatives, and Application to Domestic Systems	**21**	
A) Convention on the Physical Protection of Nuclear Material and the 2005 Amendment to the Convention	(3)	0 (not signing the Treaty); 1 (not ratifying the Treaty); 2 (not signing or ratifying the Amendment); 3 (both the Treaty and Amendment in force)
B) International Convention for the Suppression of Acts of Nuclear Terrorism	(2)	0 (not signing); 1 (not ratifying); 2 (in force)
C) Convention on Nuclear Safety	(2)	0 (not signing); 1 (not ratifying); 2 (in force)
D) Convention on Early Notification of a Nuclear Accident	(2)	0 (not signing); 1 (not ratifying); 2 (in force)
E) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	(2)	0 (not signing); 1 (not ratifying); 2 (in force)
F) Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency	(2)	0 (not signing); 1 (not ratifying); 2 (in force)
G) INFCIRC/225/Rev.5	(4)	0 (not applying or no information); 2 (applying to the national implementation system); 4 (applying and implementing adequately)
H) Enactment of laws and establishment of regulations for the national implementation	(4)	0 (not establishing domestic laws and regulations and the national implementation system); 1～2 (establishing them but insufficiently); 4 (establishing appropriately)
3. Efforts to Maintain and Improve the Highest Level of Nuclear Security	**20**	
A) Minimization of HEU in civilian use	(4)	0 (no effort or no information); 1 (limited efforts); 3 (active efforts); add 1 (committed to further enhancement)
B) Prevention of illicit trafficking	(5)	0 (not implementing or no information); 2 (limited implementation); 4 (active implementation); add 1 (committed to further enhancement)
C) Acceptance of international nuclear security review missions	(2)	0 (not accepting or no information); 1 (accepting); 2 (actively accepting)
D) Technology development —nuclear forensics	(2)	0 (not implementing or no information); 1 (implementing); 2 (actively implementing)
E) Capacity building and support activities	(2)	0 (not implementing or no information); 1 (implementing); 2 (actively implementing)
F) IAEA Nuclear Security Plan and Nuclear Security Fund	(2)	0 (no effort or information); 1 (participating); 2 (actively participating)
G) Participation in international efforts	(3)	0 (not participating); 1 (participating in a few frameworks); 2 (participating in many or all frameworks); add 1 (if contributing actively)

As for the evaluation section, a set of objective evaluation criteria is established by which the respective country's performance is assessed.

The Research Committee of this project recognizes the difficulties, limitations and risk of "scoring" countries' performances. However, the Committee also considers that an indicative approach is useful to draw attention to nuclear issues, so as to prompt debates over priorities and urgency.

The different numerical value within each category (i.e., nuclear disarmament, nuclear non-proliferation and nuclear security) reflects each activity's importance within that area, as determined through deliberation by the Research Committee of this project. However, the differences in the scoring arrangements within each of the three categories does not necessarily reflect its relative significance in comparison with others, as it has been driven by the differing number of items surveyed. Thus, the value assigned to nuclear disarmament (full points 94) does not mean that it is more than twice as important as nuclear non-proliferation (full points 61) or nuclear security (full points 41).

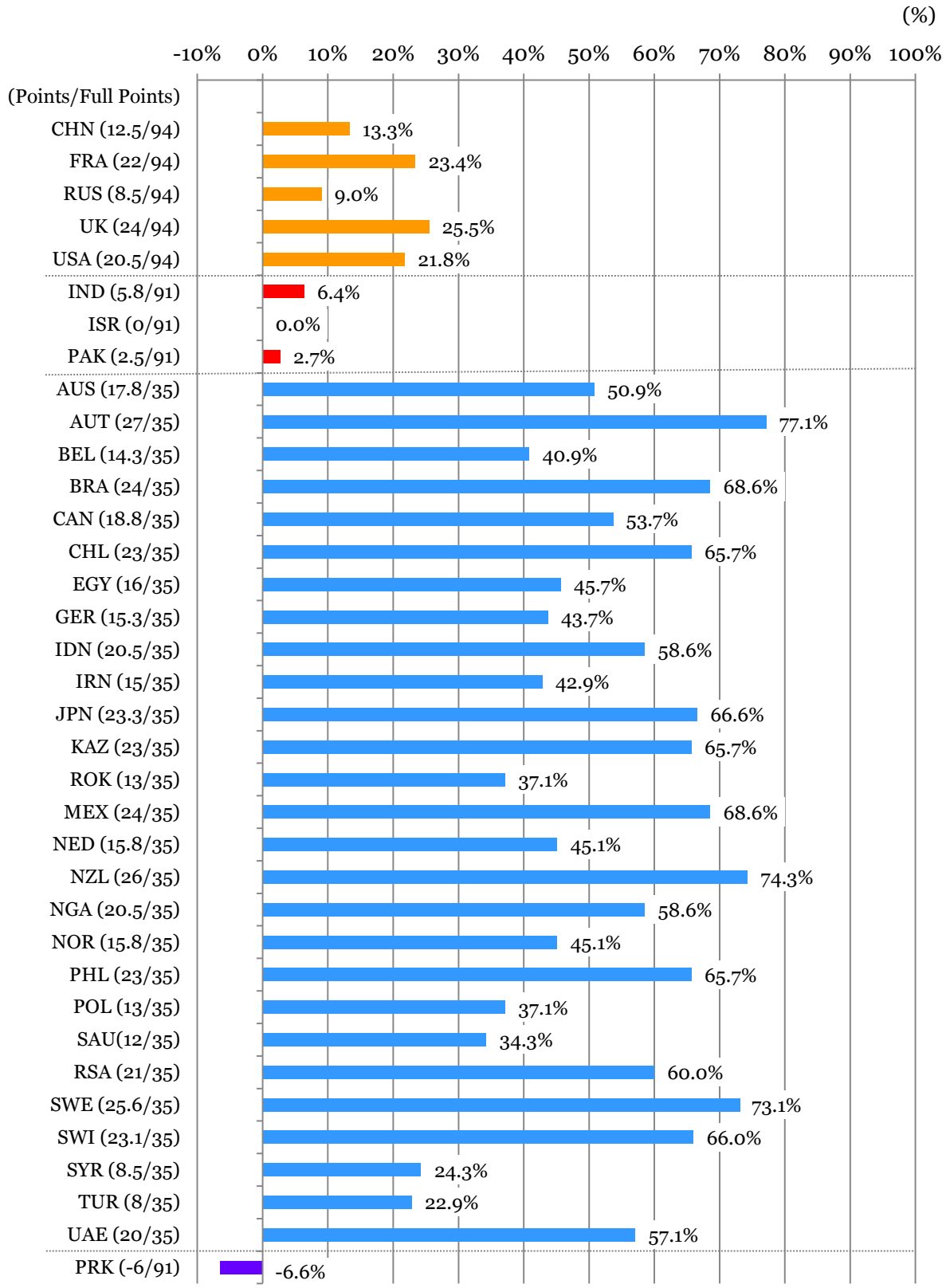
Regarding "the number of nuclear weapons" (in the nuclear disarmament section) and "the amount of fissile material usable for nuclear weapons" (in the nuclear security section), the assumption is that the more nuclear weapons or weapons-usable fissile material a country possesses, the greater the task of reducing them and ensuring their security. However, the Research Committee recognizes that "numbers" or "amounts" are not the sole decisive factors. It is definitely true that other factors—such as implications of missile defense, chemical and biological weapons, or conventional force imbalance and a psychological attachment to a minimum overt or covert nuclear weapon capability—would affect the issues and the process of nuclear disarmament, non-proliferation and nuclear security. However, they were not included in our criteria for evaluation because it was difficult to make objective scales of the significance of these factors. In addition, in view of the suggestions and comments made to the *Hiroshima Report 2013*, the Research Committee modified criteria of the following items: current status of the roles and significance of nuclear weapons in national security strategies and policies; reliance on extended nuclear deterrence; and nuclear testing.

After all, there is no way to mathematically compare the different factors contained in the different areas of disarmament, non-proliferation and nuclear security. Therefore, the evaluation points should be taken as indicative of the performances in general but by no means as an exact representation or precise assessment of different countries' performances. Since the *Hiroshima Report 2014*, such items as "relying on extended nuclear deterrence" and "nuclear testing" have been negatively graded if applicable.

In addition, radar charts were produced for the NWS, to illustrate where each country stands in different aspects of nuclear disarmament. For this purpose the 12 issues used for nuclear disarmament evaluation were grouped into six aspects: (1) the number of nuclear weapons, (2) reduction of nuclear weapons, (3) commitment to achieving a "world without nuclear weapons," (4) operational policy, (5) the status of signature and ratification of, or attitudes of negotiation to relevant multilateral treaties, and (6) transparency.

Aspects	Issues
Number	Number of nuclear weapons
Reduction	Reduction of nuclear weapons
Commitments	Commitments to achieving a world without nuclear weapons
	Disarmament and non-proliferation educations and cooperation with the civil society
	Hiroshima Peace Memorial Ceremony
Operational policy	Diminishing roles and significance of nuclear weapons in the national security strategies and policies
	De-alerting, or measures for maximizing decision time to authorize the use of nuclear weapons
Multilateral treaties	Comprehensive Nuclear-Test-Ban Treaty (CTBT)
	Fissile Material Cut-Off Treaty (FMCT)
Transparency	Transparency regarding nuclear forces, fissile material for nuclear weapons, and nuclear strategy/doctrine
	Verifications of nuclear weapons reductions
	Irreversibility

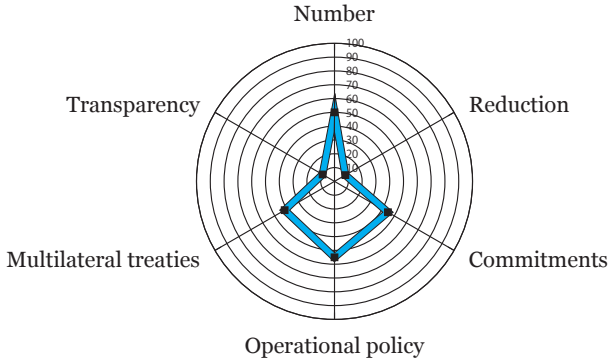
Chapter 1. Area Summary
(1) Nuclear Disarmament



6-point Nuclear Disarmament Radar Charts

According to the following radar charts illustrating where each nuclear-weapon state stands in different aspects of nuclear disarmament, China is required to improve its efforts for nuclear weapons reduction and transparency. To a lesser extent, France could be more transparent regarding its nuclear weapons-related issues. Russia and the United States are urged to undertake further reductions of their nuclear arsenals. The performances of the United Kingdom are relatively well-balanced.

[China]



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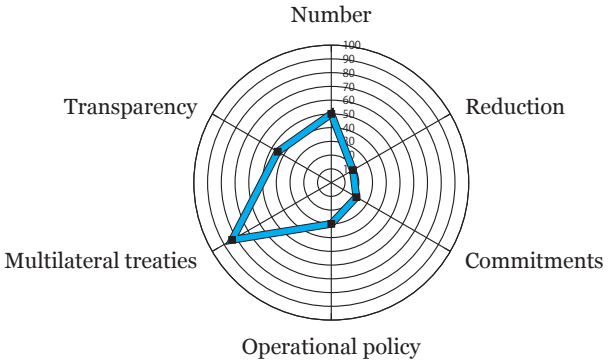

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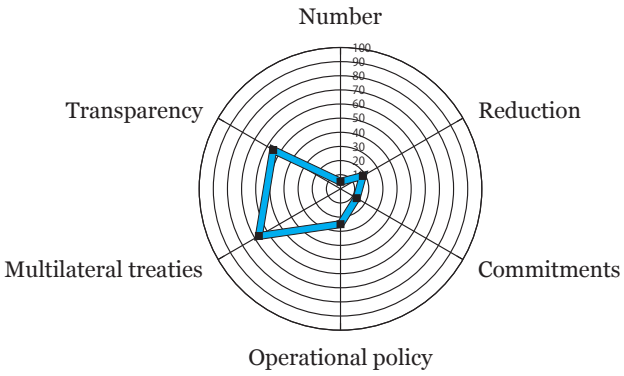

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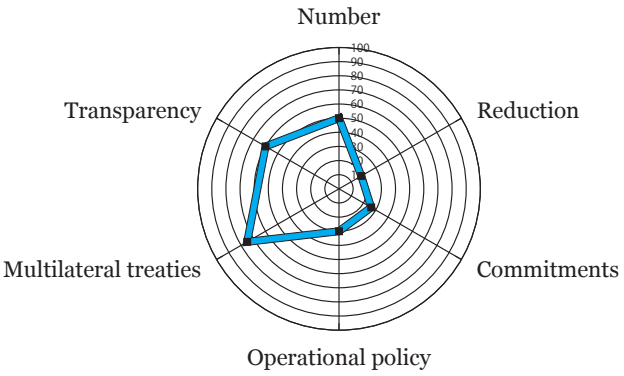
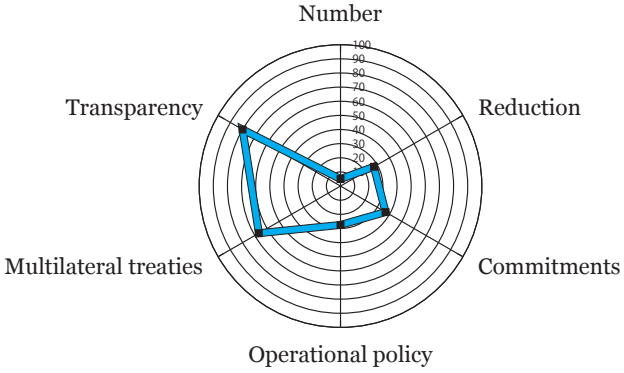
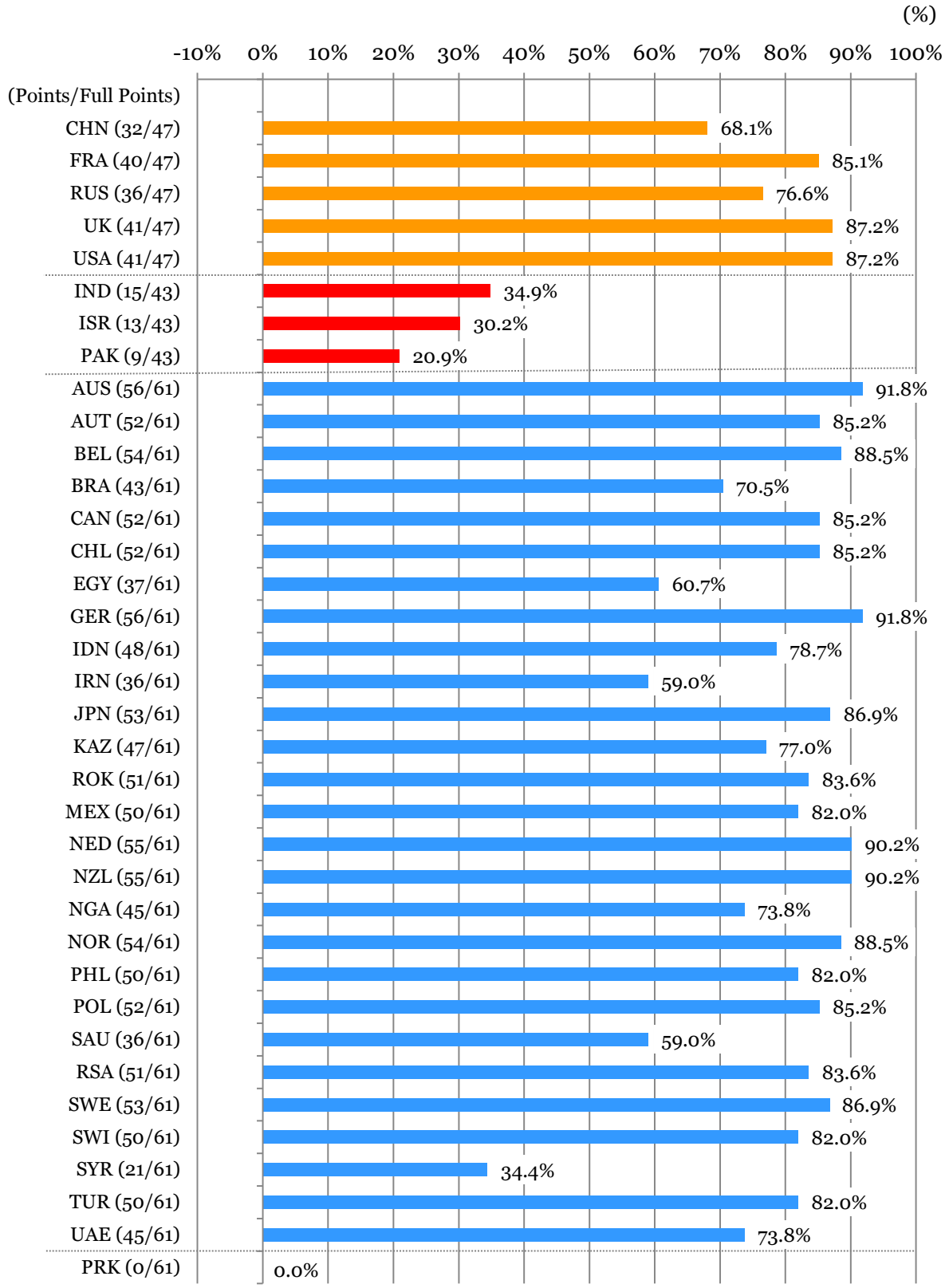


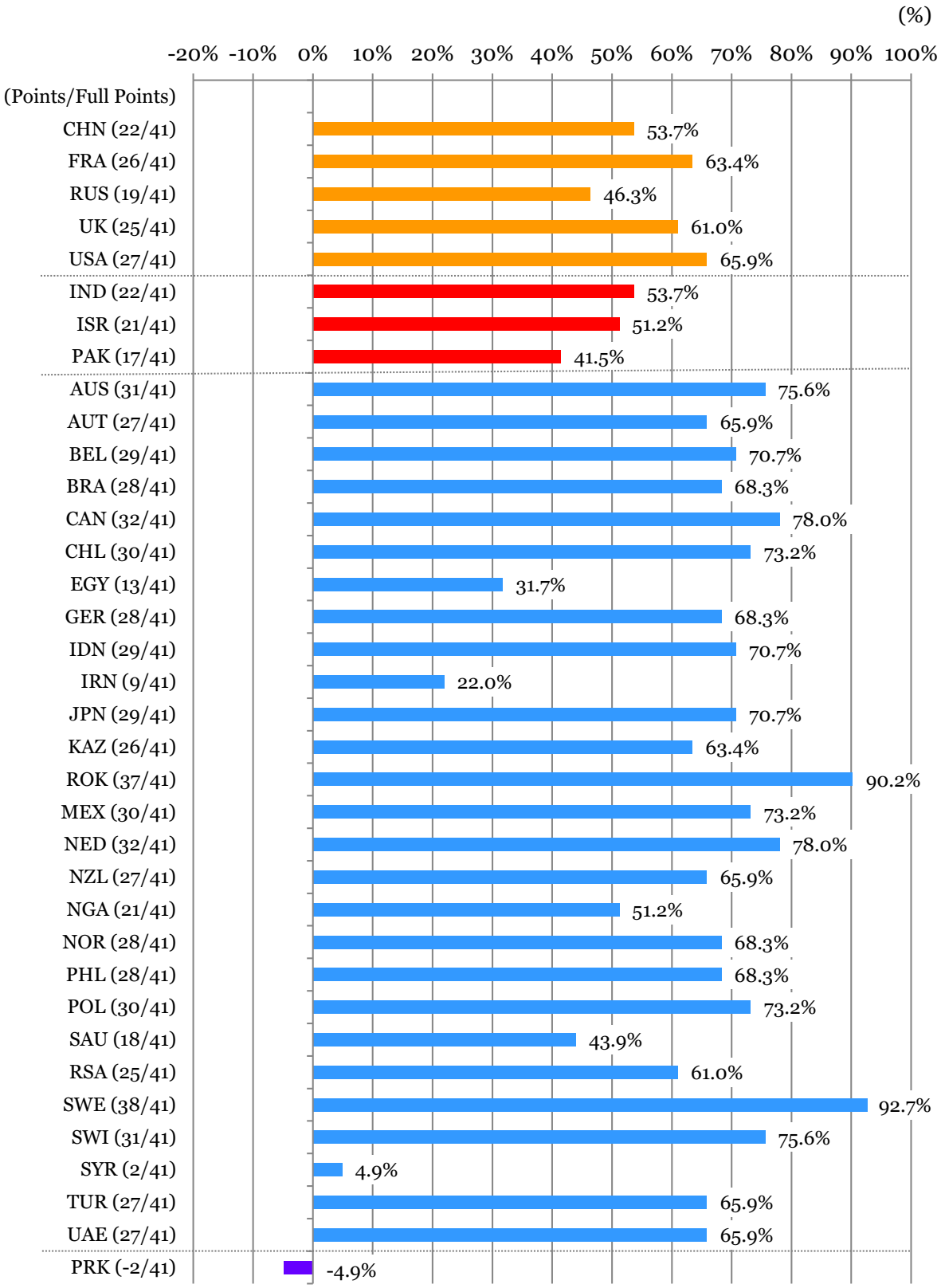
[United States]



(2) Nuclear Non-Proliferation



(3) Nuclear Security



Chapter 2. Country-by-Country Summary

(1) Nuclear-Weapon States

1. China (Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	***12.5/94 (13.3%)***

China, possessing approximately 260 nuclear warheads, has promoted active modernization programs for its nuclear forces (particularly, ICBMs and SLBMs). Different from the other nuclear-weapon states (NWS), China voted against few UN General Assembly (UNGA) Resolutions regarding nuclear disarmament except one that was promoted by Japan. While it abstained from the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," China did not participate in the Open-Ended Working Group on Taking Forward Multilateral Nuclear Disarmament Negotiations (OEWG). Neither had it indicated to join a conference on negotiating a legal instrument on prohibiting nuclear weapons, to be held in 2017. China is the only NWS that has not reduced its nuclear arsenals. China has neither ratified the CTBT nor declared a moratorium on production of fissile material for nuclear weapons. It has declared no first use of nuclear weapons and the unconditional negative security assurance. While arguing the importance of transparency in intention, China has maintained the least transparency about nuclear weapons capabilities among the NWS. Furthermore, it has pointed out a possibility that China's traditional nuclear strategy would be transformed in accordance with modernizations of ICBMs and SLBMs.

Nuclear Non-Proliferation	***32/47 (68.1%)***

China acceded to the IAEA Additional Protocol, in which no provision for complementary access visits is stipulated. Questions remain as to whether China is conducting adequate and strict implementation. However, it has reportedly taken efforts to strengthen their export-control implementation mechanisms. On sanctions against North Korea, China announced to formulate its dual-use items list, subject to export ban, in response to UNSCR 2270. Nevertheless, it continues to be reported that cross-border trade and transactions of restricted items between China and North Korea still continue. China has been criticized for exporting two nuclear power reactors to Pakistan, which may constitute a violation of the NSG guidelines.

Nuclear Security	***22/41 (53.7%)***

China joined the Nuclear Security Contact Group, which is based on the 2014 Joint Statement on Strengthening Nuclear Security Implementation (INFCIRC/869). China organized and conducted a number of control activities including radioactive source security checks in 2016. China adopted a State Security Law and Anti-Terrorism Law in 2015, and is also in the process of legislating relevant Nuclear Security regulations. China reported to committing conversion of the remaining Miniature Neutron Source Reactors (MNSR) at Shenzhen University, and research reactor at the Chinese Institute of Atomic Energy, from HEU to LEU fuel in 2016. China has been pushing forward the construction of the National Base for Research and Development of Nuclear and Radiological Safety and Security Monitoring Technologies, and also signed cooperation documents with the U.S. and Russia on preventing illicit trafficking of nuclear and other radioactive material, and conducted a joint exercise with Russia on preventing illicit trafficking of nuclear and other radioactive material on borders in 2015. China hosted the IPPAS preparatory meeting in 2016. In terms of capacity building, China-U.S. COE came into being in Beijing in March 2016.

2. France (Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	*22/94 (23.4%)*

France has announced its maximum number of nuclear warheads as 300, and has reduced its overall nuclear forces. It has also converted fissile material excess for military purpose to civilian purposes, which has been placed under the international safeguards. It voted against most of the UNGA Resolutions regarding nuclear disarmament, and showed a negative attitude to the issues on humanitarian dimensions as well as legal prohibition of nuclear weapons, in particular. France opposes to convene an international conference on negotiating a legal instrument on prohibiting nuclear weapons. While declaring a negative security assurance similar to those of the U.S. and the U.K., there was little progress in diminishing the role of nuclear weapons. Meanwhile, France has engaged in promoting the CTBT's entry into force, and developing its verification systems. It also submitted a draft FMCT to the CD.

Nuclear Non-Proliferation	*40/47 (85.1%)*

France acceded to the IAEA Additional Protocol, with the provision for complementary access visits. All of its civilian nuclear material covered by the EURATOM Treaty is subject to its safeguards. France has engaged in nuclear non-proliferation proactively, including contributions to the IAEA safeguards systems, and the establishment and implementation of its export control systems.

Nuclear Security	*26/41 (63.4%)*

France prepared a gift basket submitted to the NSS 2016 in the field of radioactive sources, and also carried out substantial operations of securing and repatriation of radioactive sources abroad in liaison with the IAEA. From 2000 to March 2016, a total of 54 high-activity radioactive sources have been either evacuated from third States to France or secured on site in the recipient states with French expertise and/or assistance. A new law on cyber security that applies to the critical infrastructures, including nuclear facilities, was voted. France committed to close the high-performance research reactor Orphée, which is fueled using HEU, by 2019, and also announced its decision to host the IPPAS follow-up mission in 2017. In the field of nuclear forensics, France has co-organized the annual meeting of the nuclear forensics ITWG and a forensics exercise CMX-5 in 2016 in Lyon.

3. Russia (Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	*8.5/94 (9.0%)*

While Russia has reduced its nuclear arsenal, it is estimated to possess approximately 7,300 nuclear warheads, and has actively developed and deployed new ICBMs and SLBMs for replacing aged delivery vehicles. Russia has increased the number of its deployed strategic (nuclear) warheads and launchers, although these activities do not constitute a violation against the New START. It is analyzed that such increase is a temporary fluctuation due to introduction of new delivery vehicles before retirement of the old ones. Meanwhile, Russia is alleged to have violated the INF Treaty. It voted against most of the UNGA Resolutions regarding nuclear disarmament, and showed a negative attitude to the issues on humanitarian dimensions as well as legal prohibition of nuclear weapons, in particular. Russia opposes to convene an international conference of negotiating a legal instrument on prohibiting nuclear weapons. In 2016, it continued to repeat nuclear saber-rattling vis-à-vis the U.S. and NATO.

Nuclear Non-Proliferation	*36/47 (76.6%)*

Russia acceded to the IAEA Additional Protocol, in which no provision for complementary access visits is stipulated. It considers that the conclusion of an Additional Protocol should be voluntary. It has implemented measures on nuclear non-proliferation proactively, though to a lesser extent than the western countries.

Nuclear Security	*19/41 (46.3%)*

In November 2014, Russia made a political statement that it would not attend the Washington Nuclear Security Summit on the grounds of their dissatisfaction with Washington's concept for preparing the summit. This decision by Russia concerned the member states. However, eventually, Russia joined the joint statement of the P5 Conference in September 2016, which underscored the P5's commitment to prevent nuclear terrorism and their support for measures to strengthen overall nuclear security, and recalled the series of Nuclear Security Summits. On a practical level, Russia has signed cooperation documents with the U.S. and China on preventing illicit trafficking of nuclear and other radioactive material, and conducted a joint exercise with China on preventing illicit trafficking of nuclear and other radioactive material on borders in 2015.

4. The United Kingdom (Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	***24/94 (25.5%)***
The size of the U.K. nuclear arsenal has decreased incrementally. The U.K. plans to reduce to no more than 120 operationally available warheads and a total stockpile of no more than 180 warheads by the mid 2020s. Construction of a new class of four SSBNs, for replacement of the existing Vanguard-class vessels, was endorsed by the U.K. House of Commons. The U.K. voted against most of the UNGA Resolutions regarding nuclear disarmament, and opposes to convene an international conference of negotiating a legal instrument on prohibiting nuclear weapons. Meanwhile, the U.K. has engaged in promoting the CTBT's entry into force, and developing its verification systems.	
Nuclear Non-Proliferation	***41/47 (87.2%)***
The U.K. acceded to the IAEA Additional Protocol with the provision for complementary access visits. All of its civilian nuclear material is subject to the international safeguards. It has proactively engaged in nuclear non-proliferation, including implementation of export controls.	
Nuclear Security	***25/41 (61.0%)***
The U.K. has deployed various efforts to counter cyber-terrorism from 2015 to 2016. A joint U.S.-U.K. civil nuclear exercise, building on the successful "Resilient Shield" exercise held in November 2015 between U.S. and U.K. financial sectors, was designed to test government and industry responses to cyber security threats. Also, the U.K. has delivered two workshops on industrial control systems for international participants. In 2016, the U.K. has completed its reception of the IPPAS mission.	

5. The United States (Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	***20.5/94 (21.8%)***
The U.S., possessing 7,000 nuclear warheads, continues to implement the New START. U.S. Vice President Joseph R. Biden, Jr. stated in January 2017 that the United States dismantled approximately 500 nuclear warheads during 2016; 2,226 warheads since 2009; and that put the U.S. active nuclear stockpile at 4,018 warheads in service. Its reports on nuclear weapons have been the most transparent among the NWS. The U.S. has established and led the "International Partnership for Nuclear Disarmament Verification (IPNDV)." The Obama administration was reported to have contemplated the possibility to change or revise its nuclear policies: a NFU of nuclear weapons; de-alerting; five-year extension of the New START; a review of structure and modernization of nuclear arsenals; and adoption of a UN Security Council Resolution on prohibiting nuclear tests. However, no proposal was actually realized, except for the last item. Nor could it achieve the ratification of the CTBT. Still, it has engaged in promoting the CTBT's entry into force, and developing its verification systems. The U.S. voted against most of the UNGA Resolutions regarding nuclear disarmament, and opposes to convene an international conference of negotiating a legal instrument on prohibiting nuclear weapons.	
Nuclear Non-Proliferation	***41/47 (87.2%)***
The U.S. has proactively led the efforts to bolster nuclear non-proliferation, including contributions to the IAEA safeguards systems and implementation of stringent export controls. It acceded to the IAEA Additional Protocol with the provision for complementary access visits.	
Nuclear Security	***27/41 (65.9%)***
The U.S. contributed to the global efforts to strengthen nuclear security, including hosting the 4th Nuclear Security Summit in Washington D.C. in March 2016, ratification of the Amended CPPNM, offering the expert testimony training program and training curriculum for nuclear forensic scientists, and also proposing a new process for receiving other governments' queries about nuclear and other radioactive material to the U.S. National Nuclear Forensics Library (NNFL) through diplomatic channels. As for the measures against sabotage, the U.S. stated its increasing focus on detection countermeasures, in cooperation with the IAEA, around key high-population density urban areas, as part of a more robust defense-in-depth approach to national level nuclear detection architectures. The U.S. also announced that they are embarking on an effort to dilute and dispose of approximately 6 metric tons of excess plutonium from the Savannah River Site, in addition to the 34 metric tons of material they have committed to dispose under the U.S.-Russia plutonium management and disposition agreement. The U.S. has announced its intention to host the INSServ mission in 2017.	

(2) Non-Parties to the NPT

6. India (Non-Party to the NPT)

Points / Full Points (%)

Nuclear Disarmament	***5.8/91 (6.4%)***
India is estimated to possess approximately 100 nuclear warheads, having added incrementally. It also continues to develop ICBM and SLBM capabilities, and to produce fissile material for nuclear weapons. India voted positively to some extent in the UNGA Resolutions regarding nuclear disarmament. However, it did not participate in the OWEG, and abstained in the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations." India continued active development of its nuclear arsenal, including flight tests of ICBMs and SLBMs. India maintains a moratorium on nuclear test explosions, but refuses to sign the CTBT.	
Nuclear Non-Proliferation	***15/43 (34.9%)***
India acceded to the IAEA Additional Protocol, in which no provision for complementary access visits is stipulated. India's quest for membership in the NSG is supported by some member states, but the group has not yet made a decision.	
Nuclear Security	***22/41 (53.7%)***
In India, security of nuclear and radiological material was ensured through oversight by India's Atomic Energy Regulatory Board (AERB), and the Nuclear Safety Regulatory Authority (NSRA) Bill had been proposed. India has contributed to measures to minimize HEU use by removing the HEU fuel in its oldest research reactor "APSARA". Also, India announced establishment of a counter nuclear smuggling team in 2015, which enables it to promote a coordinated multi-agency approach to deal with the threat of individuals or group of individuals acquiring nuclear or radioactive material for malicious purposes. In the field of capacity building, India's Global Centre for Nuclear Energy Partnership (GCNEP) has conducted a number of international and regional programs. India announced its intention to host the IAG meeting in New Delhi in February 2017.	

7. Israel (Non-Party to the NPT)

Points / Full Points (%)

Nuclear Disarmament	***0/91 (0.0%)***
Israel has consistently pursued the policy of "nuclear opacity" while estimated to possess approximately 80 nuclear warheads. Due to such a policy, its nuclear capabilities and posture remain unclear. Israel has yet to ratify the CTBT. Nor has it declared a moratorium on production of fissile material for nuclear weapons. It voted against most of the UNGA Resolutions regarding nuclear disarmament. Israel voted against the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," and seems unlikely to participate in a conference on negotiating a legal instrument on prohibiting nuclear weapons, to be held in 2017.	
Nuclear Non-Proliferation	***13/43 (30.2%)***
Israel argues that improvement of the regional security is imperative for establishing a Middle East Zone Free of WMD. It has established solid export control systems. However, Israel has not acceded to the IAEA Additional Protocol.	
Nuclear Security	***21/41 (51.2%)***
With regard to implementation of the INFCIRC225/Rev.5, Israel has followed the IAEA guidance regarding the security of nuclear facilities, and the protection of materials used in nuclear research and applications. As for the measures against sabotage, Israel has conducted periodic national preparedness and response exercises, with the participation of international observers and partners. In the field of nuclear forensics, Israel reported establishment of a national forensics laboratory to collaborate with the parties to the GICNT.	

8. Pakistan (Non-Party to the NPT)

Points / Full Points (%)

Nuclear Disarmament	***2.5/91 (2.7%)***
Pakistan seems to be increasing its nuclear arsenal incrementally, and is estimated to possess 130 nuclear warheads. In addition to continuing to develop short- and medium-range ballistic missiles, it revealed a possession of low-yield, small nuclear weapons. Such developments raise concerns about the increased possibility for early use of nuclear weapons. Pakistan voted positively to some extent in the UNGA Resolutions regarding nuclear disarmament. However, it did not participate in the OWEG, and abstained in the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations." While maintaining a moratorium on nuclear test explosions, it refuses to sign the CTBT. Pakistan continues to block the commencement of negotiations on an FMCT at the CD. It has yet to declare a moratorium on production of fissile material for nuclear weapons.	
Nuclear Non-Proliferation	***9/43 (20.9%)***
Pakistan has not yet acceded to the IAEA Additional Protocol. It argues that it has made efforts to enhance its export control systems: however, it is still unclear how robust or successfully implemented such export control systems are in practice.	
Nuclear Security	***17/41(41.5%)***
In Pakistan, physical security at a number of nuclear medical centers has been upgraded. In 2016, Pakistan ratified the Amended CPPNM, reported to establish a purpose-raised standalone, specially trained and equipped nuclear security force, and deployed vehicular and pedestrian radiation detection equipment at entry and exit points: to deter, detect and prevent illicit trafficking of nuclear and radioactive materials.	

(3) Non-Nuclear-Weapon States

9. Australia (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***17.8/35 (50.9%)***
At the OEWG, Australia requested to vote, instead of reaching consensus, on adopting a final report. Then, it voted against its adoption. Australia was also against the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations." It was against or abstained in the vote on the other resolutions related to the humanitarian dimensions, as well as legal prohibition of nuclear weapons. Along with other U.S. allies, Australia advocates the "progressive approach" toward a world without nuclear weapons, through incremental, practical measures. Australia has engaged in promoting the CTBT's entry into force, and developing its verification systems.	
Nuclear Non-Proliferation	***56/61 (91.8%)***
Australia is also a state party to the South Pacific Nuclear-Free Zone Treaty. It acceded to the IAEA Additional Protocol, and has been applied the integrated safeguards. Australia-India Nuclear Cooperation Agreement was adopted in 2015.	
Nuclear Security	***31/41 (75.6%)***
Australia has contributed to minimize holdings of HEU, including by use of LEU for the production of medical radioisotopes, by significantly expanding its production of medical radioisotopes for the global market, and using LEU for both fuel and targets. The new nuclear medicine plant, which adopts the same technology, at the Australian Nuclear Science and Technology Organisation (ANSTO) will become operational in 2017. In the field of nuclear forensics, Australia hosted a GICNT nuclear emergency planning and response workshop and exercise, "Kangaroo Harbour," in 2016, which has demonstrated best practices in issuing and responding to notifications and assistance requests to increase nuclear detection, nuclear forensics and emergency response involving the threat and use of radioactive materials in a terrorist attack.	

10. Austria (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***27/35 (77.1%)***
Austria has played a leading role for promoting the issue on the humanitarian dimensions of nuclear weapons, as well as a commencement of negotiating a legal prohibition on nuclear weapons. Then, it took an initiative to adopt the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations." It has also proactively engaged in cooperation with the civil society.	
Nuclear Non-Proliferation	***52/61 (85.2%)***
Austria has also participated in and implemented the related treaties and measures. It acceded to the IAEA Additional Protocol, and has been applied the integrated safeguards.	
Nuclear Security	***27/41 (65.9%)***
Austria has ratified major treaties on nuclear security and safety, contributed to minimize holdings of HEU in civilian use, promoted capacity building and actions to prevent the illicit trafficking of nuclear materials.	

11. Belgium (Non-Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	***14.3/35 (40.9%)***
Belgium is hosting U.S. non-strategic nuclear weapons as part of NATO's nuclear sharing policy. It was against the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," and was against or abstained in the vote on the other UNGA Resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons. Along with other U.S. allies, Belgium advocates the "progressive approach" toward a world without nuclear weapons, through implementing practical measures. It has engaged in promoting the CTBT's entry into force, and developing its verification systems.	
Nuclear Non-Proliferation	***54/61 (88.5%)***
Belgium acceded to the IAEA Additional Protocol, and has been applied the integrated safeguards. It has engaged in non-proliferation, including the establishment of the solid export control systems.	
Nuclear Security	***29/41 (70.7%)***
In March 2016, simultaneous terrorist attacks occurred in Belgium, and police investigations after the incident revealed the devastating fact that the terrorists had also attempted to attack nuclear power plants. In association with this nuclear security threat, Belgium set up a strict regulatory framework, aimed at improving nuclear security infrastructure, including an extensive system of clearances. Also, Belgium stated that it has started to set up a new directorate of the Federal Police, tasked with providing a permanent armed response capacity at nuclear sites. In the field of minimization of HEU in civilian use, Belgium reported that the Belgian research center SCK-CEN is leading an international cooperation effort with the aim of qualifying high-density LEU-fuels, which can be used in different high performance research reactors throughout the world.	

12. Brazil (Non-Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	***24/35 (68.6%)***
Brazil has played a leading role for promoting the issue on a commencement of negotiating a legal prohibition on nuclear weapons. Then, it took an initiative to adopt the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations." It voted for most of the UNGA Resolutions regarding nuclear disarmament.	
Nuclear Non-Proliferation	***43/61 (70.5%)***
Brazil is also a state party to the Latin America Nuclear-Weapon-Free Zone Treaty. While it complies with nuclear non-proliferation obligations, Brazil continues to be reluctant about accepting the IAEA Additional Protocol. It considers that the conclusion of an Additional Protocol should be voluntary.	
Nuclear Security	***28/41 (68.3%)***
Brazil ratified the Amended CPPNM and approved new anti-terrorism legislation in 2016 that criminalizes terrorist acts with nuclear or radioactive materials. In the area of strengthening physical protection measures, the "Brazilian Nuclear Program Protection System" (SIPRON) supervises and coordinates actions of several governmental agencies and entities aimed at ensuring the appropriate capacity for prompt response to nuclear emergency situations, and for the protection of its nuclear materials and installations.	

13. Canada (Non-Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	***18.8/35 (53.7%)***
While Canada has proactively engaged in nuclear disarmament, it was against the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," and was against or abstained in the vote on the other UNGA Resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons. Along with other U.S. allies, it advocates the "progressive approach" toward a world without nuclear weapons, through implementing practical measures. Canada has engaged in promoting the CTBT's entry into force, and developing its verification systems. Canada has also undertaken active cooperation with civil society.	
Nuclear Non-Proliferation	***52/61 (85.2%)***
Canada acceded to the IAEA Additional Protocol, and has been applied the integrated safeguards. Canada exported uranium to India, as their civil nuclear cooperation.	
Nuclear Security	***32/41 (78.0%)***
In terms of promoting nuclear security culture, Canada announced to seek endorsement of a Joint Statement in support of certified training for managers and personnel involved in nuclear security, provided by the Academy of the World Institute for Nuclear Security (WINS). Canada reported that it is in the final stages of concluding a project with the IAEA, to help secure disused radioactive sources in Latin American countries through the removal of radioactive sources of Canadian and other origins.	

14. Chile (Non-Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	***23/35 (65.7%)***
Chile voted for most of the UNGA Resolutions regarding nuclear disarmament, and has expressed approval of the issues on the humanitarian dimensions and legal prohibition of nuclear weapons. It was one of the co-sponsors of the UNGA resolution "Taking forward multilateral nuclear disarmament negotiations," and took an active role for commencement of negotiating a legal prohibition on nuclear weapons.	
Nuclear Non-Proliferation	***52/61 (85.2%)***
Chile is also a state party to the Latin America Nuclear-Weapon-Free Zone Treaty. It has acceded to the IAEA Additional Protocol, and has been applied the integrated safeguards. Meanwhile, more efforts are needed to strengthen its nuclear-related export controls system.	
Nuclear Security	***30/41 (73.2%)***
As a member of the Nuclear Security Contact Group, which is based on INFCIRC/869, Chile has been retaining a commitment to implement measures to build a strengthened and sustainable global nuclear security architecture.	

15. Egypt (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***16/35 (45.7%)***
Egypt voted for most of the UNGA Resolutions regarding nuclear disarmament, including the resolution "Taking forward multilateral nuclear disarmament negotiations," and has expressed approval of the issues on the humanitarian dimensions and legal prohibition of nuclear weapons. However, it has not actively engaged in promotion of nuclear disarmament. Nor has it ratified the CTBT. Egypt was the only UN Security Council member that abstained in the resolution on a nuclear test ban.	
Nuclear Non-Proliferation	***37/61 (60.7%)***
Egypt has been active toward establishing a WMD-free zone in the Middle East. Meanwhile, it has yet to conclude the IAEA Additional Protocol. Egypt has made efforts for, inter alia, putting export control legislation in place and setting enforcement agencies. Still, its export controls remain at insufficient level due to a lack of introduction of important elements including list control and catch-all control provisions. While signing, it has not yet ratified the Africa Nuclear-Weapon-Free Zone Treaty.	
Nuclear Security	***13/41 (31.7%)***
In 2016, Egypt ratified the CPPNM and the Amended CPPNM. However, noticeable progress has yet to be observed regarding Egypt's minimization of HEU, acceptance of measures recommended in the INFCIRC/225/Rev.5, and participation in international efforts on nuclear security.	

16. Germany (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***15.3/35 (43.7%)***
While Germany has proactively engaged in nuclear disarmament, it was against the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," and was against or abstained in the vote on the other UNGA Resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons. Along with other U.S. allies, Germany advocates the "progressive approach" toward a world without nuclear weapons, through incremental practical measures. Germany is hosting U.S. non-strategic nuclear weapons as part of NATO's nuclear sharing policy.	
Nuclear Non-Proliferation	***56/61 (91.8%)***
Germany acceded to the IAEA Additional Protocol, and has been applied the integrated safeguards. It has engaged in non-proliferation, including the establishment of solid export control systems.	
Nuclear Security	***28/41 (68.3%)***
Germany hosted a workshop entitled Safety and Security of Radioactive Sources in September 2016. With regard to cyber-terrorism, Germany announced to host an international workshop on computer security in 2018.	

17. Indonesia (Non-Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	***20.5/35 (58.6%)***
Indonesia has actively advocated promotion of nuclear disarmament at various nuclear disarmament fora, including the OEWG and the UNGA. It voted for most of the UNGA Resolutions regarding nuclear disarmament. It was one of the co-sponsors of the UNGA resolution "Taking forward multilateral nuclear disarmament negotiations," and took an active role for commencement of negotiating a legal prohibition on nuclear weapons.	
Nuclear Non-Proliferation	***48/61 (78.7%)***
Indonesia is also a state party to the Southeast Asia Nuclear-Weapon-Free Zone Treaty. It has concluded the IAEA Additional Protocol, of which the NAM countries are less enthusiastic about acceptance. Indonesia is applied the integrated safeguards. On export controls, however, Indonesia has yet to prepare a list of dual-use items and technologies, or to implement catch-all control.	
Nuclear Security	***29/41 (70.7%)***
Indonesia completed the process of downblending HEU to LEU in August 2016, and contributed to the minimization of HEU in civilian use. In the field of preventing illicit trafficking, Indonesia announced to install radiation portal monitors in its main ports. Indonesia established the COE on Nuclear Security and Emergency Preparedness (I-CoNSEP) in cooperation with the IAEA.	

18. Iran (Non-Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	***15/35 (42.9%)***
Iran voted for most of the UNGA Resolutions regarding nuclear disarmament, including the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," and other UNGA Resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons. However, it has not actively engaged in promotion of nuclear disarmament. Nor has it ratified the CTBT.	
Nuclear Non-Proliferation	***36/61 (59.0%)***
Iran agreed to conclude the Joint Comprehensive Plan of Action (JCPOA) in July 2015, and has complied with restrictions on its nuclear activities (including uranium enrichment) and verifications. While Iran has not ratified the IAEA Additional Protocol, it has accepted its provisional application, under which the IAEA conducted complimentary accesses. On the other hand, it has been reported that Iran has engaged in illicit transfer of nuclear-related items.	
Nuclear Security	***9/41 (22.0%)***
Iran strengthened the "Regulatory Commission on Nuclear and Radiation Facilities and Activities in Iran" in order to substantiate its legislative and regulatory framework for the 3S (Safety, Safeguards and Security), as well as to manage effectively the regulatory authorization and control in areas such as physical protection. However, noticeable progress has not yet been observed in areas such as ratification of nuclear security / safety-related treaties, minimization of HEU, acceptance of measures recommended in the INFCIRC/225/Rev.5 and participation in other nuclear security initiatives.	

19. Japan (Non-Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	***23.3/35 (66.6%)***

Japan voted against the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations." However, it is reportedly contemplating a possibility to participate in a conference on negotiating a legal instrument on prohibiting nuclear weapons. Japan has proactively engaged in nuclear disarmament, as one of the countries that lead efforts to promote and strengthen those areas, particularly for achieving a world without nuclear weapons, promoting entry into force of the CTBT, and undertaking disarmament and non-proliferation education. Japan has been provided U.S. extended deterrence. It abstained on the vote on some of the UNGA Resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons. Along with other U.S. allies, it advocates the "progressive approach" toward a world without nuclear weapons, through incremental practical measures.

Nuclear Non-Proliferation	***53/61 (86.9%)***

Japan has acceded to the IAEA Additional Protocol, and has been applied the integrated safeguards. It has proactively engaged in nuclear non-proliferation, including the establishment of solid export control systems and conducting outreach activities. In November 2016, after long negotiations, the Japan-India Nuclear Cooperation Agreement was signed. According to the Agreement and its "Note on Views and Understanding," Japan may exercise its rights and initiate the procedures to suspend nuclear cooperation under the Agreement, if and when India conducts a nuclear test explosion.

Nuclear Security	***29/41 (70.7%)***

Japan has been promoting to establish legal instruments and strengthen physical protection measures based on the INFCIRC/225/Rev.5. In the field of minimizing HEU in civilian use, Japan and the United States jointly announced that they have completed the removal of all HEU and separated plutonium fuels from the Fast Critical Assembly (FCA) in Japan. Also, all HEU fuels from the Kyoto University Critical Assembly (KUCA) will be removed to the United States within the framework for cooperation. The Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN) has received a number of foreign experts for training courses and also facilitates cooperation among the other COEs. Japan announced to host the plenary meeting of GICNT along with the United States and Russia co-chairs in 2017.

20. Kazakhstan (Non-Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	***23/35 (65.7%)***

Kazakhstan has actively advocated the importance of the CTBT. It voted for the UNGA Resolutions regarding nuclear disarmament, including the resolution "Taking forward multilateral nuclear disarmament negotiations," and has expressed approval of the issues on the humanitarian dimensions and legal prohibition of nuclear weapons.

Nuclear Non-Proliferation	***47/61 (77.0%)***

Kazakhstan is also a state party to the Central Asia Nuclear-Weapon-Free Zone Treaty. It has acceded to the IAEA Additional Protocol, and has been applied the integrated safeguards. Kazakhstan concluded the agreement with the IAEA in 2015 to establish a LEU fuel bank, which will start to be operational in 2017.

Nuclear Security	***26/41 (63.4%)***

The LEU fuel bank mentioned above also serves for the sake of minimizing HEU civilian will be launched in the second half of 2017. Also, the transition into LEU fuel of the research reactor VVR-K and critical stand has been completed in Almaty. Kazakhstan announced that it is currently studying the possibility of transfer of fuel in two research reactors into LEU. In terms of nuclear security capacity building, Kazakhstan announced to construct a National Nuclear Security Training Center in Almaty before the end of 2016, with the support of the IAEA and United States.

21. South Korea (Non-Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	***13/35 (37.1%)***
South Korea was against the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," and was against or abstained in the vote on the other UNGA Resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons. Along with other U.S. allies, it advocates the "progressive approach" toward a world without nuclear weapons, through incremental practical measures. South Korea has engaged in promoting the CTBT's entry into force, and developing its verification systems.	
Nuclear Non-Proliferation	***51/61 (83.6%)***
South Korea acceded to the IAEA Additional Protocol, and has been applied the integrated safeguards. It has proactively engaged in the issue of how to make withdrawal from the NPT more difficult. Meanwhile, facing North Korea's nuclear and missile build-up, arguments for re-deployment of the U.S. nuclear arsenals and their sharing have been increasing from outside of the South Korean government.	
Nuclear Security	***37/41 (90.2%)***
In 2016, South Korea ratified the Amended CPPNM. South Korea's International Nuclear Non-proliferation and Security Academy (INSA) has been promoting capacity building and strengthening nuclear security culture since 2014.	

22. Mexico (Non-Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	***24/35 (68.6%)***
Mexico has played a leading role for promoting the issue on the humanitarian dimensions of nuclear weapons as well as a commencement of negotiating a legal prohibition on nuclear weapons. Furthermore, it took an initiative to adopt the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations."	
Nuclear Non-Proliferation	***50/61 (82.0%)***
Mexico is also a state party to the Latin America Nuclear-Weapon-Free Zone Treaty. Mexico acceded to the IAEA Additional Protocol, but has not yet been drawn a broader conclusion.	
Nuclear Security	***30/41 (73.2%)***
In Mexico, the Federal Penal Code was amended to criminalize and punish terrorist acts, sabotage and theft of radioactive materials, nuclear fuel, sources of radiation and instruments that emit radiation. Also, Mexico reported the creation of a Regulation for the Safe Transport of Radioactive Material, which may enter into force during 2017.	

23. The Netherlands (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***15.8/35 (45.1%)***
The Netherlands is the only U.S. ally that abstained in the adoption of the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," as well as other resolutions related to the humanitarian dimensions and the legal prohibition of nuclear weapons. Along with other U.S. allies, it advocates the "progressive approach" toward a world without nuclear weapons, through incremental practical measures. It is hosting U.S. non-strategic nuclear weapons as part of NATO's nuclear sharing policy.	
Nuclear Non-Proliferation	***55/61 (90.2%)***
The Netherlands acceded to the IAEA Additional Protocol, and has been applied the integrated safeguards. It has actively engaged in non-proliferation activity, including the establishment of solid export control systems.	
Nuclear Security	***32/41 (78.0%)***
In the field of nuclear forensics, the Netherlands Forensic Institute (NFI) organized a five-year project named "The Hague Innovations Pathway 2014-2019 on Forensics in Nuclear Security" around the time of the Hague Nuclear Security Summit in 2014. Also, in 2015, the NFI organized an international conference and mock trial on nuclear forensics under the framework of the GICNT.	

24. New Zealand (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***26/35 (74.3%)***
While New Zealand abstained in the adoption of the final report at the OEWG, it was one of the co-sponsors of the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," along with other UNGA resolutions, and took an active role for commencement of negotiating a legal prohibition on nuclear weapons. New Zealand has actively advocated promotion of nuclear disarmament at various fora, including the UN General Assembly. It has engaged in promoting the CTBT's entry into force, and developing its verification systems.	
Nuclear Non-Proliferation	***55/61 (90.2%)***
New Zealand is also a state party to the South Pacific Nuclear-Free Zone Treaty. It has acceded to the IAEA Additional Protocol, and has been drawn the broader conclusion. New Zealand amended and Nigeria withdrew the Small Quantity Protocol (SQP).	
Nuclear Security	***27/41 (65.9%)***
In 2016, New Zealand ratified the Amended CPPNM and the Nuclear Terrorism Convention, and also enacted the Radiation Safety Act, which completely overhauled and updated its domestic legislative framework dealing with the safety and security of nuclear and radioactive material. In terms of acceptance of international nuclear security review missions, New Zealand has stated its decision to host the IPPAS follow-up mission in 2018.	

25. Nigeria (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***20.5/35 (58.6%)***
Nigeria was one of the co-sponsors of the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," along with other UNGA resolutions, and took an active role for commencement of negotiating a legal prohibition on nuclear weapons.	
Nuclear Non-Proliferation	***45/61 (73.8%)***
Nigeria is also a state party to the Africa Nuclear-Weapon-Free Zone Treaty. It acceded to the IAEA Additional Protocol, and has been drawn the broader conclusion. Its implementations on export controls and nuclear security-related measures are not necessarily adequate. Nigeria amended and withdrew the SQP.	
Nuclear Security	***21/41 (51.2%)***
Nigeria reported that conversion of the reactor core of the Nigeria Research Reactor-1(NIRR-1) from using HEU to LEU fuel is in progress. In the field of nuclear security capacity building, Nigeria has finalized the institutional and technical framework for the establishment of a National Nuclear Security Center (NNSC) in Abuja. In 2016, Nigeria hosted the IAEA's INSSP review meeting.	

26. Norway (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***15.8/35 (45.1%)***
Norway was against the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," and also against or abstained in the vote on the other UNGA Resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons. Along with other U.S. allies, Norway advocates the "progressive approach" toward a world without nuclear weapons, through incremental practical measures.	
Nuclear Non-Proliferation	***54/61 (88.5%)***
Norway acceded to the IAEA Additional Protocol, and has been applied the integrated safeguards. It has engaged in non-proliferation, including the establishment of the solid export control systems.	
Nuclear Security	***28/41 (68.3%)***
Norway announced to host an international conference in 2018, to review progress on the measures set out in the Nuclear Security Summit Gift Basket on Minimizing and Eliminating the Use of HEU in Civilian Applications.	

27. The Philippines (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***23/35 (65.7%)***
The Philippines was one of the co-sponsors of the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," along with other UNGA resolutions, and took an active role for commencement of negotiating a legal prohibition on nuclear weapons.	
Nuclear Non-Proliferation	***50/61 (82.0%)***
The Philippines is also a state party to the Southeast Asia Nuclear-Weapon-Free Zone Treaty. It has concluded the IAEA Additional Protocol, and has been drawn the broader conclusion. Philippines, enacting a Strategic Trade Management Act (STMA) in November 2015, introduced list control and catch-all control.	
Nuclear Security	***28/41 (68.3%)***
The Philippines has installed security alarm systems for facilities with high-risk radioactive sources, and also implemented security upgrades in hospitals and other relevant facilities with radioactive sources. The Philippines has worked continuously on the physical protection system of the Philippines Research Reactor-1. In terms of transport security, The Philippines stated that its national competent authority now requires licensees to submit a transport security plan before transporting their radioactive material. The Philippines reported to introduce systematically enhanced detection capabilities for special nuclear and other radioactive materials in containerized cargo. As part of this initiative, The Philippines installed 20 radiation portal monitors at the Port of Manila and at Cebu International Port. In the field of nuclear security capacity building, it stated its intention to establish a Nuclear Security Support Center (NSSC) at the Philippine Nuclear Research Institute, which is to be pursued in coordination with a Nuclear Training Center.	

28. Poland (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***13/35 (37.1%)***
Like other NATO countries, Poland maintains a cautious stance on legally banning nuclear weapons. At the OEWG, it requested to vote, instead of reaching consensus, on adopting a final report. Then, it voted against its adoption. Poland was also against the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations." It was against or abstained on the vote on the other resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons. Along with other U.S. allies, Poland advocates the "progressive approach" toward a world without nuclear weapons, through incremental practical measures.	
Nuclear Non-Proliferation	***52/61 (85.2%)***
Poland acceded to the IAEA Additional Protocol, and has been applied the integrated safeguards. It has engaged in non-proliferation, including the establishment of solid export control systems.	
Nuclear Security	***30/41 (73.2%)***
For the sake of adopting the recommendations of INFCIRC/225/Rev.5, Poland adopted the National Anti-terrorist Program in 2014, and a special task-force group for developing proposals to strengthen the anti-terrorist security of the nuclear research reactor "Maria" was established as a part of the inter-ministerial team for addressing terrorist threats. The group formulated a number of recommendations. In 2016, Poland hosted the IPPAS mission. In terms of minimizing HEU in civilian use, Poland had officially declared to remove all the remaining HEU and plutonium in 2016.	

29. Saudi Arabia (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***12/35 (34.3%)***
Saudi Arabia voted for most of the UNGA Resolutions regarding nuclear disarmament, including the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," and other UNGA Resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons. Meanwhile, it has yet to sign the CTBT.	
Nuclear Non-Proliferation	***36/61 (59.0%)***
Saudi Arabia has not acceded to the IAEA Additional Protocol. Its national implementation regarding export controls also came up short.	
Nuclear Security	***18/41 (43.9%)***
Saudi Arabia has been promoting to establish legal instruments and strengthen physical protection measures based on the INFCIRC/225/Rev.5. It has also declared to establish its own COE on nuclear security.	

30. South Africa (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***21/35 (60.0%)***
South Africa has played a leading role for promoting the issue on the humanitarian dimensions of nuclear weapons as well as a commencement of negotiating a legal prohibition on nuclear weapons. It also took an initiative to adopt the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations."	
Nuclear Non-Proliferation	***51/61 (83.6%)***
South Africa is a state party to the Africa Nuclear-Weapon-Free Zone Treaty. It acceded to the IAEA Additional Protocol, and has been drawn the broader conclusion. It considers that the conclusion of an Additional Protocol should be voluntary.	
Nuclear Security	***25/41 (61.0%)***
South Africa has ratified all major treaties on nuclear security and safety, except for CPPNM amendment. It has been promoting to establish legal instruments, strengthen physical protection measures and transport security based on the INFCIRC/225/Rev.5. It has also declared to establish its own COE on nuclear security.	

31. Sweden (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***25.6/35 (73.1%)***
While Sweden abstained in the adoption of the final report at the OEWG, it was one of the co-sponsors of the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," along with other UNGA resolutions, and took an active role for commencement of negotiating a legal prohibition on nuclear weapons. It has engaged in promoting the CTBT's entry into force, and developing its verification systems.	
Nuclear Non-Proliferation	***53/61 (86.9%)***
Sweden acceded to the IAEA Additional Protocol, and has been applied the integrated safeguards. It has engaged in non-proliferation, including the establishment of solid export control systems.	
Nuclear Security	***38/41 (92.7%)***
In 2016, Sweden hosted the IPPAS preparatory meeting and the IPPAS follow-up meeting.	

32. Switzerland (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***23.1/35 (66.0%)***
While Switzerland abstained in the adoption of the final report at the OEWG, it was one of the co-sponsors of the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," along with other UNGA resolutions, and took an active role for commencement of negotiating a legal prohibition on nuclear weapons. Switzerland has actively advocated promotion of nuclear disarmament. It has engaged in promoting the CTBT's entry into force, and developing its verification systems. It has also taken proactive attitudes regarding cooperation with civil society. It enacted national laws, which restrict financing for nuclear weapons production.	
Nuclear Non-Proliferation	***50/61 (82.0%)***
Switzerland acceded to the IAEA Additional Protocol. It was drawn the broader conclusion in 2015. It has engaged in non-proliferation, including the establishment of solid export control systems.	
Nuclear Security	***31/41 (75.6%)***
Switzerland has been promoting to establish legal instruments and strengthen physical protection measures based on the INFCIRC/225/Rev.5. It has also declared to establish its own COE on nuclear security.	

33. Syria (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***8.5/35 (24.3%)***
Syria voted for most of the UNGA Resolutions regarding nuclear disarmament, including the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," and other UNGA Resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons. However, it has not actively engaged in promotion of nuclear disarmament. Nor has it signed the CTBT.	
Nuclear Non-Proliferation	***21/61 (34.4%)***
Syria has yet to address and resolve the allegation of constructing a clandestine nuclear power plant, despite repeated requests by the IAEA. On the other hand, the IAEA reported that it had conducted physical inventory verification (PIV) at the Miniature Neutron Source Reactor in September 2015, and found no indication of the diversion of declared nuclear material from peaceful activities. Meanwhile, Syria has not concluded the IAEA Additional Protocol, and has yet to take appropriate measures on export controls.	
Nuclear Security	***2/41 (4.9%)***
In Syria, no noticeable progress has yet been observed in the areas such as ratification of nuclear security / safety related treaties, prevention of illicit trafficking, acceptance of measures recommended in the INFCIRC/225/Rev.5, except for a new effort on minimization of HEU that began in 2015.	

34. Turkey (Non-Nuclear-Weapon State)

	Points / Full Points (%)
Nuclear Disarmament	***8/35 (22.9%)***
Like other NATO countries, Turkey maintains a cautious stance on legally banning nuclear weapons. At the OEWG, it requested to vote, instead of reaching consensus, on adopting a final report. Then, it voted against its adoption. Turkey was also against the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations." It was against or abstained in the vote on the other resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons. Along with other U.S. allies, Turkey advocates the "progressive approach" toward a world without nuclear weapons, through incremental practical measures.	
Nuclear Non-Proliferation	***50/61 (82.0%)***
Turkey acceded to the IAEA Additional Protocol, and has been applied the integrated safeguards. It has engaged in non-proliferation, including the establishment of solid export control systems.	
Nuclear Security	***27/41 (65.9%)***
For the sake of implementing the INFCIRC225/Rev.5, Turkey's Penal Code has been updated and revised accordingly to take into account its nuclear security related international obligations. In 2016, Turkey hosted the IPPAS preparatory meeting and IPPAS mission.	

35. UAE (Non-Nuclear-Weapon State)

Points / Full Points (%)

Nuclear Disarmament	***20/35 (57.1%)***
UAE voted for most of the UNGA Resolutions regarding nuclear disarmament, including the UNGA resolution titled "Taking forward multilateral nuclear disarmament negotiations," and other UNGA Resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons. The fourth plenary meeting of the IPNDV was done in Abu Dhabi in October-November 2016.	
Nuclear Non-Proliferation	***45/61 (73.8%)***
UAE acceded to the IAEA Additional Protocol, but has not been drawn a broader conclusion. On export controls, it established national legislation, which includes a catch-all control, but it is not clear how effectively UAE has implemented such measures.	
Nuclear Security	***27/41 (65.9%)***
In 2016, UAE hosted the IPPAS mission. In the field of nuclear forensics, UAE hosted the first Inter-Arab Nuclear Detection and Response Exercise "FALCON" in Abu Dhabi, in February 2016.	

(4) Other

36. North Korea (Other)

Points / Full Points (%)

Nuclear Disarmament	***-6/91 (-6.6%)***
North Korea conducted activities for development of nuclear weapons and their delivery vehicles more aggressively in 2016 than previous years, including two nuclear tests and more than 20 ballistic missiles flight tests. It continued repeated nuclear provocations vis-à-vis Japan, the United States and South Korea. It has emphasized bolstering its nuclear deterrent and rejected its denuclearization. North Korea seemed to produce fissile material for nuclear weapons. While it voted for the UNGA resolution "Taking forward multilateral nuclear disarmament negotiations" at the First Committee, North Korea did not vote at the Plenary. It has not mentioned whether the North would participate in a conference on negotiating a legal instrument on prohibiting nuclear weapons in 2017. It has yet to sign the CTBT. Meanwhile, North Korea voted for or abstained on most of the UNGA Resolutions regarding nuclear disarmament, except a few resolutions, including ones promoted by Japan and the NAC, respectively.	
Nuclear Non-Proliferation	***0/61 (0.0%)***
North Korea, which declared to withdraw from the NPT in 2003, ignores or reneges on most of the nuclear-related treaties, agreements, obligations and norms. It is reported to actively engage in illicit transfers and procurements of nuclear and missile related items.	
Nuclear Security	***-2/41 (-4.9%)***
In North Korea, no noticeable progress has yet been observed in the areas such as ratification of nuclear security/safety related treaties, minimization of HEU, acceptance of measures recommended in the INFCIRC/225/Rev.5 and participation in nuclear security initiatives.	

Part III Special Articles

A World without Nuclear Weapons: Prospects and Challenges
Recent Trends in nuclear disarmament, non-proliferation, and nuclear security

Nobuyasu Abe

Nuclear Disarmament: Gaps between Ideal and Reality

Five years have passed since the first edition of the *Hiroshima Report* compiling the annual updates on nuclear disarmament, non-proliferation and nuclear security issues around the world was issued. During the five year period, we have witnessed a downturn from hopes for the progress towards nuclear disarmament and non-proliferation to stagnation. During the first half of the period, we witnessed such successes as the 2010 NPT Review Conference (RevCon) and the conclusion of the New Strategic Arms Reduction Treaty (New START) in 2010, heralded by the President Obama's 2009 speech in Prague advocating "a world without nuclear weapons," for which he received the Nobel Peace Prize. Positive developments were also seen even in the latter half of the period, such as the conclusion of the Joint Comprehensive Plan of Action (JCPOA) in 2015 for resolving the Iranian nuclear issue, President Obama's visit to Hiroshima in 2016, and the decision at the United Nations General Assembly (UNGA) to commence a negotiation of a legally-binding instrument to ban nuclear weapons. The latter half of the period, however, saw more steps backward; the acceleration of North Korea's nuclear and ballistic missile tests; deterioration of the relationship between Russia and the NATO after Russia's annexation of Crimea with Russia starting nuclear saber-rattling; nuclear arms race between India and Pakistan; and the development and modernization of nuclear forces by all of the nuclear-armed states. Gaps widened between the hope for nuclear elimination and the reality on the ground.

The Retirement of President Obama

A greatest loss may be the retirement of President Obama as his term expired. Well recognizing the danger of nuclear weapons and holding a firm belief to pursue a world without nuclear weapons, President Obama organized the series of Nuclear Security Summits, and accomplished the JCPOA. For Japan, the most significant event during his presidency was his visit to Hiroshima, the first visit ever by a sitting U.S. president to a city that suffered the atomic bomb paying tribute to the victims. The hope is that President Obama will keep the torch of nuclear disarmament high even after his retirement, and Japan may support his efforts.

A Difficult Time for Nuclear Disarmament

The year 2017 may witness an even more difficult time in the field of nuclear disarmament and non-proliferation. President Donald Trump, who has succeeded President Obama is known to have uttered a number of controversial statements on nuclear issues; North Korea has been aggressively conducting nuclear and missile tests so as to accelerate its nuclear deterrent buildup; and every nuclear-armed state is continuing to reinforce and modernize its nuclear arsenals.

Nonetheless, some still entertain the possibility that nuclear disarmament might advance even under the Trump administration. History has shown that some important nuclear disarmament and arms control measures have

actually been achieved under Republican Presidents; Richard Nixon (the Strategic Arms Limitation Treaty: SALT), Ronald Reagan (the Intermediate-Range Nuclear Forces (INF) Treaty), and George H. W. Bush (the Strategic Arms Reduction Treaty: START). Let us hope it becomes a reality.

What needs to be done?

What, then, should be done when serious challenges face nuclear disarmament, non-proliferation, and nuclear security?

1. Keep the torch of disarmament and non-proliferation alive.

Despite the negative trends we cannot afford to put out the torch of nuclear disarmament and non-proliferation. Two important conferences will be held in 2017: the UN conference on negotiating a nuclear weapons ban convention (in March), and the first Preparatory Committee (PrepCom) for the 2020 NPT RevCon (in May). Since the nuclear-weapon/armed states have voted against or abstained from voting for the 2016 UNGA resolution calling for the conference, they are not likely to participate in the conference. Nonetheless, since the resolution was adopted by an overwhelming majority, the conference will be held, and a treaty banning nuclear weapons will likely be discussed and drafted among the participating countries. Some nuclear-weapon/armed states, while staying away from the conference, may raise doubts about the value of the conference and lobby against any premature moves to draft a treaty from outside the conference room. On the part of countries participating in the conference they would have to look to the eventual adherence to a ban treaty by the nuclear-armed states. Therefore, it would be advisable for the participating countries to listen, without prejudice, to their concerns with a view to their eventual adherence. For example, non-participating countries may be concerned about establishing a robust verification system, enforcement mechanism against non-compliance, and the process from reduction to elimination should they proceed to eliminate all their nuclear weapons as well as measures to ensure each countries' security. It may become necessary to reflect them in the drafting of a ban treaty.

Since the NPT provides an important legal basis for nuclear disarmament, it is essential to maintain its effectiveness. In view of the fact that the 2015 RevCon failed to adopt its final document, every effort has to be made to make the coming 2020 RevCon a success. The preparatory process will start with the first PrepCom in May. This meeting, to be held right after the UN negotiating conference, will be an important step in making the 2020 RevCon successful.

2. Make a big political tide for the reduction and elimination of nuclear weapons.

Behind the success of major treaties on nuclear disarmament and arms control in the past, lay a widespread fear among the peoples in countries that nuclear weapons would actually be used. It was this fear that drove countries to those agreements. In the post-Cold War era today, there is no such serious fear that nuclear weapons are going to be used, nor a nuclear war may break out at any moment, as to cause a big political tide. People are becoming more concerned about global warming, epidemic diseases outbreaks, regional conflicts, and terrorist attacks by extremists pushing the concern about nuclear weapons use to backstage. In the U.S. and other countries, nuclear issues rarely become election campaign issues. Under these circumstances it is not easy to turn the eyes of the political leaders of nuclear-weapon/armed states who are pressed by everyday political matters towards nuclear disarmament. Moreover, faced with the growing tension between nuclear-weapon/armed states, it is an easy choice for them to show off their nuclear deterrent. However, given the disastrous consequence of a

possible use of nuclear weapons, there is no choice but to work towards generating a political tide to seek the reduction and elimination of nuclear weapons. This is by no means an easy task. We have to be creative and persistent in conveying experiences and consequences of the use of nuclear weapons, e.g. by making use of such new communication tools as the SNS.

3. Defend the achievements so far made.

The achievements so far made such as the JCPOA, the New START, and the Intermediate-Range Nuclear Forces (INF) treaty, are all indispensable tools to maintain a stable international relations on nuclear issues. Their collapse has to be prevented. Unfortunately, they are threatened by the arguments to abandon the JCPOA, to withdraw from the INF treaty, or to refuse extension of the New START. Preventing setbacks or demise of these valuable achievements is a baseline requirement from where to move nuclear disarmament and non-proliferation forward. While the Nuclear Security Summit process has wound down, it does not mean that the threat of nuclear terrorism has disappeared. It is of critical importance to keep the achievements so far made in this field and carry on the efforts to prevent nuclear terrorism.

4. Assess the current situation in a fair and cool-headed way.

In a world where nuclear-weapon/armed states continue building and modernizing their nuclear arsenals and the bilateral tensions continue between the U.S. and Russia, the U.S. and China, as well as between India and Pakistan, voices demanding the modernization and strengthening of the nuclear arsenals undoubtedly are becoming louder. However, by assessing the current situation in a calm and fair manner, we have to avoid overreacting to each other and avert escalating nuclear arms race. This is easier said than done. It is the task for experts in the field of nuclear disarmament, non-proliferation and arms control to work towards sharing their perspectives in a calm, fair, objective, and responsible manner. This is a task that is also expected of the readers of this Hiroshima Report.

5. Develop an argument that nuclear disarmament and non-proliferation are beneficial even for Conservatives and the Hawks.

If we are to move nuclear-weapon/armed states towards nuclear reduction and eventual elimination, an argument better be developed that nuclear disarmament and non-proliferation, as well as the elimination of nuclear weapons, are for the benefit of their ultimate national interest taking into account their respective security concerns. This is no easy task, but a task we cannot avoid if we are to move the nuclear-weapon/armed states.

In conclusion, those who pursue nuclear disarmament, non-proliferation, and the elimination of nuclear weapons still have a long way to go, and must vigorously tackle the number of challenges they face until they attain their goals. There is no time to waste.

- *Mr. Nobuyasu Abe*, Japan Atomic Energy Commission

Trends and Prospects of the International Community on the Legal Prohibition of Nuclear Weapons

Mitsuru Kurosawa

In December 2016, the United Nations General Assembly (UNGA) adopted a resolution on the commencement of negotiations in 2017 for a legally-binding instrument to prohibit nuclear weapons. Traditionally speaking, a Nuclear Weapons Convention (NWC) has been proposed ever since the International Court of Justice (ICJ) handed down its advisory opinion on the "Legality of the Threat or Use of Nuclear Weapons" in 1996. In these past few years, however, a Nuclear Weapon Ban Treaty (NWBT) proposed by the International Campaign to Abolish Nuclear Weapons (ICAN), an international NGO initiating the moves, has become the center of discussions in the nuclear disarmament field.

Humanitarian Approach towards Nuclear Disarmament

It was widely argued at the 2010 NPT Review Conference (RevCon) that nuclear disarmament should be discussed not just from a security perspective but also from a humanitarian dimension. In the discussions that followed, the devastating effects of the use of nuclear weapons were widely shared among the participants; moreover, the significance of complying with international humanitarian law was emphasized, and issues regarding legal prohibition of nuclear weapons were indicated.

After the 2010 NPT RevCon, the humanitarian approach has gained much attention through, inter alia, events such as the delivering of the Joint Statements on Humanitarian Consequences of Nuclear Weapons and the convening of the "International Conferences on Humanitarian Impact of Nuclear Weapons." The former was issued by 16 countries, led by Switzerland in 2012, and eventually expanded into a statement jointly addressed by 159 states in 2015. As for the latter, three conferences were held respectively in Oslo (Norway, 2013), Nayarit (Mexico, 2014) and Vienna (Austria, 2014), where participants examined the scientific effects of the use of nuclear weapons, and threw light on the long-term effects, immediate impacts, and possible consequences not only on human beings but also in the fields of climate, environment, food as well as development.

At the end of the conference in Vienna, Austria presented the "Austrian Pledge" (later renamed and having come to be known as the "Humanitarian Pledge"), in which, it emphasized the importance of human security, and stated to "pursue effective measures to fill the legal gap for the prohibition and elimination of nuclear weapons…, [and] to cooperate…in efforts to stigmatize, prohibit and eliminate nuclear weapons." More than 100 states have expressed their support to this Pledge.

Three Views on the Humanitarian Approach towards Nuclear Disarmament

There are currently three views regarding humanitarian approach towards nuclear disarmament. The first group is represented mainly by the Non-Aligned Movement (NAM) states, in which they advocate the elimination of nuclear weapons through the idea that the use of nuclear weapons is simply too inhumane. The second group is composed mostly of non-nuclear-weapon states (NNWS) under the nuclear umbrella (so-called "nuclear umbrella states"), arguing that both humanitarian and security dimensions should be fully contemplated when discussing and moving toward eliminating nuclear weapons. And the nuclear-weapon states (NWS), as the third group, insist that the elimination of nuclear weapons is achievable only when their security issues are fully assured.

Five Paths towards a World without Nuclear Weapons

On the other hand, there are mainly five ways proposed in achieving a world without nuclear weapons. The first path, traditionally proposed by NAM states, is to conclude a NWC which stipulates a phased program to eliminate nuclear weapons, accompanied by a set of verification measures and organizations.

The second path, led by a certain number of NNWS and ICAN, is to establish a NWBT. Proponents of this path pursue to ban, preceding the ban of other activities, the use and possession of nuclear weapons as a first step, and do not necessarily call for the initial participation of the nuclear-weapon/armed states as a premise.

The third path is to establish a framework agreement, which, to begin with, simply stipulates general and basic obligations, and then, gradually proceeds through negotiations to conclude protocols containing much more concrete obligations and rules.

The fourth path is the "progressive approach" proposed by the nuclear umbrella states, which explores to build blocks of practical and concrete measures. This approach proposes to commence negotiations on a treaty to eliminate nuclear weapons when the international community actually reaches the "minimization" point regarding the number of weapons existing in the world.

The fifth path is a "step-by-step approach" advocated by NWS, which argues that nuclear disarmament should be put forward one step at a time, starting with practical and feasible measures.

The Trends of Legal Prohibition of Nuclear Weapons in 2016

In accordance with the UNGA resolution adopted in 2015, the "Open-Ended Working Group (OEWG) to take forward multilateral nuclear disarmament negotiations" was convened in February, May and August 2016. Participants actively discussed on issues such as concrete and effective legal measures as well as legal provisions and norms that are essential for achieving and maintaining a world without nuclear weapons. Throughout the OEWG sessions, there was "widespread support" to recommend to the UNGA to convene an international conference in 2017, which would become a starting point for negotiations on a legally-binding instrument to prohibit nuclear weapons.

Taking upon this recommendation, the UNGA adopted a resolution in December 2016 which stated that it has "decided to convene in 2017 a United Nations conference to negotiate a legally binding instrument to prohibit nuclear weapons, leading towards their total elimination," and also "decided that the conference shall convene in New York, under the rules of procedure of the General Assembly unless otherwise agreed by the conference, from 27 to 31 March and from 15 June to 7 July 2017, with the participation and contribution of international organizations and civil society representatives."

The resolution was adopted with 113 states in favor, 34 against and 13 abstaining. NWS (except China) and almost all of the nuclear umbrella states, including the North Atlantic Treaty Organization (NATO) members, Australia and Japan, voted against the resolution.

Prospects and Japan's Role as a Bridge

According to the above UNGA resolution, negotiations on banning nuclear weapons will be launched in March 2017. Many of the 113 states in favor of the resolution are likely to support a proposal to "ban use and possession of nuclear weapons, not necessarily on the premise of the participation of the nuclear-weapon States." Furthermore, the proposal not only contains prohibitions of certain behaviors of NWS, but also those of the nuclear umbrella states; these behaviors include permitting deployment of nuclear weapons in their territories, financing activities related to nuclear weapons, and assisting any activity prohibited by the treaty.

Needless to say, NWS and the nuclear umbrella states opposed this approach. The United States, in particular, was furiously opposed to this move and strongly demanded the NATO member states and its other allies to vote against the resolution. Hence, there is no doubt that the international community is currently divided between "states supporting for a NWBT and those in opposition, including NWSs and the nuclear umbrella states," rather than the traditional division between "NWS and NNWS."

Although it is still too early to foresee specific prospects of the conference at this stage, still, it can be pointed out that a severe split and disagreement between these two camps would likely be a realistic possibility should the current positions and attitudes be maintained. Therefore, one of the significant challenges would be whether states supporting a NWBT would maintain their existing attitudes to pursue a stringent prohibition of nuclear weapons, or whether and how they are willing to prepare for making certain concessions so as to conclude an actual treaty.

Realistically speaking, however, it would also become necessary to step aside from these disagreements and explore other options. In his speech at the UNGA, a U.S. representative stated that "while we might disagree on process, we all agree on the goal: the peace and security of a world without nuclear weapons." Furthermore, in the joint statement of the five NWS delivered at the 2015 NPT RevCon, it was stated that "we remain steadfast in our commitment to seeking a safer world for all and achieving a world without nuclear weapons, in accordance with the goals of the NPT." In other words, there is no doubt that firm commitments by all states, including NWS, to a world without nuclear weapons is a common goal shared by all.

In the UN Security Council (UNSC) Resolution 1887 adopted at the UNSC summit meeting on nuclear non-proliferation and nuclear disarmament in 2013, firm determination to seek a safer world for all and to create the conditions for a world without nuclear weapons was presented. In addition, the advisory opinion by the ICJ in

1996 reaffirmed the existence of an obligation "to pursue in good faith and to bring to a conclusion negotiations leading to nuclear disarmament" as an interpretation of article Vl of the NPT. Moreover, the Final Document of the 2000 NPT RevCon clearly mentioned "an unequivocal undertaking by the nuclear-weapon States to accomplish the total elimination of their nuclear arsenals leading to nuclear disarmament to which all States parties are committed under Article VI."

What is obvious from these facts is that the obligation to pursue a world without nuclear weapons has been legally discussed, and supposedly established, at least, at the political level. Thus, taking account of every group's position and opinion, the best measure that can be taken at this point would be to establish a framework agreement which includes a legal obligation to "pursue a world without nuclear weapons."

Instead of following a path which would invite further division or disagreement, the international community should strive to pursue negotiations and to conclude such a framework agreement. And with this framework agreement as the basis, each group mentioned above should work towards proposing various options and alternatives in achieving a legalized nuclear disarmament measures.

-*Dr. Mitsuru Kurosawa*, Osaka Jogakuin University

Significance of President Obama's Visit to Hiroshima

Kazumi Mizumoto

On May 27, 2016, President Barack Obama became the first sitting U.S. president in history to visit Hiroshima, a city that suffered from the tragedy of the atomic bombing of 1945. Polls taken by some media immediately after his visit showed that more than 90 percent of the respondents were in favor of this action. For example, a telephone poll conducted by the Japanese Kyodo News agency on May 28-29 found that 98 percent of those surveyed answered that the visit was a positive move. In a poll conducted by the Nihon Keizai Shimbun and TV Tokyo on May 27-29, 92 percent of the respondents valued President Obama's decision to visit Hiroshima. These polls clearly show that the majority of the Japanese citizens regarded the visit by the President to Hiroshima as favorable.

At the same time, however, critical opinions were seen among some of the Hibakusha, victims of the atomic bombing, as well as citizens of Hiroshima concerning the President's visit. For example, the Japan Confederation of A- and H-Bomb Sufferers Organizations (Nihon Hidankyo) adopted a resolution at its general assembly on June 16, condemning President Obama's statement for having avoided mentioning the responsibility of the United States for dropping the bomb. Moreover, three out of the four experts who were interview by the local newspaper, Chugoku Shimbun, including Takashi Hiraoka, former Mayor of Hiroshima, and Hiroshi Harada, former Director of the Hiroshima Peace Memorial Museum, gave comments criticizing the President's statement for, inter alia, not proposing specific measures toward nuclear disarmament.

In the background of these criticisms lies the fact that President Obama's visit to Hiroshima, which had been decided with very short notice, brought about excessive expectations among the Hiroshima citizens that include:

- understanding toward the realities of the damage caused by the atomic bombing;
- dialogues with the Hibakusha, including hearing their testimonies;
- visit to the Cenotaph for the A-bomb Victims;
- apology for the dropping of the atomic bombs; and
- concrete proposals for nuclear disarmament.

Let us review the day of his visit to Hiroshima to know what really happened that day. After the G7 Ise-Shima Summit held in Mie Prefecture, President Obama helicoptered off to Hiroshima via Iwakuni. The President's motorcade arrived at the Hiroshima Peace Memorial Park under heavy security. Excluding his transit time, his stay there was no more than 52 minutes, with only 10 minutes for visiting the Peace Memorial Museum and the 17 minutes spared for his statement in front of the Cenotaph for the A-bomb Victims.

Contrary to the expectation for talks with the Hibakusha, President Obama, after his statement, engaged in a conversation for only a few minutes with three leading members of the Nihon Hidankyo, including Sunao Tsuboi, and Shigeaki Mori, a scholar who specializes in the research of U.S. soldiers killed in the atomic bombing.

President Obama's statement, which attracted much attention, included the following expressions:

- death fell from the sky and the world was changed;
- flash of light and a wall of fire destroyed a city and demonstrated that mankind possessed the means to destroy itself;
- the dead, including over 100,000 Japanese men, women and children, thousands of Koreans, a dozen Americans held prisoner;
- the world war that reached its brutal end in Hiroshima and Nagasaki;
- the history of civilization is filled with war;
- the same discoveries can be turned into ever more efficient killing machines;
- that is why we come to this place (Hiroshima);
- we have a shared responsibility to look directly into the eye of history and ask what we must do differently to curb such suffering again;
- the memory of the morning of August 6th, 1945 must never fade;
- among those nations that hold nuclear stockpiles, we must have the courage to pursue a world without them;
- even the crudest rifles and barrel bombs can serve up violence on a terrible scale. We must change our mindset about war itself. To prevent conflict through diplomacy, and strive to end conflicts after they've begun;
- we can learn from stories of the Hibakusha–one that describes a common humanity; one that makes war less likely and cruelty less easily accepted;
- the woman who forgave a pilot who flew the plane that dropped the atomic bomb; the man who sought out families of Americans killed here; and
- Hiroshima and Nagasaki are known as the start of our own moral awakening.

To sum up, President Obama's focus through his statement were on the following points: "the devastation caused by the atomic bombing;" "victims of the atomic bomb and their experiences;" "the significance of the atomic bombing in the history of war;" "the development of the means for warfare and atomic bomb;" "the responsibility of nuclear-armed states to eliminate nuclear weapons;" and "the role of Hiroshima and Nagasaki."

Aside from the results of the public opinion polls, there are also controversies over President Obama's visit and his statement. Those who have positive views value the President's actions since: 1) the President of the country that dropped the atomic bomb actually came to the city which was attacked by the bomb, and tried to apprehend the damage and devastation caused by the bombing; 2) the President showed sympathy toward the Hibakusha and mourned the dead; and 3) stressed the need for a world without nuclear weapons and war.

On the other hand, those who hold negative views criticize the President's actions since: 1) the visit was so short that the President did not have enough time to listen to the stories of the Hibakusha and understand the reality of the devastation caused by the bombing; 2) the President did not apologize for the dropping of the bomb in 1945; and 3) he did not provide concrete proposals toward nuclear disarmament.
Upon President Obama's visit to Hiroshima, I had come up with three evaluation criteria. The first criterion was the extent of influence the President's visit would exert on the different understandings seen between Japan and the United States toward the dropping of the atomic bomb on Hiroshima and Nagasaki.

Whereas many Japanese people regard the dropping of the atomic bomb as an inhumane and brutal act, the majority of the U.S. citizens, even today, consider it as a positive action, considering it as an inevitable move to end the war. I was seriously concerned about the consequences of President Obama's visit to Hiroshima, that it would widen the already existing gap between the two countries should the President's visit invite huge opposition within the United States. The gap between the two countries' perceptions may have widened, especially if it were to have been abused by the middle-class white conservatives to attack the Democratic Party in the midst of the presidential campaign. In such a situation, President Obama's visit would have likely become a failure, thus, I considered that the visit should not be made. It turned out, however, that the visit neither provoked huge opposition nor had been abused to attack the Democratic Party: the worst-case scenario had been averted.

The second criterion was whether the President himself would enrich his understanding regarding the real damage done by the atomic bombing. There were high expectations for the President to visit the Peace Memorial Museum and have talks with the Hibakusha, but, unfortunately, his time to do so was extremely limited.

The third criterion was whether President Obama would propose specific and concrete plans for nuclear disarmament. I had expected him to propose certain steps toward further reduction of the U.S. and Russian nuclear arsenals, as well as the conclusion of a legally binding instrument to prohibit of nuclear weapons. Contrary to this expectation, however, he did not touch upon either of these proposals in his statement.

On the day of President Obama's visit, replying to an interview by a local newspaper, the author mentioned that "his statement was considerate to the Hibakusha, hence, he deserves a passing grade despite lacking to show concrete policy recommendations for nuclear disarmament." The reason for giving him a "passing grade" was mainly because the author judged his visit to Hiroshima functioning as to narrow the gap between the two countries in their understanding toward the atomic bombing, rather than "widening" it.

Why, then, was this the case? My answer to this question is that the President's statement made in Hiroshima contained the humanitarian perspectives of both nuclear weapons and of war in an equal manner. Although President Obama's statement may have not fully satisfied the citizens of Hiroshima who tend to focus on the misery of the atomic bombing, we should not forget the fact that the inhumane act of the dropping of the atomic bomb can be considered as an act that was pursued in the midst of the inhumane war started by Japan. We should keep in mind that both of these acts have caused tremendous humanitarian consequences.

As we enter the year 2017, Hiroshima is still continuously basking in the afterglow of President Obama's visit in 2016. We can feel this most when we visit the Hiroshima Peace Memorial Museum. The Museum is now under renovation. Still, by the end of January, there has been a 18.5 percent increase in the number of visitors in total, and a 4.3 percent increase of visitors from foreign countries compared to the number from the same period of last year. This is presumably because the paper cranes presented to the Museum by President Obama during his visit were displayed until the end of January. In particular, the number of foreigners visiting the Museum jumped up sharply around the time of the President's visit–a 54.3 percent increase in May 2016, and a 56.6 percent increase in June, compared respectively to those of the same periods from last year.

In January 2017, Donald Trump was inaugurated as the new President of the United States. Although his nuclear

policy has not been fully revealed at this point, the people of Hiroshima fear that President Trump's "America First" policy may promote the justification of the dropping of the atomic bombs in 1945 and care less about the humanitarian consequences and dangers of actually using nuclear weapons, which the experiences of both Hiroshima and Nagasaki have been continuously trying to appeal. The former Obama administration had, at least, shared the notion of the humanitarian consequences and dangers caused by nuclear weapons with the international community, and had explored options to promote the reduction and control of nuclear weapons through multilateral cooperation. The new administration, now in power, should not neglect those valuable endeavors.

-*Professor Kazumi Mizumoto*, Hiroshima Peace Institute, Hiroshima City University

Remarks by President Obama at Hiroshima Peace Memorial[1]

Hiroshima Peace Memorial
Hiroshima, Japan

Seventy-one years ago, on a bright, cloudless morning, death fell from the sky and the world was changed. A flash of light and a wall of fire destroyed a city and demonstrated that mankind possessed the means to destroy itself.

Why do we come to this place, to Hiroshima? We come to ponder a terrible force unleashed in a not so distant past. We come to mourn the dead, including over 100,000 in Japanese men, women and children; thousands of Koreans; a dozen Americans held prisoner. Their souls speak to us. They ask us to look inward, to take stock of who we are and what we might become.

It is not the fact of war that sets Hiroshima apart. Artifacts tell us that violent conflict appeared with the very first man. Our early ancestors, having learned to make blades from flint and spears from wood, used these tools not just for hunting, but against their own kind. On every continent, the history of civilization is filled with war, whether driven by scarcity of grain or hunger for gold; compelled by nationalist fervor or religious zeal. Empires have risen and fallen. Peoples have been subjugated and liberated. And at each juncture, innocents have suffered, a countless toll, their names forgotten by time.

The World War that reached its brutal end in Hiroshima and Nagasaki was fought among the wealthiest and most powerful of nations. Their civilizations had given the world great cities and magnificent art. Their thinkers had advanced ideas of justice and harmony and truth. And yet, the war grew out of the same base instinct for domination or conquest that had caused conflicts among the simplest tribes; an old pattern amplified by new capabilities and without new constraints. In the span of a few years, some 60 million people would die – men, women, children no different than us, shot, beaten, marched, bombed, jailed, starved, gassed to death.

There are many sites around the world that chronicle this war – memorials that tell stories of courage and heroism; graves and empty camps that echo of unspeakable depravity. Yet in the image of a mushroom cloud that rose into these skies, we are most starkly reminded of humanity's core contradiction; how the very spark that marks us as a species – our thoughts, our imagination, our language, our tool-making, our ability to set ourselves apart from nature and bend it to our will – those very things also give us the

[1] "Remarks by President Obama and Prime Minister Abe of Japan at Hiroshima Peace Memorial," Hiroshima Peace Memorial, Hiroshima, Japan, May 27, 2016, https://www.whitehouse.gov/the-press-office/2016/05/27/remarks-president-obama-and-prime-minister-abe-japan-hiroshima-peace.

capacity for unmatched destruction.

How often does material advancement or social innovation blind us to this truth. How easily we learn to justify violence in the name of some higher cause. Every great religion promises a pathway to love and peace and righteousness, and yet no religion has been spared from believers who have claimed their faith as a license to kill. Nations arise, telling a story that binds people together in sacrifice and cooperation, allowing for remarkable feats, but those same stories have so often been used to oppress and dehumanize those who are different.

Science allows us to communicate across the seas and fly above the clouds; to cure disease and understand the cosmos. But those same discoveries can be turned into ever-more efficient killing machines.

The wars of the modern age teach this truth. Hiroshima teaches this truth. Technological progress without an equivalent progress in human institutions can doom us. The scientific revolution that led to the splitting of an atom requires a moral revolution, as well.

That is why we come to this place. We stand here, in the middle of this city, and force ourselves to imagine the moment the bomb fell. We force ourselves to feel the dread of children confused by what they see. We listen to a silent cry. We remember all the innocents killed across the arc of that terrible war, and the wars that came before, and the wars that would follow.

Mere words cannot give voice to such suffering, but we have a shared responsibility to look directly into the eye of history and ask what we must do differently to curb such suffering again. Someday the voices of the hibakusha will no longer be with us to bear witness. But the memory of the morning of August 6th, 1945 must never fade. That memory allows us to fight complacency. It fuels our moral imagination. It allows us to change.

And since that fateful day, we have made choices that give us hope. The United States and Japan forged not only an alliance, but a friendship that has won far more for our people than we could ever claim through war. The nations of Europe built a Union that replaced battlefields with bonds of commerce and democracy. Oppressed peoples and nations won liberation. An international community established institutions and treaties that worked to avoid war and aspire to restrict and roll back, and ultimately eliminate the existence of nuclear weapons.

Still, every act of aggression between nations; every act of terror and corruption and cruelty and oppression that we see around the world shows our work is never done. We may not be able to eliminate man's capacity to do evil, so nations – and the alliances that we've formed – must possess the means to defend ourselves. But among those nations like my own that hold nuclear stockpiles, we must have the courage to escape the logic of fear, and pursue a world without them.

We may not realize this goal in my lifetime. But persistent effort can roll back the possibility of catastrophe. We can chart a course that leads to the destruction of these stockpiles. We can stop the spread to new

nations, and secure deadly materials from fanatics.

And yet that is not enough. For we see around the world today how even the crudest rifles and barrel bombs can serve up violence on a terrible scale. We must change our mindset about war itself – to prevent conflict through diplomacy, and strive to end conflicts after they've begun; to see our growing interdependence as a cause for peaceful cooperation and not violent competition; to define our nations not by our capacity to destroy, but by what we build.

And perhaps above all, we must reimagine our connection to one another as members of one human race. For this, too, is what makes our species unique. We're not bound by genetic code to repeat the mistakes of the past. We can learn. We can choose. We can tell our children a different story – one that describes a common humanity; one that makes war less likely and cruelty less easily accepted.

We see these stories in the hibakusha – the woman who forgave a pilot who flew the plane that dropped the atomic bomb, because she recognized that what she really hated was war itself; the man who sought out families of Americans killed here, because he believed their loss was equal to his own.

My own nation's story began with simple words: All men are created equal, and endowed by our Creator with certain unalienable rights, including life, liberty and the pursuit of happiness. Realizing that ideal has never been easy, even within our own borders, even among our own citizens.

But staying true to that story is worth the effort. It is an ideal to be strived for; an ideal that extends across continents, and across oceans. The irreducible worth of every person, the insistence that every life is precious; the radical and necessary notion that we are part of a single human family – that is the story that we all must tell.

That is why we come to Hiroshima. So that we might think of people we love – the first smile from our children in the morning; the gentle touch from a spouse over the kitchen table; the comforting embrace of a parent – we can think of those things and know that those same precious moments took place here seventy-one years ago. Those who died – they are like us. Ordinary people understand this, I think. They do not want more war. They would rather that the wonders of science be focused on improving life, and not eliminating it.

When the choices made by nations, when the choices made by leaders reflect this simple wisdom, then the lesson of Hiroshima is done.

The world was forever changed here. But today, the children of this city will go through their day in peace. What a precious thing that is. It is worth protecting, and then extending to every child. That is the future we can choose – a future in which Hiroshima and Nagasaki are known not as the dawn of atomic warfare, but as the start of our own moral awakening. (Applause.)

END

Civil Society

Roles and Issues regarding Nuclear Disarmament

Akira Kawasaki

Can't we do anything?

"You know it is the nuclear-weapon states (NWS) that have nuclear weapons. Nuclear disarmament will never be achieved unless the NWS take actual actions. They are the ones that carry the ball. We, the non-nuclear-weapons states (NNWS) do not hold the ultimate key in this process."

This is what I heard from a Japanese high-ranking official at a dialogue between NGOs (Non-Governmental Organizations) and the government held 20 years ago. At that time, opportunities for NGOs to discuss disarmament issues with the government were rare, and I still clearly remember the sense of nervousness of being able to engage in talks with high-ranking officials.

It is an undeniable fact that nuclear disarmament is an issue that should primarily be addressed by countries possessing nuclear weapons. However, this should not mean that countries that do not possess nuclear weapons should give up on the issue, thinking that they cannot do anything to further nuclear disarmament. If this is the case, then it could inevitably mean that non-state actors, like the general public, are not able to play a role regarding nuclear disarmament. This sense of abandonment has, unfortunately, also become a common understanding within our society. For citizens, nuclear disarmament is rather a far-reaching issue. Putting forth this sense of understanding as the starting point becomes crucial when contemplating the role of civil society in promoting nuclear disarmament.

On the other hand, NGOs have played remarkable roles in other international issues, including global environment, development and human rights. The participation of NGOs in international conferences regarding these issues has increased since the 1990s, making it a natural course. Where do these differences come from?

NGOs play a central role as one of the main actors in the fields of development cooperation and peace building. They are keenly aware of the actual situations on the field, sometimes much better than the government. Compared to these economic and social issues, however, participation of NGOs in political and security issues are fairly limited. It is furthermore understandable that regarding military affairs, which are directly linked to national security, governments and militaries become the principal actors: issues on nuclear weapons are the most obvious case among them. Hence, it is rather a necessary consequence that the role of civil society in the field of nuclear disarmament tends to be underestimated, compared to other international issues.

From a terminological perspective, one must keep in mind that the term "civil society" itself needs special attention. In the 1980s and 90s, the phrase "NGO" drew attention in the sense that non-governmental actors started to play a larger role regarding issues that the government almost exclusively have dealt with. On the other hand, the term "civil society" began to be used widely and frequently right around the time the United Nations Millennium Declaration was adopted in 2000.[1] Despite not having a clear definition, civil society refers to not only NGOs as expert groups, but also includes actors from a wider perspective, such as municipalities, community groups, schools, academia, religious groups, cooperative societies, social businesses, and the media. In addition, elected legislators are also sometimes perceived as civil society actors, as they technically represent the voices of the citizens.

Roles of NGOs and civil society

What roles can and should NGOs and civil society play regarding nuclear disarmament? Three viewpoints may be indicated as follows.

First, NGOs and civil society can shed light on the negative effects of nuclear weapons on human beings and the environment. Since governments often emphasize national interest in the narrow sense, their discussions on disarmament and arms control tend to focus too much on the bargaining among countries that occurs in international relations. Civil society, in contrast, contributes to enhancing people's consciousness of urgency, by providing humane viewpoints and underlining the transnational threat of nuclear weapons throughout the globe. In other words, civil society provides human security and global security perspectives, rather than a national security viewpoint.

Second, non-governmental actors such as NGOs and civil society can advance discussions on issues where inter-governmental negotiations do not see immediate progress. For instance, they are able to conduct non-governmental level discussions (so-called "track 2") in regions where there are continuous conflicts and tensions, thus, disallowing governmental level talks immediately being commenced. Furthermore, they are able to initiate pioneer discussions regarding treaties and technologies which may become inevitable in the future.

And third, NGOs and the media are able to disseminate information and galvanize public opinion. Citizens can become strong powers in pushing governmental actions by raising their voices and keeping an eye on the government's activities. Moreover, requests to further reinforcement of the accountability of the government may lead to strengthening the credibility of international legal frameworks for nuclear disarmament.

Efforts regarding the NPT Review Process

A specific example of the role of NGOs in nuclear disarmament can be found in the NPT review process. Since the indefinite extension of the NPT and the reinforcement of its review process in 1995, the Review Conferences (RevCons) and their Preparatory Committees (PrepComs) have regularly been holding sessions where NGOs are allowed to make presentations. More than 100 NGOs from all over the world participate in every quinquennial RevCon. In addition to the three-hour session within the official program of the RevCons, NGOs also convene

[1] The United Nations Millennium Declaration was adopted at the United Nations Millennium Summit in September 2000 in New York. It listed mutual goals of the international community in development issues, such as the eradication of poverty and hunger.

numerous side events at the United Nations Headquarters building.

During the NGO presentation session at the 2015 NPT RevCon, the main topics presented were, among others, appeals by Japanese and Korean atomic bomb survivors; appeals by the Mayors of Hiroshima and Nagasaki; requests to commence negotiations for a legally binding instrument to prohibit nuclear weapons; issues on the modernization of nuclear weapons; the necessity of cooperation between the United States and Russian; risks of an accidental nuclear war; concerns of religious groups over humanitarian dimensions of nuclear weapons; Middle Eastern issues; situations on the Korean Peninsula; and appeals from the youth. Topics covered at the side events included: the nuclear disarmament cases filed to the International Court of Justice (ICJ) by the Marshall Islands; replacement of U.K. Trident Submarine-Launch Ballistic Missiles (SLBMs); divestments from companies involved in nuclear weapons-related activities; proposals for a Nuclear-Weapons-Free Zone in Northeast Asia; a Zone Free of Weapons of Mass Destruction in the Middle East; and reprocessing and plutonium issues.

NGOs monitor inter-governmental discussions from the gallery, and disseminate as well as disclose to the public the contents of statements made by respective governments via the Internet and social media. Such information serves as important sources for national delegations with limited personnel.

Paving the way for the prohibition of nuclear weapons

Civil society has been the forerunner of the movement towards the adoption of a legally binding instrument for prohibiting nuclear weapons. Negotiations have finally commenced in March 2017. The initial point of this movement was a statement by the International Committee of the Red Cross (ICRC) in April 2010, which called for the ban and the abolition of nuclear weapons. The initiation by the ICRC ushered in a new phase regarding the discussions of nuclear weapons: the humanitarian dimension was newly added to the traditional discussions, which mainly focused on the logics of military balance.

During 2013-2014, the International Conferences on the Humanitarian Impact of Nuclear Weapons were held, respectively, in Norway, Mexico, and Austria. With scientific evidences provided by medical scientists and meteorologists, international humanitarian agencies warned that using nuclear weapons would cause such devastating damages that it would make it impossible for the international community to conduct immediate humanitarian assistance should the weapons be actually used.

Since then, the number of countries that have participated in the Joint Statements on the Humanitarian Consequences of Nuclear Weapons and the Humanitarian Pledge has steadily increased. This phenomenon is largely the result of the cooperation between the Humanitarian Initiative—a group of states that have played central roles in promoting the humanitarian aspect of nuclear weapons—and NGOs participating in the International Campaign to Abolish Nuclear Weapons (ICAN).[2] ICAN, by applying the model toward the

[2] The International Campaign to Abolish Nuclear Weapons (ICAN) was established in 2007 in Melbourne, Australia, as a working group of the International Physicians for the Prevention of Nuclear War (IPPNW). It has launched its international office in Geneva, Switzerland in 2011, supported by the Norwegian government. It has cooperated with the Humanitarian Initiative—a group of governments which emphasizes the inhumanity of nuclear weapons—to advocate the adoption of a nuclear weapon ban treaty. As of January 2017, 440 groups from 100 countries are participating in the campaign.

establishment of the two respective conventions banning anti-personnel landmines and cluster munitions, is proposing a Nuclear Weapon Ban Treaty that emphasizes shaping a norm which stigmatizes nuclear weapons based on the humanitarian dimension of nuclear weapons. In other words, non-governmental experts have been discussing and have proposed such a treaty prior to official talks among governments.

In addition, the Mayors for Peace, the Parliamentarians for Nuclear Non-Proliferation and Disarmament (PNND), and many more, have also been actively engaged in promoting further advancements of policies on a national level regarding nuclear disarmament.

Challenges for Japan

With the history of Hiroshima and Nagasaki, Japan has a number of citizen groups working on nuclear abolition and a wide range of educational activities compared to the rest of the world. The Japanese government has cooperated with civil society in disseminating the reality of the calamity of nuclear weapons through disarmament education and the activities of the Special Communicator for a World without Nuclear Weapons. However, the current cooperative relationship between the government and civil society has not yet reached the level of the actual advancement of nuclear disarmament. The government, which regards diplomatic and security policies as its exclusive prerogative, has yet to consider civil society as its equal partner. On the other hand, civil society, which has repeatedly advocated for the abolition of nuclear weapons in general terms, has not necessarily shown enough understanding and interest in concrete policies dealing with nuclear issues vis-à-vis the actual international circumstance.

In order to utilize the hope for nuclear abolition shared within the Japanese society to advance actual policies on nuclear disarmament, it becomes essential for civil society, such as municipalities, academia, and the media, to act as the mediators that encourage further discussions and cooperation between the government and non-governmental actors.

-Mr. Akira Kawasaki, Peace Boat

Trends and Prospects of Nuclear Non-Proliferation

Challenges and Reinforcement Measures for the Nuclear Non-Proliferation Regime

Masahiro Kikuchi

Introduction

The international safeguard system operated by the International Atomic Energy Agency (IAEA), and the export control system of sensitive items and equipment by supplying states of nuclear technology managed by the Nuclear Suppliers Group (NSG), have respectively played central roles in the international nuclear non-proliferation regime. In order to maintain the nuclear non-proliferation regime, several documents have been concluded to embody these systems: inter alia, the IAEA Comprehensive Safeguards Agreement (CSA) and its Additional Protocol, as well as the NSG Guidelines. Generally, the establishment of an international regal framework is highly affected by the international situation at that time; therefore, the framework would be required to cope with the changing international situation accordingly, through modifying and/or adding certain concepts and measures. Improvement on how to operate and handle rules and measures under the existing framework would also be required, even before contemplating such revisions at all. This article will discuss the challenges that the international safeguard and export control systems have faced, and consider possible measures to reinforce them.

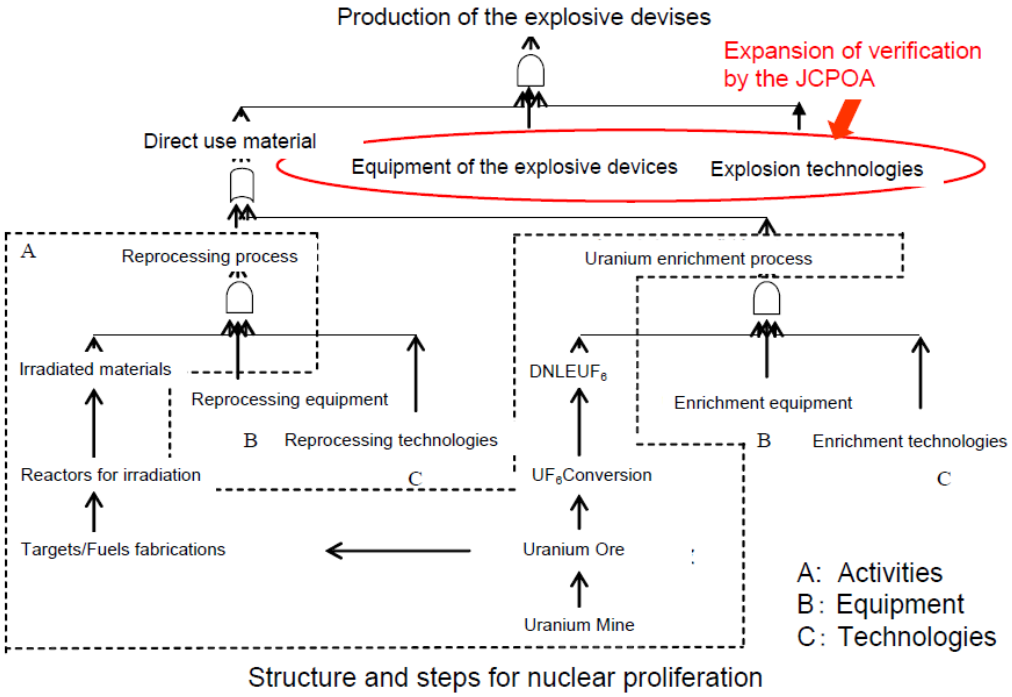
The International Safeguard System: Challenges and Countermeasures

Article III-1 of the NPT obliges non-nuclear-weapon states (NNWS) that "the [IAEA] safeguards…shall be applied on all source or special fissionable material in all peaceful nuclear activities within the territory of such State, under its jurisdiction, or carried out under its control anywhere," which is also stipulated in Part I-1 of the CSA. The verification mechanism through safeguards was created upon the fundamental notion that nuclear activities in the NNWS that joined the NPT, and concluded the CSA, are solely for peaceful purposes—that is, the existence of nuclear activities other than those of peaceful purposes would obviously violate the obligations under the NPT and the IAEA CSA—and that "all source and special fissionable material" are used exclusively for peaceful nuclear activities.

During the Safeguards Committee under the IAEA Board of Governors held in 1970 to establish a model for a CSA, discussions were made on whether to incorporate capabilities to detect clandestine nuclear facilities that aim to develop nuclear weapons into the existing inspection function. However, the idea was eventually dismissed, based on the understanding that no secret facility exists in a state in good faith, that has not only concluded the CSA but has also accepted the IAEA verification, as well as fulfilling the obligations of the Agreement. In the 1980s, verification under the IAEA safeguards functioned as a confidence building measure regarding the peaceful use of nuclear energy among states party to the CSA.

However, circumstances surrounding the implementation of the CSA have changed since the early 1990s when the Cold War ended. After the Gulf War in 1991, clandestine activities to develop nuclear weapons by Iraq and North Korea were revealed. These facts led the international community to recognize the necessity to conduct verification activities that anticipate the possibility of existing undeclared nuclear activities even within a state party to the CSA. The original concept of the verification activity is to make sure that a firm identity exists regarding the actual and declared activities of a certain country. Therefore, in accordance with this concept, the IAEA decided to analyze all activities that potentially would lead to the development of nuclear weapons, to specify related activities, and to set a new obligation which demands state parties to declare the presence (or absence) of those specified activities, as well as to confirm the activities by the IAEA: this new obligation is stipulated in the Additional Protocol. The IAEA built a new technical framework of safeguards to detect the existence of certain undeclared activities—whether intentional concealment or inadvertently undeclared—through comparing declarations submitted by state parties with the results of related information originally accumulated by the IAEA, such as satellite images, as well as inspection results and complementary access introduced in the Additional Protocol. Another indispensable technology, known as the environmental sampling technology was also introduced into this verification activity. The technology enables the detection of clandestine activities by swiping samples at the time of inspections and/or complimentary access. The technology could detect a small particle nuclear material from swiping samples that is emitted by undeclared activities to the atmosphere and the surrounding environment.

In other words, a set of "traps" in the name of obligations are laid out, and those unclear events which are caught up in these traps go through all possible means of investigation: this is how reinforced measures regarding verification activities have been established. In this process, however, it becomes fundamentally important to continue considerations on whether other events related to nuclear proliferation can pass through these traps, or whether there is any loophole in the IAEA safeguards system itself.



Structure and steps for nuclear proliferation

Within the above path diagram, A (Activities) is put under verification as activities regulated under the IAEA Safeguards Agreement, whereas B (Equipment) and C (Technologies) are subject to verification under the Additional Protocol. This means that the Additional Protocol has adopted measures to detect the existence of clandestine infrastructures and technologies that are necessary for acquiring and producing nuclear materials potentially usable for developing nuclear weapons and/or other nuclear explosive devices. The IAEA has been promoting to universalize the Additional Protocol—that is, increasing the number of state parties concluding the Additional Protocol—to strengthen its safeguard system.

One of the focuses that the IAEA has been tackling for more than a decade is the Iranian nuclear issue. Until 2001, the IAEA had concluded that there was no doubt on the Iranian nuclear activities for peaceful purposes. However, in 2002, the exiled Iranian opposition group, the National Council of Resistance of Iran, revealed Iran's secret nuclear activities regarding the construction of uranium enrichment facilities and production of heavy water. This led Iran, three European countries (France, Germany and the United Kingdom, also known as the E3), and the IAEA to engage in discussions aiming to resolve this issue. Following the talks, Iran eventually signed the Additional Protocol on December 18th, 2003, which was provisionally applied to its activities from December 2004 to February 2006. In this period of time, the IAEA found inconsistencies and doubts regarding Iran's declaration. Despite the lack of positive cooperation by Iran ever since, actors involved in this case have continued to make efforts in solving the issue. The IAEA Board of Governors Report in 2011 （GOV/2011/65) listed the problems of the Iranian nuclear issue by categorizing them into two parts: "those under the Safeguards Agreement" and "those not under the agreement (including those regarding possible military dimensions)." The activities that were doubted as having a military use purpose were reported as "possible military dimensions (PMD) to Iran's nuclear program," and listed as "nuclear explosive development indicators." To strengthen their existing measures, the IAEA has developed an effective verification mechanism, which enables them to detect undeclared nuclear materials and activities leading to the development of nuclear weapons, which has led to the actual success of detecting PMD in Iran. The wide range of verification activities, including the one mentioned above, have been conducted continuously under the Joint Comprehensive Plan of Action (JCPOA), which was concluded in September 2015 between Iran and E3/EU+3 (France, Germany and the United Kingdom/the European Union plus China, Russia and the United States).

As a result, the scope of verification conducted by the IAEA has expanded to the area framed by the red line in the path diagram shown above. Although this was a specific agreement concluded with a specific country, it is also an undeniable fact that verification activities beyond the CSA and the Additional Protocol are now being implemented. In short, this experience implies that a future expansion of the IAEA verification scope is a possibility.

Export Control System: Challenges and Countermeasures

In 1974, soon after the conclusion of the NPT, India conducted its first nuclear test in the name of a "peaceful" nuclear explosion. India was not a member to the NPT at the time of the event, and it has not been so even up to today. In demonstrating the explosion back in 1974, India produced plutonium 239 by using a heavy water reactor imported from Canada, separated and extracted the material by utilizing own reprocessing technologies, and used this Pu-239 as the source material for its nuclear explosion. The fact that India produced these source materials by using facilities originally designated for the peaceful use of nuclear energy caused much concern in the international community. At the same time, it also urged the international community to consider necessary

measures to deal with nuclear proliferation issues regarding non-NPT member states. This urgency resulted in the establishment of the NSG, which aims at implementing stringent export controls of not just the nuclear materials controlled under the NPT, but also other nuclear-related sensitive items and equipment.

It should be noted, however, that although the IAEA safeguards under the NPT deals with every source material and special fissionable materials, it, in fact, does not deal with sensitive items and equipment. On the other hand, member states of the NSG created and agreed to a list of items and technologies that are "sensitive" when regarding the issue of nuclear proliferation, and demanded recipient countries for strict control when these specific items and technologies are transferred (or exported) from their suppliers. Nonetheless, since the NSG arrangement is nothing more than a gentleman's agreement, it is not a legally-binding instrument, thus lacking verification mechanisms.

One of the original conditions for initiating transfers was for the recipient country to conclude a CSA with the IAEA. In recent years, however, it has been proposed that the conclusion of the Additional Protocol by the recipient country should also be added as one of the conditions to receive nuclear-related items and technologies from the NSG member states. In other words, this proposal calls for stipulating the conclusion of the Additional Protocol by the recipient county within the framework of a bilateral nuclear cooperation agreement between itself and its supplier. By utilizing the validate information come from complementary accesses of the IAEA Additional Protocol to the recipient country, the export control system, which lacks concrete verification mechanisms on its own, will be able to gain greater effectiveness in its implementation system, for a better, more reliable operation. The Additional Protocol demands supplier country to provide the information regarding specific equipment and non-nuclear material that correspond to controlled items under the NSG guidelines for each exported, and also requests recipient country to provide the information concerning imported them. Should all countries conclude the Additional Protocol, the IAEA can monitor situations regarding the transfer of those items, even if they are to be further transferred to a third country. This will allow the IAEA to conduct complementary access for end use of the final recipient country, and confirm the actual situation of how sensitive items and equipment are ultimately being used at their final destination.

On the other hand, some countries that have the potential to become the recipient of nuclear-related items and technology are criticizing and opposing the current move of adding such conditions to the existing system, since they see this as another tightening measure compounding the already onerous, strict regulations.

Conclusion

As discussed above, the challenges regarding nuclear proliferation facing the international community have changed along with the changes in the international security environment. Nuclear non-proliferation measures have been strengthened in pursuing these changing conditions. It is not enough to create specific international frameworks—such as the NPT, the IAEA CSA and the Additional Protocol, the export control system by the NSG—to dispel or even alleviate the varying concerns regarding nuclear proliferation. Rather, it is only by facing up to these realities, together with the continuous efforts made by the international community to implement, improve, and strengthen these frameworks, that their effectiveness can truly be achieved.

-*Dr. Masahiro Kikuchi*, Nuclear Material Control Center

Prospects and Challenges of the Post-Nuclear Security Summit Phase

Hiroshi Tamai

The series of Nuclear Security Summit, initiated by President Barack Obama, was held biennially, four times since 2010, and played an important role in promoting international efforts to enhance nuclear security. Despite Russia's refusal to participate in the fourth meeting, these summit-level meetings have gained both international and domestic attention, which have led to remarkable improvements in the field of nuclear security of each participating country. Therefore, there is an urgent need to take continuous measures to keep this momentum alive even after the final Nuclear Security Summit concluded in 2016. This article will overview the challenges in strengthening nuclear security, prospects in the post-Nuclear Security Summit phase, as well as efforts and measures that Japan should pursue.

Challenges in Strengthening Nuclear Security

As introduced in this year's *Hiroshima Report*, the Communiqué of the last Nuclear Security Summit held in March-April 2016 stresses that more work remains to be done to prevent non-state actors from obtaining nuclear and other radioactive materials, and reaffirms not only the fundamental responsibility of states to maintain effective security of all nuclear and other radioactive materials, as well as nuclear facilities under their control, but also the leading role of the International Atomic Energy Agency (IAEA) in strengthening the global nuclear security architecture. The Communiqué also encourages the maintenance of the international network of government officials and experts who have supported the Summit process, and the continued engagement of relevant partners in the nuclear industry, as well as civil society. In order to maintain political momentum and to continuously strengthen nuclear security, the participating countries resolved to implement the Action Plans, in support of the international organizations and initiatives to which they respectively belong.

At the IAEA International Conference on Nuclear Security in December 2016, participating countries, reaffirming the Communiqués of the Nuclear Security Summit, emphasized the necessity of regional and international cooperation, with the IAEA in its central role, to continuously maintain and to further strengthen nuclear security. They also called upon the IAEA to continue to organize international conferences on nuclear security every three years. In addition, they decided to support the IAEA's and member states' efforts to provide education and training opportunities regarding nuclear security, including methods such as using national and regional Centers of Excellence (COEs) to foster nuclear security professionals.

In short, the year 2016 saw the blooming of several representing measures for maintaining the post-Summit political momentum, including the commencement of the above-mentioned IAEA International Conference on Nuclear Security and the launch of various group initiatives based on the 2016 Communiqué, as described in the next section.

Prospects in the post-Nuclear Security Summits

The sequential Nuclear Security Summit process has accelerated the speed of reinforcing nuclear security in respective countries in a short period of time through its periodical meetings among top leaders, in which they have announced and shared respective domestic achievements and action plans. From this perspective, the Nuclear Security Contact Group (NSCG), which consists of high-level government officials of the Summit member states, can be expected to act as a potential post-Nuclear Security Summit architecture for continuously addressing and advancing nuclear security. In October 2016, the NSCG issued the Statement of Principles, in which they announced that they will convene annually on the margins of the General Conference of the IAEA in order to assess implementations of nuclear security commitments, including the four Communiqués and the Action Plans issued during the Nuclear Security Summit process.[1] The annual assessment by the NSCG is expected to promote measures regarding nuclear security in a much proactive manner.

The Communiqué and the Action Plans issued at the fourth Nuclear Security Summit in 2016 referred to five international frameworks—the United Nations, the IAEA, the International Criminal Police Organization (INTERPOL), the Global Initiative to Combat Nuclear Terrorism (GICNT), and the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction—which are expected to work as driving mechanisms from both the policy and practice aspect, to continuously strengthen nuclear security at the global level. It therefore becomes indispensable that each state provides substantial support and active cooperation, so that these international frameworks can fulfill their mandates and reinforce nuclear security by making the most of their expertise.

On the industrial side, the Nuclear Industry Steering Group for Security (NISGS) was newly established in September 2016 to take over the role of the Nuclear Industry Summits, which had been held concurrent to the series of the Nuclear Security Summit.[2] The NISGS is expected to contribute to enhancing nuclear security through strengthening partnerships between industries and international organizations, sharing expertise on nuclear security, developing training materials, and improving governance.

Another significant accomplishment through the short Summit process, worth pointing out, is the support towards the development of human resources. The International Network for Nuclear Security Training and Support Centers (NSSC), which the IAEA has been serving as the secretariat, provides a network that facilitates the cooperation between national training centers run by the COE of respective states, assists to share best practices, and promotes training. At the regional level, in particular, it is worth noting that the collaboration of COEs among Japan, China and Republic of Korea, which was among the first networks being launched, is viewed as one of the successful models of regional collaborative networks of COEs. The activities initiated by NSSC/COE are expected to flourish into becoming one of the promising tools for the advancement of nuclear security.

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[1] IAEA, "Communication Dated 24 October 2016 Received From the Permanent Mission of Canada Concerning the Statement of Principles of the Nuclear Security Contact Group, INFCIRC/899," https://www.iaea.org/publications/documents/infcircs/communication-dated-24-october-2016-received-from-the-permanent-mission-of-canada-concerning-the-statement-of-principles-of-the-nuclear-security-contact-group.

[2] "Nuclear Industry Steering Group for Security Formed," *WINS News*, September 26, 2016, https://www.wins.org/index.php?article_id=63&news=235.

Prospects and Challenges of Japan's Nuclear Security

Facing the international situations described in the previous sections, Japan needs to play a leading role in advancing initiatives and mechanisms to enhance nuclear security while further coordinating, not only with other countries, but also regional communities, as well as international institutions. At the same time, there is an urgent need to develop within Japan a domestic system to reinforce nuclear security.

Significant challenges facing the development of a stronger domestic system in the field of nuclear security would be to come up with solid countermeasures regarding internal threats and cyber security. The internal threat protection has been updated and reinforced by following the guidelines of the IAEA INFCIRC/225/Rev.5. From the viewpoint of preventing thefts of nuclear materials and sabotage against nuclear facilities, it becomes crucial for the competent organizations and facility personnel to work side-by-side for an efficient countermeasure for, among others, working out a set of rules regarding access control, pursuing strict operations, and reinforcing surveillance regarding vital facilities. Moreover, on the issue of the trustworthiness of the facility personnel, the protection of personal information, from a human rights' perspective, has made Japan hesitant to pursue concrete measures, leaving it somewhat behind the United States and European countries regarding this matter. However, in recent years, progress has been seen in enacting related legislations, such as amending the articles on the Physical Protection Program in the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors. Thus, a stricter implementation of the rules and compliance of workers in the field becomes essential to increase the effectiveness of these measures.

Regarding issues on cyber security, no news has yet been reported on major damage caused by any cyber-attack on a national nuclear facility. However, there have been serious concerns regarding potential delays in handling these unexpected crises: while cyber-attacks are becoming easier to execute with the rapid development of computer technology, nuclear facilities, as potential targets, do not have enough experience against such attacks. It is crucial to properly assess the risks of cyber security, to make rules and procedures to tackle the issue, and to raise security awareness among on-the-spot employees. At the same time, it is also imperative to have daily updates on the latest risk awareness, assessment and countermeasures through sharing information with those inside and outside of the nuclear industry.

Another valuable endeavor for improving the effectiveness of the above-mentioned measures is to foster a "nuclear security culture:" in other words, cultivating the ability of risk assessment, as well as constructing the system of frequent information sharing in order to raise the security awareness of every employer and employee of the organization. Each organization is expected to develop its own nuclear security culture based on its own features.

Facing the mounting threat of international terrorism, there is an urgent need to strengthen the nuclear security of nuclear facilities, nuclear materials, and other radioactive substances. With the 2020 Tokyo Olympics and Paralympics just around the corner, it is crucial to promote every effort to improve nuclear security in an integrated manner, by closely coordinating with all organizations concerned, such as putting countermeasures in place regarding nuclear facilities and strengthening their security, as well as promoting the development of technologies for nuclear detection and forensics.

-*Dr. Hiroshi Tamai*, Japan Atomic Energy Agency

Appendix

Chronology (January-December 2016)

Jan	North Korea conducted the fourth nuclear test. Implementation Day of the Joint Comprehensive Plan of Action (JCPOA)
Feb	Open-Ended Working Group on Taking Forward Multilateral Nuclear Disarmament Negotiation (OEWG) in Geneva (First session)
Mar	Adoption of the UNSCR2270 regarding North Korea's nuclear issues Nuclear Security Summit in Washington, D.C.
Apr	G7 Foreign Minister's Meeting in Hiroshima
May	Open-Ended Working Group on Taking Forward Multilateral Nuclear Disarmament Negotiation (OEWG) in Geneva (Second Session) Enter into Force of the Amendment to the Convention on the Physical Protection of Nuclear Material(CPPNM) President Obama visited Hiroshima
Jun	The 20 Years CTBT Ministerial Meeting in Vienna The Third meeting of the International Partnership for Nuclear Disarmament Verification (IPNDV) in Tokyo Meeting to celebrate the 10th year anniversary of the Global Initiative to Combat Nuclear Terrorism (GINCT) in The Hague
Jul	The U.K. House of Commons endorsed to construct a new class of SSBNs
Aug	Hiroshima Peace Memorial Ceremony Nagasaki Peace Ceremony Open-Ended Working Group on Taking Forward Multilateral Nuclear Disarmament Negotiation (OEWG) in Geneva (Third session)
Sep	North Korea conducted the fifth nuclear test The Eighth Ministerial Meeting of the Friends of the CTBT in New York Adoption of UNSCR2310 regarding prohibition of nuclear testing
Oct	The International Court of Justice (ICJ) ruled that the Marshall Islands failed to prove that a legal dispute over nuclear disarmament The fourth meeting of the IPNDV in Abu Dhabi
Nov	Kazakhstani President Nursultan Nazarbayev visited Hiroshima. Adoption of the UNSCR2321 regarding North Korea's nuclear issues Signatory of the Japan-India Nuclear Cooperation Agreement

Abbreviation

ABACC	Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials
AEOI	Atomic Energy Organization of Iran
AG	Australia Group
ALCM	Air Launch Cruise Missile
ASBM	Anti-Ship Ballistic Missile
ASEAN	Association of Southeast Asian Nations
BMD	Ballistic Missile Defense
CASD	Continuous at Sea Deterrence
CBO	Congressional Budget Office
CBRNE	Chemical, Biological, Radiological, Nuclear, Explosives
CD	Conference on Disarmament
CMX	Comprehensive Material Excercise
COE	Center of Excellence
CPPNM	Convention on the Physical Protection of Nuclear Material
CSA	Comprehensive Safeguards Agreement
CSC	Convention on Supplementary Compensation for Nuclear Damage
CTBT	Comprehensive Nuclear-Test-Ban Treaty
CTBTO	CTBT Organization
CTR	Cooperative Threat Reduction
DBT	Design Basis Threat
DCA	Dual-Capable Aircraft
DRDO	Defense Research and Development Organization
EU	European Union
EURATOM	European Atomic Energy Community
EUROPOL	European Police Office
FCA	Fast Critical Assembly
FMCT	Fissile Material Cut-Off Treaty
FMWG	Fissile Material Working Group
FNCA	Forum for Nuclear Cooperation in Asia
G8GP	G8 Global Partnership
GAO	Government Accountability Office
GBSD	Ground Based Strategic Deterrent
GEM	Group of Eminent Persons
GGE	Group of Governmental Experts
GICNT	Global Initiative to Combat Nuclear Terrorism
GLCM	Ground-Launched Cruise Missile
GTRI	Global Threat Reduction Initiative
HEU	Highly Enriched Uranium
IAEA	International Atomic Energy Agency
ICAN	International Campaign to Abolosh Nuclear Weapons
ICBM	Inter-Continental Ballistic Missile
ICJ	International Court of Justice
ICNND	International Commission on Nuclear Non-proliferation and Disarmament

ICNS	International Convention on Nuclear Security
IDC	International Data Center
IMO	International Maritime Organization
IMS	International Monitoring System
INF	Intermediate-range Nuclear Forces
INSEN	International Nuclear Security Education Network
INSServ	International Nuclear Security Advisory Service
INSSP	Integrated Nuclear Security Support Plan
INTERPOL	International Criminal Police Organization
IPPAS	International Physical Protection Advisory Service
IRBM	Intermediate-range Ballistic Missile
ISCN	Integrated Support Center for Nuclear Nonproliferation and Nuclear Security
ISSAS	IAEA State System for Accountancy and Control (SSAC) Advisory Service
ITC	International Training Course on the Physical Protection of Nuclear Materials and Nuclear Facilities
ITDB	Incident and Trafficking Database
ITU	International Telecommunication Union
ITWG	Nuclear Forensics International Technical Working Group
IUEC	International Uranium Enrichment Center
JCPOA	Joint Comprehensive Plan of Action
JPOA	Joint Plan of Action
LEU	Low Enriched Uranium
LOF	Locations outside Facilities
LOW	Launch on Warning
LRSO	Long-Range Stand Off
LUA	Launch under Attack
MFFF	Mixed Oxide Fuel Fabrication Facility
MIRV	Multiple Independently-targetable Reentry Vehicle
MNSR	Miniature Neutron Source Reactors
MOX	Mixed Oxide
MRBM	Medium-Range Ballistic Missile
MTCR	Missile Technology Control Regime
NAC	New Agenda Coalition
NAM	Non-Aligned Movement
NATO	North Atlantic Treaty Organization
NFWG	Nuclear Forensics Working Group
NNSA	National Nuclear Security Administration
NNWS	Non-Nuclear-Weapon States
NORAD	North American Aerospace Defense Command
NPDI	Non-Proliferation and Disarmament Initiative
NPEG	Non-Proliferation Experts Group
NPR	Nuclear Posture Review
NPT	Nuclear Non-Proliferation Treaty
NRRC	Nuclear Risk Reduction Center
NSA	Negative Security Assurance

NSC	National Security Council
NSF	Nuclear Security Fund
NSG	Nuclear Suppliers Group
NSGEG	Nuclear Security Governance Experts Group
NSSC	Nuclear Security Training and Support Centres
NUSEC	Nuclear Security Information Portal
NWBT	Nuclear Weapons Ban Treaty
NWC	Nuclear Weapons Convention
NWFZ	Nuclear-Weapon-Free Zone
NWS	Nuclear-Weapon States
OEWG	Open-Ended Working Group
OFAC	Office of Foreign Assets Control
OMM	Ocean Maritime Management
OPANAL	Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean
PAROS	Prevention of an Arms Race in Outer Space
PLA	People's Liberation Army
PMD	Possible Military Dimensions
PMDA	Plutonium Management and Disposition Agreement
PrepCom	Preparatory Committee
PSI	Proliferation Security Initiative
PTS	Provisional Technical Secretariat
RevCon	Review Conference
RMWG	Response and Mitigation Working Group
SDSR	Strategic Defence and Security Review
SLA	State-Level Approach
SLBM	Submarine Launched Ballistic Missile
SLC	State-Level Concept
SLCM	Submarine Launched Cruise Missile
SLV	Space Launch Vehicle
SMEF	Special Material Enrichment Facility
SQP	Small Quantity Protocol
SRBM	Short-Range Ballistic Missile
SSAC	State Systems of Accountancy and Control
SSBN	Nuclear-Powered Ballistic Missile Submarine
SSN	Attack Submarine
SSP	Stockpile Stewardship Program
START	Strategic Arms Reduction Treaty (Talks)
UKNI	UK-Norway Initiative
UN	United Nations
UNGA	UN General Assembly
UNSCR	UN Security Council Resolution
WA	Wassenaar Arrangement
WMD	Weapons of Mass Destruction

Country-by-Country Evaluation

No.	Nuclear Disarmament	Maximum points	Scale of measurement	Nuclear-Weapon States					Non-NPT Parties			Non-Nuclear Weapon States																											Other
				CHN	FRA	RUS	UK	USA	IND	ISR	PAK	AUS	AUT	BEL	BRA	CAN	CHL	EGY	GER	IDN	IRN	JPN	KAZ	ROK	MEX	NED	NZL	NGA	NOR	PHL	POL	SAU	RSA	SWE	SWI	SYR	TUR	UAE	PRK
1	**Status of Nuclear Forces (estimates)**	**-20**																																					
	Status of nuclear forces (estimates)	-20	-5 (〜50); -6 (51〜100); -8 (101〜200); -10 (201〜400); -12 (401〜1,000); -14 (1,001〜2,000); -16 (2,001〜4,000); -17 (4,001〜6,000); -19 (6,001〜8,000); -20 (8,001〜) (not applicable to the NNWS)	-10	-10	-19	-10	-19	-8	-6	-8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	-5
2	**Commitment to Achieve a World without Nuclear Weapons**	**14**																																					
	A) Voting behavior on UNGA resolutions on nuclear disarmament proposals by Japan, NAC and NAM	6	On each resolution: 0 (against); 1(abstention); 2 (in favor)	3	1	0	1	2	2	1	3	3	5	3	6	3	6	5	3	6	5	4	6	1	6	3	5	6	3	6	3	6	4	5	4	4	2	6	2
	B) Voting behavior on UNGA resolutions calling for commencement of negotiations on a legal prohibition of nuclear weapons	3	On each resolution: 0 (against); 0.5（abstention); 1 (in favor)	2.5	0	0.5	0	0	2.5	0	2.5	0.5	2	0	3	0.5	3	3	0	3	3	1	3	0	3	0.5	2	3	0.5	3	0	3	3	2	1.5	2	0	3	2
	C) Announcement of significant policies and important activities	3	Add 1 point for each policy, proposal and other initiatives having a major impact on the global momentum toward a world without nuclear weapons (maximum 3 points).	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	D) Humanitarian consequences of nuclear weapons	2	On each resolution: 0 (against); 0.5（abstention); 1 (in favor). (Added points)×2/3	1	0	0	0	0	1.3	0	1	0.3	2	0.3	2	0.3	2	2	0.3	2	2	1.3	2	0	2	0.3	2	2	0.3	2	0	2	2	1.6	1.6	2	0	2	1
3	**Reduction of Nuclear Weapons**	**22**																																					
	A) Reduction of nuclear weapons	15	・Add 1〜10 points in accordance with the decuple rate of reduction from the previous fiscal year for a country having declared the number of nuclear weapons. ・For a country having not declared it, add some points using the following formula: (the previous target – the latest target)÷the estimated number of nuclear weapons×10. ・Add 1 (engaging in nuclear weapons reduction over the past 5 years); add 1 (engaging in nuclear weapons reduction under legally-binding frameworks such as New Strategic Arms Reduction Treaty); add 1 (announcing further reduction plan and implementing it in 2013) ・Give a perfect score (15 points) in case of the total abolition of nuclear weapons.	0	1	2	1	2	0	0	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
	B) A concrete plan for further reduction of nuclear weapons	3	0 (no announcement on a plan of nuclear weapons reduction); 1 (declaring a rough plan of nuclear weapons reduction); 2 (declaring a plan on the size of nuclear weapons reduction); 3 (declaring a concrete and detailed plan of reduction) (not applicable to the NNWS)	0	0	0	0	1	0	0	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
	C) Trends on strengthening/modernizing nuclear weapons capabilities	4	0 (modernizing/reinforcing nuclear forces in a backward move towards nuclear weapons reduction; 2〜3 (modernizing/reinforcing nuclear forces which may not lead to increasing the number of nuclear weapons; 4 (not engaging in nuclear modernization/reinforcement) (not applicable to the NNWS)	2	3	2	3	3	2	3	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
4	**Diminishing the Role and Significance of Nuclear Weapons in National Security Strategies and Policies**	**8**																																					
	A) The current status of the roles and significance of nuclear weapons	-8	-7〜-8 (judged based on the declaratory policy) (not applicable to the NNWS)	-7	-7	-7	-7	-7	-7	-7	-7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	-7
	B) Commitment to "sole purpose," no first use, and related doctrines	3	0 (not adopting either policy); 2 (adopting a similar policy or expressing its will to adopt either policy in the future); 3 (already adopting either policy) (not applicable to the NNWS)	3	0	0	0	2	3	0	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
	C) Negative security assurances	2	0 (not declaring); 1 (declaring with reservations); 2 (declaring without reservations) (not applicable to the NNWS)	2	1	1	1	1	2	0	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
	D) Signing and ratifying the protocols of the treaties on nuclear-weapon-free zones	3	Add 0.5 point for the ratification of one protocol; a country ratifying all protocols marks 3 points (not applicable to countries expect NWS)	2	2	2	2	0.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	E) Relying on extended nuclear deterrence	-5	(not applicable to the NWS and Non-NPT Parties) applied solely to the NNWS:-5 (a country relying on the nuclear umbrella and participating in nuclear sharing); -3 (a country relying on the nuclear umbrella); 0 (a country not relying on the nuclear umbrella)	—	—	—	—	—	—	—	—	-3	0	-5	0	-3	0	0	-5	0	0	-3	0	-3	0	-5	0	0	-3	0	-3	0	0	0	0	0	-5	0	—
5	**De-alerting or Measures for Maximizing Decision Time to Authorize the Use of Nuclear Weapons**	**4**																																					
	De-alerting or measures for maximizing decision time to authorize the use of nuclear weapons	4	0〜1 (maintaining a high alert level); 2 (maintaining a certain alert level); 3 (de-alerting during peacetime); add 1 point for implementing measures for increasing the credibility of (lowered) alert status (not applicable to the NNWS)	3	2	1	2	1	3	2	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3

	Nuclear Disarmament	Maximum points	Scale of measurement	Nuclear-Weapon States					Non-NPT Parties			Non-Nuclear Weapon States																											Other
				CHN	FRA	RUS	UK	USA	IND	ISR	PAK	AUS	AUT	BEL	BRA	CAN	CHL	EGY	GER	IDN	IRN	JPN	KAZ	ROK	MEX	NED	NZL	NGA	NOR	PHL	POL	SAU	RSA	SWE	SWI	SYR	TUR	UAE	PRK
6	**CTBT**	**11**																																					
	A) Signing and ratifying the CTBT	4	0 (not signing); 2 (not ratifying); 4 (ratifying)	2	4	4	4	2	0	2	0	4	4	4	4	4	4	2	4	4	2	4	4	4	4	4	4	4	4	4	4	0	4	4	4	0	4	4	0
	B) Moratoria on nuclear test explosions pending CTBT's entry into force	3	0 (not declaring); 2 (declaring); 3 (declaring and closing the nuclear test sites) (not applicable to the NNWS)	2	3	2	2	2	2	0	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
	C) Cooperation with the CTBTO Preparatory Commission	2	0 (no cooperation or no information); 1～2 (paying contributions, actively participating in meetings, and actively engaging in the outreach activities for the Treaty's entry into force)	1	2	2	2	2	0	1	0	2	2	2	1	2	1	0	2	0	0	2	2	2	1	2	2	0	2	2	2	0	1	2	2	0	2	2	0
	D) Contribution to the development of the CTBT verification systems	2	Add 1 point for establishing and operating the IMS; add another 1 point for participating in the discussions on enhancing the CTBT verification capabilities	1	2	2	2	2	0	2	0	2	2	2	2	2	1	0	2	2	1	2	2	2	2	2	2	1	2	1	2	0	2	2	2	0	2	0	0
	E) Nuclear testing	-3	-3 (conducting nuclear test explosions in the past 5 years);-1 (conducting nuclear tests without explosion or the status is unclear); 0 (not conducting any nuclear tests) (not applicable to the NNWS)	-1	-1	-1	-1	-1	-1	-1	-1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	-3
7	**FMCT**	**10**																																					
	A) Commitment, efforts, and proposals toward immediate commencement of negotiations on an FMCT	5	Add 1 (expressing a commitment); add 1～2 (actively engaging in the promotion of early commencement); add 1～2 (making concrete proposals on the start of negotiations)	1	4	1	3	3	1	1	1	3	3	3	3	4	2	1	3	1	1	4	1	3	1	3	3	2	3	2	2	1	3	3	3	0	1	1	0
	B) Moratoria on the production of fissile material for use in nuclear weapons	3	0 (not declaring); 1 (not declaring but not producing fissile material for nuclear weapons); 2 (declaring); 3 (declaring and taking measures for the cessation of the production as declared) (not applicable to the NNWS)	1	2	3	2	2	0	0	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
	C) Contribution to the development of verification measures	2	0 (no contribution or no information); 1 (proposing a research on verification measures); 2 (engaging in R&D for verification measures)	0	1	0	1	1	0	0	0	1	1	1	0	1	0	0	1	0	0	1	0	1	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0
8	**Transparency in Nuclear Forces, Fissile Material for Nuclear Weapons, and Nuclear Strategy/Doctrine**	**6**																																					
	Transparency in nuclear forces, fissile material for nuclear weapons, and nuclear strategy/doctrine	6	Add 1～2 (disclosing the nuclear strategy/doctrine); add 1～2 (disclosing the status of nuclear forces); add 1～2 (disclosing the status of fissile material usable for nuclear weapons (not applicable to the NNWS)	1	3	2	4	5	1	0	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
9	**Verifications of Nuclear Weapons Reductions**	**7**																																					
	A) Acceptance and implementation of verification for nuclear weapons reduction	3	0 (not accepting or implementing); 2 (limited acceptance and implementation); 3 (accepting and implementing verification with comprehensiveness and completeness); deduct 1～2 points in case of non-compliance or problems in implementation (not applicable to the NNWS)	0	0	3	0	3	0	0	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
	B) Engagement in research and development for verification measures of nuclear weapons reduction	1	0 (not engaging or no information); 1 (engaging in R&D)	1	1	1	1	1	0	0	0	1	0	1	1	1	1	0	1	1	0	1	1	1	1	1	0	0	1	1	1	0	0	1	1	0	1	1	0
	C) The IAEA inspections to fissile material declared as no longer required for military purposes	3	0 (not implementing), 1(limited implementation); 3 (implementing); add 1 point if a country engages in the efforts for implementing or strengthening the implementation, except in the case of already implementing (not applicable to the NNWS)	0	1	0	3	1	0	0	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
10	**Irreversibility**	**7**																																					
	A) Implementing or planning dismantlement of nuclear warheads and their delivery vehicles	3	0 (not implementing or no information); 1 (perhaps implementing but not clear); 2～3 (implementing) (not applicable to the NNWS)	0	2	2	2	3	0	0	0																												0
	B) Decommissioning/conversion of nuclear weapons-related facilities	2	0 (not implementing or no information); 1 (implementing in a limited way); 2 (implementing extensively) (not applicable to the NNWS)	0	1	1	1	1	0	0	0																												0
	C) Measures for fissile material declared excess for military purposes, such as disposition or conversion to peaceful purposes	2	0 (not implementing or no information); 1 (implementing in a limited way); 2 (implementing); 3 (implementing extensively) (not applicable to the NNWS)	0	1	2	1	2	0	0	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
11	**Disarmament and Non-Proliferation Education and Cooperation with Civil Society**	**4**																																					
	Disarmament and non-proliferation education and cooperation with civil society	4	Add 1 (participating in the joint statement); add 1-2 (implementing disarmament and non-proliferation education); add 1-2 (cooperating with civil society). Maximum 4 points	2	2	1	3	4	1	1	0	3	4	2	1	3	2	2	3	1	0	4	1	1	2	3	4	2	1	1	1	0	1	3	4	0	1	1	0
12	**Hiroshima Peace Memorial Ceremony**	**1**																																					
	Hiroshima Peace Memorial Ceremony	1	0 (not attending)；0.5 (not attending in 2015 but has attended more than once during the past 3 years)；1 (attending)	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.5	1	1	1	1	1	1	1	0.5	1	1	1	0	1	1	0	0.5	0	0	0
	Points			**12.5**	**22**	**8.5**	**24**	**20.5**	**5.8**	**0**	**2.5**	**17.8**	**27**	**14.3**	**24**	**18.8**	**23**	**16**	**15.3**	**20.5**	**15**	**23.3**	**23**	**13**	**24**	**15.8**	**26**	**20.5**	**15.8**	**23**	**13**	**12**	**21**	**25.6**	**23.1**	**8.5**	**8**	**20**	**-6**
	Full Points			**94**	**94**	**94**	**94**	**94**	**91**	**91**	**91**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**91**
	(%)			**13.3**	**23.4**	**9.0**	**25.5**	**21.8**	**6.4**	**0.0**	**2.7**	**50.9**	**77.1**	**40.9**	**68.6**	**53.7**	**65.7**	**45.7**	**43.7**	**58.6**	**42.9**	**66.6**	**65.7**	**37.1**	**68.6**	**45.1**	**74.3**	**58.6**	**45.1**	**65.7**	**37.1**	**34.3**	**60.0**	**73.1**	**66.0**	**24.3**	**22.9**	**57.1**	**-6.6**

	Nuclear Non-Proliferation	Maximum points	Scale of measurement	Nuclear-Weapon States					Non-NPT Parties			Non-Nuclear Weapon States																											Other
				CHN	FRA	RUS	UK	USA	IND	ISR	PAK	AUS	AUT	BEL	BRA	CAN	CHL	EGY	GER	IDN	IRN	JPN	KAZ	ROK	MEX	NED	NZL	NGA	NOR	PHL	POL	SAU	RSA	SWE	SWI	SYR	TUR	UAE	PRK
1	**Acceptance and Compliance with Nuclear Non-Proliferation Obligations**	**20**																																					
	A) Accession to the NPT	10	0 (not signing or declaring withdrawal); 3 (not ratifying); 10 (in force)	10	10	10	10	10	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	0
	B) Compliance with Articles I and II of the NPT and the UNSC resolutions on non-proliferation	7	0 (non-complying with Article 1 or 2 of the NPT); 3～4 (having not yet violated Article 1 or 2 of the NPT but displaying behaviors that raise concerns about proliferation, or not complying with the UNSC resolutions adopted for relevant nuclear issues); 5 (taking concrete measures for solving the non-compliance issue); 7 (complying). ・As for the non-NPT states (maximum 3 points) : 2 (not complying with the UNSC resolutions adopted for relevant nuclear issues); 3 (other cases)	7	7	7	7	7	2	3	2	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	4	7	7	0
	C) Nuclear-Weapon-Free Zones	3	1 (signing the NWFZ treaty); 3 (ratifying the treaty)	—	—	—	—	—	0	0	0	3	0	0	3	0	3	1	0	3	0	0	3	0	3	0	3	3	0	3	0	0	3	0	0	0	0	0	0
2	**IAEA Safeguards Applied to the NPT NNWS**	**18**																																					
	A) Signing and ratifying a Comprehensive Safeguards Agreement	4	0 (not signing); 1 (not ratifying); 4 (in force)	—	—	—	—	—	—	—	—	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0
	B) Signing and ratifying an Additional Protocol	5	0 (not signing); 1 (not ratifying); 3 (provisional application); 5 (in force)	—	—	—	—	—	—	—	—	5	5	5	0	5	5	0	5	5	3	5	5	5	5	5	5	5	5	5	5	0	5	5	5	0	5	5	0
	C) Implementation of the integrated safeguards	4	0 (not implementing); 2 (broader conclusion) 4 (implementing)	—	—	—	—	—	—	—	—	4	4	4	0	4	4	0	4	4	0	4	2	4	0	4	2	0	4	2	4	0	2	4	2	0	2	0	0
	D) Compliance with IAEA Safeguards Agreement	5	0 (not resolving the non-compliance issue); 2 (taking concrete measures for solving the non-compliance issue); 5 (complying)	—	—	—	—	—	—	—	—	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	0	5	5	0
3	**IAEA Safeguards Applied to NWS and Non-Parties to the NPT**	**7**																																					
	A) Application of the IAEA safeguards (Voluntary Offer Agreement or INFCIRC/66) to their peaceful nuclear in facilities	3	0 (not applying); 2 (applying INFCIRC/66); 3 (applying Voluntary Offer Agreement)	3	3	3	3	3	2	2	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	B) Signing, ratifying, and implementing the Additional Protocol	4	0 (not signing); 1 (not ratifying); 3 (in force); add 1 point if widely applied to peaceful nuclear activities	3	3	3	3	4	3	0	0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4	**Cooperation with the IAEA**	**4**																																					
	A) Efforts for strengthening the safeguards	4	Add 1 (contributing to the development of verification technologies); add 1～2 (contributing to the universalization of the Additional Protocol); add 1 (other efforts)	1	3	2	3	3	0	0	0	3	2	3	1	3	1	0	3	1	0	3	0	3	1	3	2	1	2	1	1	0	1	2	2	0	1	1	0
5	**Implementing Appropriate Export Controls on Nuclear-Related Items and Technologies**	**15**																																					
	A) Establishment and implementation of the national control systems	5	0 (not establishing); 1 (establishing but insufficient); 2 (establishing a system to a certain degree); 3 (establishing an advanced system, including the Catch-all); add 1～2 (if continuing to implement appropriate export controls); deduct 1～2 (not adequately implementing)	3	5	4	5	5	4	5	2	5	5	5	5	5	2	2	5	1	0	5	5	5	5	5	5	1	5	3	5	1	5	5	5	0	5	3	0
	B) Requiring the conclusion of the Additional Protocol for nuclear export	2	0 (not requiring or no information); 1 (requiring for some cases); 2 (requiring)	0	0	0	0	1	0	0	0	1	1	0	0	1	1	0	1	0	0	1	0	0	1	1	1	1	1	1	1	0	0	1	0	0	1	1	0
	C) Implementation of the UNSCRs concerning North Korean and Iranian nuclear issues	3	0 (not implementing or no information); 2 (implementing); 3(actively implementing); deduct 1～3 (depending on the degree of violation)	2	3	2	3	3	2	2	1	3	3	3	2	3	2	2	3	2	2	3	2	3	3	3	3	2	3	2	2	2	3	3	3	0	2	2	0
	D) Participation in the PSI	2	0 (not participating); 1 (participating); 2 (actively participating)	0	2	2	2	2	0	1	0	2	0	2	0	2	2	0	2	0	0	2	1	2	0	2	2	0	2	1	2	1	0	1	1	0	2	1	0
	E) Civil nuclear cooperation with non-parties to the NPT	3	0 (exploring active cooperation); 1~2 (contemplating cooperation, subject to implementing additional nuclear disarmament and non-proliferation measures); 3 (showing a cautious attitude or being against it)	0	0	0	1	0	—	—	—	1	3	3	3	0	3	3	3	3	3	1	0	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0
6	**Transparency in the Peaceful Use of Nuclear Energy**	**4**																																					
	A) Reporting on the peaceful nuclear activities	2	0 (not reporting or no information); 1 (reporting but insufficiently); 2 (reporting)	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	2	2	0
	B) Reporting on plutonium management	2	0 (not reporting or no information); 1 (reporting); 2 (reporting on not only plutonium but also uranium)；add 1 (ensuring a high level of transparency in plutonium although not being obliged to report)	1	2	1	2	1	0	0	0	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	0
	Points			**32**	**40**	**36**	**41**	**41**	**15**	**13**	**9**	**56**	**52**	**54**	**43**	**52**	**52**	**37**	**56**	**48**	**36**	**53**	**47**	**51**	**50**	**55**	**55**	**45**	**54**	**50**	**52**	**36**	**51**	**53**	**50**	**21**	**50**	**45**	**0**
	Full Points			**47**	**47**	**47**	**47**	**47**	**43**	**43**	**43**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**	**61**
	（%）			**68.1**	**85.1**	**76.6**	**87.2**	**87.2**	**34.9**	**30.2**	**20.9**	**91.8**	**85.2**	**88.5**	**70.5**	**85.2**	**85.2**	**60.7**	**91.8**	**78.7**	**59.0**	**86.9**	**77.0**	**83.6**	**82.0**	**90.2**	**90.2**	**73.8**	**88.5**	**82.0**	**85.2**	**59.0**	**83.6**	**86.9**	**82.0**	**34.4**	**82.0**	**73.8**	**0.0**

Nuclear Security

		Maximum points	Scale of measurement	Nuclear-Weapon States					Non-NPT Parties			Non-Nuclear Weapon States																													Other
				CHN	FRA	RUS	UK	USA	IND	ISR	PAK	AUS	AUT	BEL	BRA	CAN	CHL	EGY	GER	IDN	IRN	JPN	KAZ	ROK	MEX	NED	NZL	NGA	NOR	PHL	POL	SAU	RSA	SWE	SWI	SYR	TUR	UAE	PRK
1	**The Amount of Fissile Material Usable for Weapons**	**-16**																																					
	The amount of fissile material usable for weapons	-16	Firstly, -3 (if possessing fissile material usable for nuclear weapons). Then, deduct if: ・HEU: -5 (>100t) ; -4 (>20t); -3 (>10t); -2 (>1t); -1 (possessing less than 1t) ・Weapon-grade Pu: -5 (>100t); -4 (>20t); -3 (>10t); -2 (>1t); -1 (possessing less than 1t) ・Reactor-grade Pu: -3 (>10t); -2 (>1t); -1 (possessing less than 1t)	-10	-12	-16	-12	-12	-8	-5	-6	-4	0	-4	0	-5	0	0	-6	0	-4	-8	-6	0	0	-4	0	-4	-4	0	0	0	-4	0	-4	-4	0	0	-5
2	**Status of Accession to Nuclear Security and Safety-Related Conventions, Participation in Nuclear Security Related Initiatives, and Application to Domestic Systems**	**21**																																					
	A) Convention on the Physical Protection of Nuclear Material and the 2005 Amendment to the Convention	3	0 (not signing the Treaty); 1 (not ratifying the Treaty); 2 (not signing or ratifying the Amendment); 3 (both the Treaty and Amendment in force)	3	3	3	3	3	3	3	3	3	3	3	2	3	3	1	3	3	0	3	3	3	3	3	3	3	3	2	3	3	2	3	3	0	3	3	0
	B) International Convention for the Suppression of Acts of Nuclear Terrorism	2	0 (not signing); 1 (not ratifying); 2 (in force)	2	2	2	2	2	2	1	0	2	2	2	2	2	2	1	2	2	0	2	2	2	2	2	2	2	2	1	2	2	2	2	2	1	2	2	0
	C) Convention on Nuclear Safety	2	0 (not signing); 1 (not ratifying); 2 (in force)	2	2	2	2	2	2	1	2	2	2	2	2	2	2	1	2	2	0	2	2	2	2	2	0	2	2	1	2	2	2	2	2	1	2	2	0
	D) Convention on Early Notification of a Nuclear Accident	2	0 (not signing); 1 (not ratifying); 2 (in force)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	1
	E) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	2	0 (not signing); 1 (not ratifying); 2 (in force)	2	2	2	2	2	0	0	0	2	2	2	2	2	2	0	2	2	0	2	2	2	0	2	0	2	2	1	2	2	2	2	2	0	0	2	0
	F) Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency	2	0 (not signing); 1 (not ratifying); 2 (in force)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	1
	G) INFCIRC/225/Rev.5	4	0 (not applying or no information); 2 (applying to the national implementation system); 4 (applying and implementing adequately)	2	2	2	2	2	2	2	2	2	0	2	2	2	2	0	2	2	2	2	2	2	2	2	2	2	0	2	2	0	2	2	2	0	2	2	0
	H) Enactment of laws and establishment of regulations for the national implementation	4	0 (not establishing domestic laws and regulations and the national implementation system); 1～2 (establishing them but insufficiently); 4 (establishing appropriately)	4	4	4	4	4	4	4	4	4	4	4	4	4	3	2	4	4	3	4	4	4	4	4	4	3	2	3	3	1	4	4	4	2	4	2	1
3	**Efforts to Maintain and Improve the Highest Level of Nuclear Security**	**20**																																					
	A) Minimization of HEU in civilian use	4	0 (no effort or no information); 1 (limited efforts); 3 (active efforts); add 1 (committed to further enhancement)	4	4	4	3	4	4	4	0	4	4	4	4	4	3	0	3	3	0	3	4	4	4	4	3	3	4	3	4	0	4	4	4	0	3	4	0
	B) Prevention of illicit trafficking	5	0 (not implementing or no information); 2 (limited implementation); 4 (active implementation); add 1 (committed to further enhancement)	4	4	4	4	5	5	4	5	4	4	4	4	4	4	2	4	4	2	4	2	4	4	2	2	2	4	5	4	2	4	4	4	0	2	4	0
	C) Acceptance of international nuclear security review missions	2	0 (not accepting or no information); 1 (accepting); 2 (actively accepting)	1	2	0	2	2	0	0	0	2	0	0	0	2	2	2	0	2	2	2	2	1	2	2	2	2	2	2	1	0	0	2	2	0	2	1	0
	D) Technology development —nuclear forensics	2	0 (not implementing or no information); 1 (implementing); 2 (actively implementing)	0	2	2	2	2	0	2	1	2	0	1	0	2	1	0	1	0	0	2	0	2	0	2	0	0	1	0	0	0	1	2	2	0	2	0	0
	E) Capacity building and support activities	2	0 (not implementing or no information); 1 (implementing); 2 (actively implementing)	1	2	1	2	2	1	0	1	1	1	0	1	1	1	0	2	1	0	2	1	2	0	2	0	0	1	1	0	1	1	2	1	0	0	0	0
	F) IAEA Nuclear Security Plan and Nuclear Security Fund	2	0 (no effort or information); 1 (participating); 2 (actively participating)	2	2	2	2	2	2	0	0	0	0	2	0	2	0	0	2	0	0	2	1	2	0	2	2	0	2	0	0	0	0	2	0	0	0	0	0
	G) Participation in international efforts	3	0 (not participating); 1 (participating in a few frameworks); 2 (participating in many or all frameworks); add 1 (if contributing actively)	1	3	3	3	3	1	1	1	3	1	3	1	3	1	0	3	0	0	3	3	3	3	3	3	0	3	3	3	1	1	3	3	0	1	1	0
	Points			**22**	**26**	**19**	**25**	**27**	**22**	**21**	**17**	**31**	**27**	**29**	**28**	**32**	**30**	**13**	**28**	**29**	**9**	**29**	**26**	**37**	**30**	**32**	**27**	**21**	**28**	**28**	**30**	**18**	**25**	**38**	**31**	**2**	**27**	**27**	**-2**
	Full Poins			**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**
	(%)			**53.7**	**63.4**	**46.3**	**61.0**	**65.9**	**53.7**	**51.2**	**41.5**	**75.6**	**65.9**	**70.7**	**68.3**	**78.0**	**73.2**	**31.7**	**68.3**	**70.7**	**22.0**	**70.7**	**63.4**	**90.2**	**73.2**	**78.0**	**65.9**	**51.2**	**68.3**	**68.3**	**73.2**	**43.9**	**61.0**	**92.7**	**75.6**	**4.9**	**65.9**	**65.9**	**-4.9**

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