"Hiroshima for Global Peace" Plan

2016 Edition

Hiroshima Report

Evaluation of Achievement in Nuclear Disarmament, Non-Proliferation and Nuclear Security in 2015

Hiroshima Prefecture

Center for the Promotion of Disarmament and Non-Proliferation

The Japan Institute of International Affairs

March 2016

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Preface and Acknowledgements

This report, *Hiroshima Report 2016: Evaluation of Achievement in Nuclear Disarmament, Non-Proliferation and Nuclear Security in 2015* (hereinafter referred to as "*Hiroshima Report 2016*") 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 in 2013, 2014 and 2015. As in the last three 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—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. India and Pakistan which are not parties to the NPT are also pursuing a buildup of their nuclear arsenals in the South Asian unstable security environment. Another non-state party to the NPT, Israel, is widely considered to have nuclear weapons, although it has maintained a policy of "nuclear ambiguity" by neither confirming nor denying possession of nuclear weapons.

The status and prospects regarding nuclear non-proliferation are also gloomy. North Korea is determined to pursue building up of its nuclear forces after declaring withdrawal from the NPT and conducted four nuclear tests. The international community was given a chance to solve the long-standing concern about the nuclear ambition of Iran. Whether this can lead to a long-lasting solution of the Iranian nuclear issue is yet to be known, however. 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.

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 2015 to discuss the contents. The members of the Research Committee are as follows:

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

Chairperson

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

Research Members

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Sukeyuki Ichimasa (Senior Research Fellow, National Institute for Defense Studies)

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Masahiro Kikuchi (Former Board Member, Nuclear Material Control Center)

Mitsuru Kurosawa (Professor, Osaka Jogakuin College)

Kazumi Mizumoto (Vice-President, Hiroshima Peace Institute, Hiroshima City University)

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)

Appreciation is also expressed to Mr. Michiru Nishida (Ministry of Foreign Affairs, Japan) and Mr. Naoki Miyamoto (Nuclear Material Control Center) for valuable technical comments; and Mr. Gordon Wyn Jones (King's College London, Centre for Science and Security Studies) for editing the *Hiroshima Report*.

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

Introduction

(1) Overview

The most significant developments in the nuclear field in 2015 were the inconclusive Nuclear Non-Proliferation Treaty (NPT) Review Conference (RevCon) which convened in April-May, and the conclusion of the Joint Comprehensive Plan of Action (JCPOA) on July 14 between Iran and six major powers which for the time being resolved the so-called Iranian nuclear crisis.

It was recognized from the beginning that a successful conclusion of the 2015 NPT RevCon would be difficult, due to two contentious issues. One was the stalemate in nuclear disarmament since the signing of the U.S.-Russia New Strategic Arms Reduction Treaty (New START) in 2010. Many non-nuclear-weapon states (NNWS) attempted to revitalize nuclear disarmament by emphasizing the "humanitarian consequences of nuclear weapons" and by issuing joint statements during the NPT review process and at the United Nations General Assembly. For their part, the nuclear-weapon states (NWS) remained cautious about the humanitarian initiative, out of fear that it would stir pressure toward nuclear disarmament. The NWS, as well as the western NNWS allied with the United States, argued the importance of taking into consideration the dimension of national and regional security. Debates on this issue at the RevCon appeared to further deepen the gap between NWS and NNWS. The other main contentious issue concerned efforts to convene an international conference on a Middle East Zone Free of Weapons of Mass Destruction (WMD). The 2010 RevCon had decided to hold such a Conference by 2012, but this could not be achieved before the opening of the 2015 RevCon, due to disagreements on agenda and modality between Arab states and Israel. Egypt, which led the initiative to establish such a zone, and the United States, which maintains a close relationship with Israel, were the primary antagonists in what became a serious confrontation over this issue.

Regarding nuclear disarmament, earlier versions of a draft final document for the 2015 NPT RevCon included some of the proactive proposals made by NNWS. However, facing opposition by NWS, a number of such proposals, particularly relating to issues on the humanitarian consequences and legal prohibition of nuclear weapons, were deleted or diluted in later drafts. Still, it was reported that participating countries managed to reach consensus over language on nuclear disarmament in a final draft of a final document submitted by the President of the RevCon on the final day. Final hopes for a consensus final document were dashed, however, when the United States, together with United Kingdom and Canada, expressed disagreement on proposals for convening a Middle Eastern Conference described in the draft document because it did not protect Israel's interests.

At the end of the RevCon, many NNWS, mainly a "humanitarian group" and the Non-Aligned Movement (NAM) countries, had increased their frustration over NWS's passive attitudes on nuclear disarmament, particularly the issues on the humanitarian dimensions and legal prohibitions of nuclear weapons. Reflecting such a situation, NNWS proposed several resolutions on these issues at the UN General Assembly, which were adopted. However, the voting behavior on those resolutions revealed that the rift among NWS, NNWS allying with the United States, and other NNWS, over the humanitarian dimensions issue and calls for a legal prohibition of nuclear weapons has been deepening. Furthermore, while the 2015 UNGA adopted a resolution on convening an open-ended working group (OEWG) on nuclear

disarmament, the five NWS, all of which opposed the resolution, did not participate in the first session of the OEWG in February 2016.

On nuclear non-proliferation, remarkable progress was achieved in July when 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) finally concluded the JCPOA that resolved the Iranian nuclear issue for the time being, pending faithful implementation. Under the JCPOA, which limits Iran's nuclear activities, including uranium enrichment and the potential for plutonium production for a certain period of time, the so-called "breakout time"—defined as the amount of time that it would take Iran to produce sufficient weapons-grade uranium for one nuclear weapon if it were to decide to produce nuclear weapons—is estimated to have been extended from what had been two months to approximately one year. On the other hand, no progress was made on the North Korean nuclear issue in 2015. North Korea continues its nuclear and missile developments, and conducted the fourth nuclear explosion test on January 6, 2016.

Because the year 2015 was an intersession period of major international conferences on nuclear security, only a relatively small number of states issued national statements on their progress in enhancing their nuclear security system. Nevertheless, some states announced that they had successfully removed highly-enriched uranium (HEU) and plutonium from their soil, and a number of states also confirmed that they had accepted nuclear security advisory services conducted by the International Atomic Energy Agency (IAEA). Moreover, concerned states expected positive results from the Washington Nuclear Security Summit (NSS) in March 2016 and the second IAEA International Conference on Nuclear Security, which will be held in December 2016. For example, there were some discussions on future international architecture of nuclear security from 2016, in which the current global nuclear security system and the commitment of each state would be maintained and strengthened. Also, expert communities drafted and publicly released a draft International Convention on Nuclear Security (ICNS) and released the draft to the public. Russia's decision to no longer participate in the NSS process diminished expectations, however.

(2) Items

In the *Hiroshima Report 2016,* 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 were 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 2016* maintains the same structure and items, as per the following:[1]

1. Nuclear Disarmament
   - (1) Status of Nuclear Forces (estimates)
   - (2) Commitment to Achieve a World without Nuclear Weapons
     - A) Voting behavior on the UNGA resolutions on nuclear disarmament proposed by Japan, NAC and NAM
     - B) Voting behavior on the UNGA resolutions calling for commencement of negotiations on a legal prohibition of nuclear weapons
     - C) Announcement of significant policies and important activities
     - D) 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 the National Security Strategies and Policies
     - A) The current status of the roles and significance of nuclear weapons
     - B) Commitment to the "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) The moratorium 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) The moratorium on production of fissile material for nuclear weapons

[1] On nuclear disarmament, since Russia decided not to continue the Cooperative Threat Reduction (CTR) program, we do not evaluate performances of NNWS regarding "Implementing or planning dismantlement of nuclear warheads and their delivery vehicles" (1.(10)A)) and "Decommissioning/conversion of nuclear weapons-related facilities" (1.(10)B)) in this *Hiroshima Report*.

(8) Transparency in Nuclear Forces, Fissile Material for Nuclear Weapons, and Nuclear Strategy/Doctrine
(9) Verifications of Nuclear Weapons Reductions
(10) Irreversibility
A) Implementing or planning dismantlement of nuclear warheads and their delivery vehicles
B) Decommissioning/conversion of nuclear weapons-related facilities
C) Measures for the fissile material declared excess for military purposes, such as disposition or conversion to peaceful purposes
(11) Disarmament and Non-Proliferation Education and Cooperation with Civil Society
(12) Hiroshima Peace Memorial Ceremony

2. Nuclear Non-Proliferation
(1) Acceptance and Compliance with the Nuclear Non-Proliferation Obligations
A) Accession to the NPT
B) Compliance with Articles 1 and 2 of the NPT and the UNSC resolutions on non-proliferation
C) Nuclear-Weapon-Free Zones
(2) IAEA Safeguards Applied to the NPT NNWS
A) Conclusion of the IAEA Safeguards Agreements
B) Compliance with the 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

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
A) Accession status to nuclear security-related conventions
B) INFCIRC/225/Rev.5
(3) Efforts to Maintain and Improve the Highest Level of Nuclear Security
A) Minimization of HEU in civilian use
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 2015*, 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 2016* 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[2])

(4) Approach

This project focuses on the time period of calendar year 2015. 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, and Conference on Disarmament) 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 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 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

[2] 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 status.

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, 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 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; 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 2015

Chapter 1. Nuclear Disarmament[1]

(1) Status of Nuclear Forces (estimates)

As of December 2015, eight countries have declared that they have nuclear weapons. According to Article 9-3 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. North Korea declared it had withdrawn from the treaty in 2003. 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 states that have publicly declared or are believed to possess nuclear weapons are referred to as "nuclear-armed states."

Nuclear weapons, which had accumulated to approximately 70,000 at the peak of the Cold War era, have been reduced steadily. According to the estimates produced by the Stockholm International Peace Research Institute (SIPRI), however, 15,850 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 reduction of 6,800 nuclear weapons from 2010, and 450 nuclear weapons from the previous year, the pace of reduction in 2014/15 has been slowing. SIPRI estimates 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).[3]

Among nuclear-weapons/armed states, France declared it possesses 300 nuclear weapons,[4] and the United Kingdom announced 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.[5] Meanwhile, the United States has recently released information more actively, as described in the following section. For example, at the 2015 NPT Review Conference, U.S. Secretary of State John Kerry released an update of its nuclear stockpile (except those awaiting dismantlement) and announced

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[1] Chapter 1 is written by Hirofumi Tosaki.

[2] Stockholm International Peace Research Institute, *SIPRI Yearbook 2015: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2015), chapter 11. Regarding deployments of nuclear forces of each nuclear-armed state, see Hans M. Kristensen and Robert S. Norris, "Worldwide Deployments of Nuclear Weapons, 2014," *Bulletin of the Atomic Scientists*, Vol. 70, No. 5 (September/October 2014), pp. 96-108.

[3] While SIPRI and most U.S. scholars estimate that China has 250 nuclear warheads, one Russian scholar estimates that the arsenal comprises 800-900 warheads. See Viktor Yesin, "China's Nuclear Capabilities," Aleksey Arbatov, Vladimir Dvorkin and Sergey Oznobishchev, eds., *Prospects of China's Participation in Nuclear Arms Limitation* (Moscow: Institute of World Economic and International Relations, Russian Academy of Sciences, 2012), chapter 3.

[4] 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.

[5] 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.

that, as of September 2014, the total U.S. stockpile of nuclear warheads was 4,717.[6]

Table 1-1: Number of nuclear weapons—2010-2015

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

Sources) Stockholm International Peace Research Institute (SIPRI), *SIPRI Yearbook 2010: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2010), chapter 8; *SIPRI, SIPRI 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.

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] John Kerry, "Remarks," at the 2015 NPT Review Conference, General Debate, April 27, 2015, http://www.state.gov/secretary/remarks/2015/04/241175.htm. Since the inauguration of the Barack Obama administration in January 2009, about 500 nuclear warheads has retired. See 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/.

Table 1-2: The status of nuclear forces (estimates, as of January 2015)

	Total nuclear stockpile	Breakdown				Nuclear warheads	Delivery vehicles
U.S.	～7,260	Retired / Awaiting dismantlement ～2,500					
		Operational ～4,760	Non-deployed ～2,680				
			Deployed ～2,080	Non-strategic 180			
				Strategic ～1,900	ICBM	450	450
					SLBM	1,152	288
					Strategic bomber	300	60
Russia	～7,500	Retired / Awaiting dismantlement ～3,120	(Non-strategic) (1,950)				
		Operational 4,380	Non-deployed 2,600	(Non-strategic) (1,950)			
			Deployed ～1,780	Strategic ～2,430	ICBM	1,049	311
					SLBM	576	144
					Strategic bomber	810	60
U.K.	215	Deployed 48			SLBM	215	48
France	～290	Deployed 98			SLBM	240	48
					Attack aircraft (including carrier based aircraft)	50	50
China	～260				Land-based medium- and long-range ballistic missile	163	160
					SLBM	48	48
					Attack aircraft	20	20
					Cruise missile	n/a	150～350
India	90～110				Land-based ballistic missile Attack aircraft		
Pakistan	100～120				Land-based ballistic missile Attack aircraft		
Israel	～80				Ballistic missile Attack aircraft		
N. Korea	～8						
World	～15,850	(Deployed) (4,300)					

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

Source) Stockholm International Peace Research Institute, *SIPRI Yearbook 2015: Armaments, Disarmament and International Security* (Oxford: Oxford University Press, 2015), chapter 11.

(2) Commitment to Achieve 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 6 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."

At the previous NPT Review Conferences (RevCon), as their commitment to nuclear disarmament, participating countries agreed on a reduction of "nuclear weapons globally, with the ultimate goals of eliminating those weapons" (1995); "[a]n unequivocal undertaking by the nuclear-weapon States to accomplish the total elimination of their nuclear arsenals" (2000); and a commitment "to pursue policies that are fully compatible with the Treaty and the objective of achieving a world without nuclear weapons" (2010)—reflecting "America's commitment to seek the peace and security of a world without nuclear weapons," as stated by the U.S. President Barack Obama in April 2009.[7]

As mentioned in the previous *Hiroshima Reports*, no country, including the NWS, 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. For example, at the 2015 NPT RevCon, the five NWS together "reaffirm[ed] the shared goal of nuclear disarmament and general and complete disarmament as referenced in the preamble and provided for in Article VI of the NPT." At the same time, however, they stated: "While we continue to work towards our common goal of nuclear disarmament, we affirm that our nuclear forces should be maintained at the lowest levels needed to meet national security requirements."[8] NNWS, with increased frustration over nuclear-weapon/armed states' passive attitudes on nuclear disarmament, criticized the "reluctance by the nuclear weapon States to fulfill their legal obligations, undertakings and commitments with respect to nuclear disarmament."[9]

As for approaches to nuclear disarmament, the five NWS have reiterated that "an incremental, step-by-step approach is the only practical option for making progress towards nuclear disarmament,

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[7] "Remarks by President Barack Obama," Prague, Czech Republic, April 5, 2009, http://www.whitehouse.gov/the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered/. He reiterated that "the United States [sought] the peace and security of a world without nuclear weapons" in 2015. Office of the Press Secretary, "Statement by the President on the 45th Anniversary of the Nuclear Non-Proliferation Treaty," U.S. White House, March 5, 2015, http://www.whitehouse.gov/the-press-office/2015/03/05/statement-president-45th-anniversary-nuclear-non-proliferation-treaty.

[8] "Statement by the People's Republic of China, France, the Russian Federation, the United Kingdom of Great Britain and Northern Ireland, and the United States of America to the 2015 Treaty on the Non-Proliferation of Nuclear Weapons Review Conference," April 30, 2015.

[9] "Statement by New Zealand on behalf of New Agenda Coalition," at the 2015 NPT Review Conference, General Debate, April 27, 2015.

while upholding global strategic security and stability."[10] In their joint statement following the NWS (or P5) conference in February 2015, they also "reaffirmed that a step-by-step approach to nuclear disarmament that promotes international stability, peace and undiminished and increased security for all remains the only realistic and practical route to achieving a world without nuclear weapons."[11] Meanwhile, in 2015 the United States preferred to use the term, "full-spectrum approach." A U.S. official, for example, stated that, "reaching our common goal of nuclear disarmament must include a process that involves all states that possess nuclear weapons, reflects the realities of the international security environment, and proceeds along the full-spectrum approach that has demonstrated multiple successes over the past several decades."[12] France has also emphasized consistently: "[W]e cannot progress towards nuclear disarmament unless we are able to guarantee undiminished security for all while making sure that there is not another arms race. That is why the framework of general and complete disarmament remains important."[13] In addition to the five NWS, India has stated that "[the goal of universal, non-discriminatory and verifiable nuclear disarmament] can be achieved by a step by step process."[14]

On the other hand, the western NNWS have propounded a building-blocks approach. Twenty countries, including Australia, Belgium, Germany, Japan, the Netherlands, Poland and Sweden, submitted a working paper entitled "Building Blocks for a World without Nuclear Weapons" to the 2014 NPT Preparatory Committee (PrepCom), and argued that "[a] focus on 'building blocks' can complement the pursuit of a 'step by step' approach…While ultimate measures for achieving and maintaining a world without nuclear weapons will need to be multilateral, effective disarmament will require mutually reinforcing 'building blocks' that are multilateral, plurilateral, bilateral or unilateral."[15] The Non-Aligned Movement (NAM) countries have argued "the urgent necessity of negotiating and bringing to a conclusion a phased programme for the complete elimination of nuclear weapons with a specified time frame."[16] At the First Committee of the 2015 UNGA, they also stated, "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. 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

[10] "Statement by the People's Republic of China, France, the Russian Federation, the United Kingdom of Great Britain and Northern Ireland, and the United States of America to the 2015 Treaty on the Non-Proliferation of Nuclear Weapons Review Conference," April 30, 2015.

[11] "Joint statement issued by the People's Republic of China, France, the Russian Federation, the United Kingdom and the United States," London, February 6, 2015, https://www.gov.uk/government/news/joint-statement-from-the-nuclear-weapon-states-at-the-london-p5-conference.

[12] Anita E. Friedt, "A Full Spectrum Approach to Achieving the Peace and Security of a World without Nuclear Weapons," Friedrich-Ebert-Stiftung Tiergarten Conference, Berlin, September 10, 2015, http://www.state.gov/t/avc/rls/2015/246943.htm.

[13] "Statement by France," at the First Committee of the UN General Assembly, General Debate, October 19, 2015.

[14] "Statement by India," at the First Committee of the UN General Assembly, General Debate, October 12, 2015.

[15] NPT/CONF.2015/PC.III/WP.23, April 15, 2014.

[16] NPT/CONF.2015/WP.13, March 10, 2015.

disarmament."[17] Among the nuclear-armed states, Pakistan has expressed concurrence with a time-bound, phased approach.

A) Voting behavior on the UNGA resolutions on nuclear disarmament proposed by Japan, NAC and NAM

In 2015, the United Nations General Assembly adopted the following resolutions: "United action with renewed determination towards the total elimination of nuclear weapons"[18] promoted by Japan; "Towards a nuclear-weapon-free world: accelerating the implementation of nuclear disarmament commitments"[19] proposed by the New Agenda Coalition (NAC); and "Nuclear disarmament"[20] by the NAM members. The voting behavior of the countries surveyed in this project on the three resolutions at the UNGA in 2015 is presented below.

- "United action with renewed determination towards the total elimination of nuclear weapons"
  - Proposing: Australia, Belgium, Canada, Chile, Germany, Japan, the Netherlands, Nigeria, Norway, the Philippines, Poland, Sweden, Switzerland and others
  - 166 in favor, 3 Against (China, Russia and North Korea), 16 Abstentions (Egypt, France, India, Iran, Israel, South Korea, Pakistan, South Africa, Syria, the U.K., the U.S. 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
  - 142 in favor, 7 Against (France, India, Israel, North Korea, Russia, the U.K. and the U.S.), 36 Abstentions (Australia, Belgium, China, Germany, Japan, South Korea, the Netherlands, Norway, Pakistan Poland, Turkey and others)
- "Nuclear disarmament"
  - Proposing: Indonesia, Iran, Nigeria, the Philippines and others
  - 127 in favor, 43 Against (Australia, Belgium, Canada, France, Germany, Israel, the Netherlands, Norway, Poland, Russia, Switzerland, Turkey, the U.K., the U.S. and others), 15 Abstentions (Austria, India, Japan, South Korea, New Zealand, Pakistan, Sweden and others)

It is worth noting that NWS's attitudes about the resolution titled "United action with renewed determination towards the total elimination of nuclear weapons" was drastically changed from the previous year: France (voting in favor in 2014), the United Kingdom and the United States (both of which joined as lead sponsors in 2014) abstained in 2015; and China and Russia, abstaining in 2014, voted against the resolution in 2015. France stated, "Given the developments that the resolution has seen this year, including in the form of references to the humanitarian consequences of any use

[17] "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 19, 2015.

[18] A/RES/70/40, December 7, 2015.

[19] A/RES/70/51, December 7, 2015.

[20] A/RES/70/52, December 7, 2015.

of nuclear weapons, my country has chosen to abstain."[21] This also appeared to be why the United Kingdom and United States abstained and why Russia voted against. China criticized the following sentence of the resolution: "[The General Assembly e]ncourages every effort to raise awareness of the humanitarian impact of the use of nuclear weapons, including through, *inter alia*, visits by leaders, youth and others, to the cities devastated by the use of nuclear weapons, and testimonies of the atomic bomb survivors, the hibakusha." Beijing argued that it did "not want to see the issue of humanitarianism taken advantage of by a certain country, and used as a tool to obscure and distort history, and, furthermore, that "this tragedy [of suffering nuclear bombings] was a direct result of the aggressive war launched by Japan, and the culprits were the Japanese militarists."[22]

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

Since the 2010 NPT RevCon, debate on a "legal prohibition of nuclear weapons," as one of the "effective measures" under Article 6 of the NPT, has been growing. At the Second Conference on the Humanitarian Impact of Nuclear Weapons in Nayarit in February 2014, Mexico submitted the chair's summary, in which legal aspects regarding nuclear weapons issues were mentioned. At the Third Conference in December 2014, Austria presented a statement, titled "Austrian Pledge," which "call[ed] on all states parties to the NPT…to identify and pursue effective measures to fill the legal gap for the prohibition and elimination of nuclear weapons,"[23] implying to explore the possibility to achieve a legal prohibition of nuclear weapons. Austria subsequently renamed it as the "Humanitarian Pledge," which 107 countries supported at the 2015 NPT RevCon.

At the NPT RevCon and the UNGA in 2015, various opinions were expressed on this issue. The NAC summarized "options that have been suggested for the achievement and maintenance of a world free of nuclear weapons" in its working paper submitted to the 2014 NPT PrepCom. The options included a comprehensive Nuclear Weapons Convention (NWC); a Nuclear Weapons Ban Treaty (NWBT); a framework arrangement; and a hybrid arrangement.[24] At the 2015 NPT RevCon, the NAC submitted a working paper, in which it "presented with a choice between two legally distinct approaches" as a result of a further analysis.[25] "The first approach involves the negotiation of a stand-alone agreement, whether a comprehensive convention or a ban treaty… The difference between the two agreements lies…in their location along that spectrum in terms of scope and level of detail." The NAC also introduced "[t]he

[21] France, "Japanese Resolution: Explanation of National Vote," at the First Committee of the UN General Assembly, November 2, 2015.

[22] "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.

[23] "Austrian Pledge," Vienna Conference on the Humanitarian Impact of Nuclear Weapons, December 8-9, 2014.

[24] NPT/CONF.2015/PC.III/WP.18, April 2, 2014. In this working paper, a comprehensive NWC is defined as one "which, in setting out general obligations, prohibitions and an effective basis for time-bound, irreversible and verifiable nuclear disarmament, would complement the Chemical Weapons Convention and the Biological and Toxin Weapons Convention as an effective measure for the elimination of all weapons of mass destruction," and a NWBT is defined as one "which would establish the key prohibitions necessary for the pursuit, achievement and maintenance of a world free of nuclear weapons; such a Treaty could, but need not, additionally set out the practical arrangements required for implementing and overseeing effective, time-bound, irreversible and verifiable nuclear disarmament."

[25] NPT/CONF.2015/WP.9, March 9, 2015.

second approach, that of a framework agreement comprising mutually supporting instruments… [I]t establishes obligations pursuant to a 'head,' or primary, agreement that would be negotiated first and that would formulate the objectives of the overall regime, establish broad commitments of the States parties and institute a general system of governance for subsequent negotiations. These subsequent 'second-tier' negotiations would then articulate more detailed rules on discrete aspects of the overall regime…"

The NAM countries, in their working paper submitted to the 2015 NPT RevCon, "reaffirm[ed] the urgent necessity of negotiating and bringing to a conclusion a phased programme for the complete elimination of nuclear weapons with a specified time frame," and "called for the urgent commencement of negotiations in the Conference on Disarmament for the early conclusion of a comprehensive convention on nuclear weapons to prohibit their possession, development, production, acquisition, testing, stockpiling, transfer, use or threat of use and to provide for their destruction."[26] Furthermore, in their another working paper, the NAM countries "propose[d] a plan of action for the total elimination of nuclear weapons consisting of the following concrete steps and measures."[27] The action plan proposed three phases:

- First phase (2015-2020)
  - Commencement of negotiations on and conclusion of a comprehensive convention on nuclear weapons, which: prohibits the possession, development, production, acquisition, testing, stockpiling, transfer, use or threat of use of nuclear weapons; provides for their destruction; and includes a single integrated multilateral comprehensive verification system to ensure compliance with the provisions of the convention.
  - Pending the conclusion of a comprehensive convention, the immediate implementation of the following measures, which include agreed steps from the Review Conferences of 1995, 2000 and 2010, must be undertaken: a moratorium on the production of fissile materials by nuclear-weapon States; the entry into force of the Comprehensive Nuclear-Test-Ban Treaty, starting with the ratification of the Treaty by the remaining nuclear-weapon States; the cessation of all nuclear test explosions pending the entry into force of the Comprehensive Nuclear-Test-Ban Treaty; the closure of all nuclear weapon test sites and their associated infrastructure; the cessation of the upgrading of the existing nuclear weapon systems through new technology, including nuclear weapon research and development by nuclear-weapon States; the cessation of the role of nuclear weapons in the security doctrines of nuclear-weapon States, leading to the elimination of such a role; provisions of unconditional and legally binding negative security assurances by nuclear-weapon States to non-nuclear-weapon States; the establishment of nuclear-weapon-free zones, in particular in the Middle East; and the reduction of nuclear arsenals and de-

[26] NPT/CONF.2015/WP.13, March 10, 2015.

[27] NPT/CONF.2015/WP.14, March 13, 2015. Costa Rica presented a draft Model Convention on Nuclear Weapons at the Conference on Disarmament (CD) in January 2015. However, France and the United States argued that a commencement of negotiations on an FMCT should have been prioritized. "Conference on Disarmament Discusses Humanitarian Impact on Nuclear Weapons, Model Convention on Nuclear Weapons and the Fissile Materials Cut-Off Treaty," The United Nations Office at Geneva, January 28, 2015, http://www.unog.ch/unog/website/news_media.nsf/%28httpNewsByYear_en%29/9537F14884EA5920C1257DDB0061BBE2?OpenDocument.

alerting by nuclear-weapon States.

- Second phase (2020-2025)
  - Acceleration of the ratification and early entry into force of the comprehensive convention on nuclear weapons, which includes a phased program and a specified time frame for the complete elimination of nuclear weapons.
  - Upon entry into force of the comprehensive convention on nuclear weapons, the following steps must be undertaken: the establishment of a single integrated multilateral comprehensive verification system to ensure compliance with the provisions of the comprehensive convention on nuclear weapons; Declarations by possessor States parties of their stocks of nuclear weapons and material usable for nuclear weapons; the preparation, under international auspices, of an inventory of nuclear arsenals, including fissile materials, nuclear warheads and their delivery vehicles; the separation of nuclear warheads from their delivery vehicles; the placement of nuclear warheads in secure storage under international supervision, pending the removal of special nuclear materials from those warheads; the transfer of nuclear materials, including fissile materials, to "peaceful purposes"; the placement of nuclear fissile material transferred from military to peaceful uses by nuclear-weapon States under International Atomic Energy Agency (IAEA) safeguards.
- Third phase (2025-2030): Further measures for the full implementation of the comprehensive convention on nuclear weapons and of its verification regime
  - The elimination of all nuclear weapons in an irreversible and verifiable manner
  - The conversion of all facilities for the production of nuclear weapons to "peaceful purposes" in an irreversible and verifiable manner
  - The placement of all nuclear facilities under IAEA safeguards

At the 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.[28] 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 6 of the NPT. The voting behavior in 2015 is presented below.

- Proposing: Brazil, Chile, Egypt, India, Indonesia, Iran, Mexico, Nigeria, the Philippines, Syria and others
- 137 in favor, 24 Against (Belgium, France, Germany, Israel, the Netherlands, Poland, Russia, Turkey, the U.K., the U.S. and others), 25 Abstentions (Australia, Canada, Japan, South Korea, Norway and others)

At the 2015 UNGA, the 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

[28] A/RES/69/43, December 11, 2014.

under any circumstances," was also proposed and adopted.[29] Its voting behavior is following.

- Proposing: Egypt, India, Indonesia, Iran and others
- 130 in favor, 48 Against (Australia, Austria, Belgium, Canada, France, Germany, Israel, the Netherlands, New Zealand, Norway, Poland, Sweden, Switzerland, Turkey, the U.K., the U.S. and others), 8 Abstentions (Japan, South Korea, Russia and others)

As shown by their voting behaviors mentioned above, NWS except China clearly oppose to pursuing a "legal prohibition of nuclear weapons," at least at the present time. The United States insists that "an outright ban now on nuclear weapons will not get rid of nuclear weapons overnight."[30] It also argues that "proposals such as a nuclear weapons ban or convention cannot succeed because they fail to recognize the need to develop the verification capabilities and build the security conditions for progress on disarmament. Instead, they risk creating a very unstable security environment, where misperceptions or miscalculations could escalate crises with unintended and unforeseen consequences, not excluding the possible use of a nuclear weapon. We must focus our efforts on realistic and achievable objectives that can make the world a safer place."[31] The United Kingdom considers that "a ban treaty would be a referendum on NPT and risk undermining the security that the NPT has created."[32] Russia stated that it did "not want to create grounds for higher expectations and obligations that would be problematic."[33] France was more forthright, arguing that "disarmament cannot be based on an exclusively legal approach… [since] the specific nature of nuclear weapons compared with other weapons of mass destruction should be taken into account."[34] In addition, NNWS allied with the United States maintained a cautious approach. For instance, Australia stated that a treaty banning nuclear weapons "simply would not result in the elimination of nuclear weapons."[35]

The International Campaign to Abolish Nuclear Weapons (ICAN) in 2012 conducted a study on states' responses to the proposal for negotiating a Nuclear Weapons Convention. According to the ICAN report, among the countries surveyed for this project, Belgium, France, Israel, the Netherlands, Poland, Russia, Turkey, the United Kingdom and the United States "don't support" the Nuclear Weapons Convention, while Australia, Canada, Germany, Japan, South Korea and Sweden are "on the fence" (undecided).[36] The ICAN also introduced recent statements by governments (including Austria, Brazil, Egypt, Indonesia, Kazakhstan, Malaysia, Mexico, Nigeria, Norway, the Philippines, South Africa,

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[29] A/RES/70/62, December 7, 2015.

[30] "Statement of the United States," at the First Committee of the UN General Assembly, Thematic Discussion on Nuclear Weapons, October 19, 2015.

[31] "Statement of the United States," at the First Committee of the UN General Assembly, General Debate, October 12, 2015.

[32] Mia Gandenberger and Gabriella Irsten, "News in Brief," *NPT News in Review*, Vol. 13, No. 13 (May 19, 2015), p. 4.

[33] Ibid.

[34] "Statement of France," at the First Committee of the UN General Assembly, Thematic Discussion on Nuclear Weapons, October 19, 2015.

[35] "Statement of Australia," at the First Committee of the UN General Assembly, Thematic Discussion on Nuclear Weapons, October 19, 2015.

[36] Tim Wright, "Towards a Treaty Banning Nuclear Weapons: A Guide to Government Position on a Nuclear Weapons Convention," International Campaign to Abolish Nuclear Weapons, January 2012; "National Positions on a Ban," International Campaign to Abolish Nuclear Weapons, http://www.icanw.org/why-a-ban/positions/.

Switzerland and the UAE) in favor of a treaty banning nuclear weapons.[37]

It is difficult to predict how debates over a legal prohibition of nuclear weapons will continue. It would be safe to say that NWS are highly unlikely to accept any concrete negotiation on a legal prohibition of nuclear weapons, including a NWC, for at least the foreseeable future. Such attitudes will likely have the NAC and NAM increase their frustration over the demise of nuclear disarmament, and step up their efforts aiming to conclude a legal prohibition of nuclear weapons despite NWS's opposition. However, there seem to be divergent views among countries belonging to NAC and NAM in terms of what sort of measures and how to promote a legal prohibition. Furthermore, without accession of the nuclear-weapon/armed states, the effectiveness of an agreed legal prohibition promoted by NNWS would not be expected. Further discussion is needed regarding how and to what extent the international community should address the issues on a legal prohibition of nuclear weapons.

C) Announcement of significant policies and important activities

After the 2010 NPT RevCon, a number of conferences have been convened for the purpose of promoting nuclear disarmament. These included: the Open-Ended Working Group (OEWG) on Nuclear Disarmament in 2013; the High-level Meeting on Nuclear Disarmament in September 2013; and the International Conferences on the Humanitarian Impact of Nuclear Weapons in 2013 and 2014. It is also imperative to note that the Marshall Islands filed applications in 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.[38] At a ministerial level, Japan's Foreign Minister Fumio Kishida proactively proposed concrete measures for promoting nuclear disarmament and non-proliferation through his speeches and op-eds.

The 2015 NPT RevCon was convened in a confrontational situation, with a widening gap between the NWS and many NNWS regarding aspirations for nuclear disarmament. The Conference could not adopt a final document due to opposition by the United States, Canada and the United Kingdom to language in the final draft document about an international conference on a Middle East Weapons of Mass Destruction (WMD) Free Zone. It is not clear, however, whether agreement on that language would have allowed for agreement on the overall document. Several NNWS, particularly in the NAM and NAC, were unsatisfied that a number of their active proposals on nuclear disarmament were written in a weakened manner or were not included in the final draft. Austria, on behalf of 48 countries including Brazil, Chile, Egypt, Indonesia, Mexico, Nigeria, the Philippines, Saudi Arabia and South Africa, made a closing statement, in which it expressed frustration unequivocally by stating that "[t]he exchanges of views that we have witnessed during this review cycle demonstrate that there is a wide divide that presents itself in many fundamental aspects of what nuclear disarmament should mean.

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[37] "Support for a Ban," International Campaign to Abolish Nuclear Weapons, http://www.icanw.org/why-a-ban/positions/.

[38] The Marshall Islands also filed a U.S. federal lawsuit against the United States. In February 2015, U.S. Federal Court judge dismissed the motion, however. Josh Butler, "Marshall Islands Nuclear Proliferation Case Thrown Out of U.S. Court," *Inter Press Service*, February 12, 2015, http://www.ipsnews.net/2015/02/marshall-islands-nuclear-proliferation-case-thrown-out-of-u-s-court/.

There is a reality gap, a credibility gap, a confidence gap and a moral gap."[39]

Since no action plans on nuclear disarmament for the next five years could be agreed in the 2015 NPT RevCon, due to a failure of adopting a final document, some countries have explored how to set some direction as well as concrete measures to promote nuclear disarmament for the next NPT review process. One of the most notable events in 2016 will be an Open-Ended Working Group (OEWG) on nuclear disarmament. The 2015 UNGA adopted a resolution led by Mexico, 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."[40] The voting behavior of countries surveyed in this project on this resolution is presented below.

- Proposing: Australia, Brazil, Chile, Mexico, Nigeria, Norway, the Philippines, South Africa and others
- 138 in favor, 12 Against (China, France, Israel, Poland, Russia, the U.K., the U.S. and others), 34 Abstentions (Australia, Belgium, Canada, India, Japan, South Korea, the Netherlands, Norway, Pakistan, Syria, Turkey and others)

In this resolution, it was decided for the OEWG to convene in Geneva in 2016 "as a subsidiary body of the General Assembly and under its rules of procedure." That is, any decision in the OEWG is to be by majority vote, not by consensus. Such a decision-making approach reflected the criticism by some NNWS, which consider a consensus-rule—providing a de facto veto power to NWS—as one of the major factors that a negotiation on a treaty banning nuclear weapons has not been able to commence in the Conference on Disarmament (CD).

On the other hand, five NWS explained the reason for opposing the resolution stating that while "[p]roductive results can only be ensured through a consensus-based approach…, [it] lacks all those vital components that would guarantee both a meaningful collaboration and a productive outcome as a result of concerted collective effort."[41] At the 2015 NPT RevCon, NWS did not reject the convening of a consensus-based OEWG being written in the final draft of a final document. In addition, the United States reiterated before the UNGA that it would accept a proposal on convening a conference with a consensus rule.[42] As of December 2015, there was no information as to whether countries which did not favor the resolution will participate in the OEWG.[43] NWS argued, "we remain open to other channels

[39] "Statement by Austria," at the 2015 NPT Review Conference, Closing statements, May 22, 2015.

[40] A/RES/70/33, December 7, 2015. According to the original draft resolution (A/C.1/70/L.13, October 20, 2015), they proposed "to establish an open-ended working group to negotiate with a view to reaching agreement on concrete and effective legal measures to achieve nuclear disarmament, in particular new legal provisions and norms to attain and maintain a world without nuclear weapons." Besides that resolution, Iran also submitted a different draft resolution (A/C.1/70/L.28/Rev.1, October 28, 2015) proposing to establish an OEWG, which was similar to one that had been included in a draft final document of the 2015 NPT RevCon, in terms of conducting an OEWG's work on the basis of consensus. Later, Iran withdrew its draft resolution.

[41] "Explanation vote of the NWS," at the First Committee of the UN General Assembly, November 2, 2015.

[42] Friedt, "A Full Spectrum Approach to Achieving the Peace and Security of a World without Nuclear Weapons"; Kingston Reif, "Next Steps on Disarmament Uncertain," *Arms Control Today*, Vol. 45, No. 7 (September 2015), p. 34.

[43] In January 2016, it was reported that Japan, which abstained from the vote, decided to participate in the OEWG.

of discussion, not excluding an appropriately-mandated OEWG, provided that they are conducive to a constructive dialogue. Productive results can only be ensured through a consensus-based approach."[44] As mentioned above, the OEWG will not adopt a consensus-based decision-making. However, the resolution also mentioned that participating countries would be required "to make their best endeavors to reach general agreement." Without participation of countries including NWS giving a significant influence over a trend of nuclear disarmament, discussion made in the OEWG would not likely lead to concrete progress toward a world without nuclear weapons. Furthermore, NWS absence may lead to increased NNWS frustration and criticism, which could make the arguments of the latter countries on nuclear disarmament much more radical.

D) Humanitarian consequences of nuclear weapons

Since the joint statement delivered by 16 countries at the NPT PrepCom in 2012, debates on humanitarian consequences of nuclear weapons have received remarkable attention from the international community.

The International Conferences on the Humanitarian Impact of Nuclear Weapons were held in Oslo in March 2013 with 128 countries, in Nayarit in February 2014 with 146 countries, and Vienna in December 2014 with 158 countries. Among the nuclear-weapon/armed states, India and Pakistan joined all three Conferences; and the United Kingdom and the United States attended the third one.

At the NPT PrepCom/RevCon as well as the UNGA, two different joint statements on the humanitarian impact of nuclear weapons have been issued since 2012: one was joined by more than 100 countries; another one was prepared mainly by the western NNWS, many of which concur on the principle regarding the humanitarian consequences of nuclear weapons but could not join in the first one due to their security policies.

At the 2015 RevCon, Austria, on behalf of 159 participating countries, presented again the "Joint Statement on the Humanitarian Consequences of Nuclear Weapons,"[45] in which they reiterated the following arguments used in previous statements:

- Past experience from the use and testing of nuclear weapons has amply demonstrated the unacceptable humanitarian consequences caused by the immense, uncontrollable destructive capability and indiscriminate nature of these weapons.
- A key message from experts and international organisations [participating in the Conferences on the Humanitarian Impact of Nuclear Weapons] was that no State or international body could address the immediate humanitarian emergency caused by a nuclear weapon detonation or provide adequate assistance to victims.
- We firmly believe that it is in the interests of all States to engage in discussions on the

[44] "Explanation of national vote of the NWS," at the First Committee of the UN General Assembly, November 2, 2015.

[45] "Joint Statement on the Humanitarian Consequences of Nuclear Weapons," delivered by Austria, 2015 NPT Review Conference, April 28, 2015. Participating countries include Austria, Brazil, Chile, Egypt, Indonesia, Iran, Japan, Kazakhstan, Mexico, New Zealand, Nigeria, Norway, the Philippines, Saudi Arabia, South Africa, Sweden, Switzerland and UAE.

humanitarian consequences of nuclear weapons, which aim to further broaden and deepen understanding of this matter, and we welcome civil society's ongoing engagement.

- We firmly believe that it is in the interests of all States to engage in discussions on the humanitarian consequences of nuclear weapons, which aim to further broaden and deepen understanding of this matter, and we welcome civil society's ongoing engagement.
- It is in the interest of the very survival of humanity that nuclear weapons are never used again, under any circumstances. The catastrophic effects of a nuclear weapon detonation, whether by accident, miscalculation or design, cannot be adequately addressed. All efforts must be exerted to eliminate the threat of these weapons of mass destruction.
- The only way to guarantee that nuclear weapons will never be used again is through their total elimination. All States share the responsibility to prevent the use of nuclear weapons, to prevent their vertical and horizontal proliferation and to achieve nuclear disarmament, including through fulfilling the objectives of the NPT and achieving its universality.

Besides the above joint statements, Austria also presented the "Humanitarian Pledge,"[46] to which 107 countries expressed their support by the end of the 2015 RevCon. Differing from the above joint statement, the "Humanitarian Pledge" called for a legal prohibition of nuclear weapons, saying: "Austria calls on all states parties to the NPT to renew their commitment to the urgent and full implementation of existing obligations under Article VI, and to this end, to identify and pursue effective measures to fill the legal gap for the prohibition and elimination of nuclear weapons and Austria pledges to cooperate with all stakeholders to achieve this goal."

On the other hand, Australia, on behalf of 26 countries, issued the "Joint Statement on the Humanitarian Consequences of Nuclear Weapons,"[47] in which participating countries argued for the necessity of taking concrete measures for nuclear disarmament, together with recognizing the importance of the humanitarian dimensions of nuclear weapons, as follows:

- It is in the interests of the very survival of humanity that nuclear war must never occur.
- [E]liminating nuclear weapons is only possible through substantive and constructive engagement with those states which possess nuclear weapons.
- To create the conditions that would facilitate further major reductions in nuclear arsenals and eventually eliminate them requires the global community to cooperate to address the important security and humanitarian dimensions of nuclear weapons.
- [W]e have to accept that the hard practical work necessary to bring us closer to a world free of nuclear weapons must still be done. …There are no short cuts.

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[46] The "Humanitarian Pledge" was attached to a working paper submitted to the 2015 NPT RevCon (NPT/CONF.2015/WP.29, April 21, 2015). The list of countries endorsing and/or supporting the "Humanitarian Pledge" is posted on the homepage of Austrian Foreign Ministry (http://www.bmeia.gv.at/fileadmin/user_upload/Zentrale/Aussenpolitik/Abruestung/HINW14/HINW14vienna_update_pledge_support.pdf), which include 120 countries, as of November 2015, such as Austria, Brazil, Chile, Egypt, Indonesia, Iran, Kazakhstan, Mexico, Nigeria, the Philippines, Saudi Arabia and UAE.

[47] "Statement on the Humanitarian Consequences of Nuclear Weapons," delivered by Australia, 2015 NPT Review Conference, April 30, 2015. Participating countries include Australia, Belgium, Canada, Germany, Japan, the Netherlands, Poland, Turkey and so on.

At the 2015 UNGA, Austria and other co-sponsors for the first time proposed a resolution titled "Humanitarian consequences of nuclear weapons," which stipulates, *inter alia*:[48]

- Stress[ing] that it is in the interest of the very survival of humanity that nuclear weapons are never used again, under any circumstances;
- Emphasiz[ing] that the only way to guarantee that nuclear weapons will never be used again is their total elimination;
- Stress[ing] that the catastrophic effects of a nuclear weapon detonation, whether by accident, miscalculation or design, cannot be adequately addressed;
- Express[ing] its firm belief that awareness of the catastrophic consequences of nuclear weapons must underpin all approaches and efforts towards nuclear disarmament;
- Call[ing] upon all States, in their shared responsibility, to prevent the use of nuclear weapons, to prevent their vertical and horizontal proliferation and to achieve nuclear disarmament; and
- Urge[ing] States to exert all efforts to totally eliminate the threat of these weapons of mass destruction.

The voting behavior of countries surveyed in this project on this resolution is presented below.

- Proposing: Australia, Chile, Egypt, Indonesia, Kazakhstan, Mexico, New Zealand, Nigeria, the Philippines, South Africa, Sweden, Switzerland, UAE and others
- 138 in favor, 18 Against (France, Israel, South Korea, Poland, Russia, Turkey, the U.K., the U.S. and others), 22 Abstentions (Australia, Belgium, Canada, China, Germany, the Netherlands, Norway, Pakistan and others)

In addition, based on the "Humanitarian Pledge," Austria proposed the resolution titled "Humanitarian pledge for the prohibition and elimination of nuclear weapons."[49] Main points of the resolution are:

- Stress[ing] the importance of having fact-based discussions and presenting findings and compelling evidence on the humanitarian impact of nuclear weapons in all relevant forums and within the United Nations framework, as they should be at the centre of all deliberations and the implementation of obligations and commitments with regard to nuclear disarmament;
- Appeal[ing] to all States to follow the imperative of human security for all and to promote the protection of civilians against risks stemming from nuclear weapons;
- Urge[ing] all States parties to the Treaty on the Non-Proliferation of Nuclear Weapons to renew their commitment to the urgent and full implementation of their existing obligations under article VI, and calls upon all States to identify and pursue effective measures to fill the legal gap for the prohibition and elimination of nuclear weapons and to cooperate with all stakeholders to achieve this goal;
- Request[ing] all States possessing nuclear weapons, pending the total elimination of their nuclear weapon arsenals, to take concrete interim measures to reduce the risk of nuclear weapon detonations, including reducing the operational status of nuclear weapons and

[48] A/RES/70/47, December 7, 2015.

[49] A/RES/70/48, December 7, 2015.

moving nuclear weapons away from deployment and into storage, diminishing the role of nuclear weapons in military doctrines and rapidly reducing of all types of nuclear weapons; and

- Call[ing] upon all relevant stakeholders, States, international organizations, the International Red Cross and Red Crescent Movement, parliamentarians and civil society to cooperate in efforts to stigmatize, prohibit and eliminate nuclear weapons in the light of their unacceptable humanitarian consequences and associated risks.

The voting behavior of countries surveyed in this project on this resolution is presented below.

- Proposing: Austria, Chile, Indonesia, Kazakhstan, Mexico, Nigeria, the Philippines, South Africa and others
- 139 in favor, 29 Against (Australia, Belgium, Canada, France, Germany, Israel, South Korea, the Netherlands, Poland, Russia, Turkey, the U.K., the U.S. and others), 17 Abstentions (China, India, Japan, North Korea, Norway, Pakistan and others)

Furthermore, the voting behavior of the resolution titled "Ethical imperatives for a nuclear-weapon-free world"[50] led by South Africa is:

- Proposing: Austria, Iran, Mexico, Nigeria, the Philippines, South Africa and others
- 132 in favor, 36 Against (Australia, Belgium, Canada, France, Germany, Israel, South Korea, the Netherlands, Norway, Poland, Russia, Turkey, the U.K., the U.S. and others), 16 Abstentions (China, India, Japan, North Korea, Pakistan, Sweden, Switzerland and others)

At the UNGA, on behalf of the western NNWS (including Belgium, Canada, Germany, Japan, South Korea and Poland), Australia again issued the joint statement on the humanitarian consequences of nuclear weapons,[51] in which they argued, based on the previous statement delivered at the 2015 NPT RevCon, as following:

- Nuclear Weapon States must make efforts to achieve further cuts in their nuclear arsenals as soon as possible, de-alert nuclear warheads and reduce the role and significance of nuclear weapons in their defence doctrines. They should also commit to cease production of any new nuclear weapons.
- While a treaty banning nuclear weapons is probably necessary to maintain a world without nuclear weapons, such a treaty now will not get us to global zero. We have to accept that the hard practical work necessary to bring us closer to a world free of nuclear weapons must still be done, including a focus on not just humanitarian but also security considerations. There are no short cuts.
- We stand ready to work with others to build upon the momentum created by the conferences on the humanitarian consequences, be it in the format of an OEWG or otherwise, to discuss next steps. We need to be realistic and inclusive as we undertake this task, including maintaining an open mind, without prior assumptions about outcomes. Above all, we should aim to promote areas of agreement in relation to the humanitarian consequences discourse,

[50] A/RES/70/50, December 7, 2015.

[51] "Statement on Nuclear Weapons," delivered by Australia, UN General Assembly, First Committee, October 21, 2015.

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	○	×	×	×	×	△	×	△	×	△	×	○
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	×	○	○	×	○	○	△	○	△	○	×	△
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	○	×	○	×	○	○	△	×	○	×	○	○
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]

> rather than accentuate the differences, as it is only through finding a common way forward that we can reach our shared goal of a world without nuclear weapons.

As noted in the previous *Hiroshima Reports*, NWS cautiously monitored the debates regarding the humanitarian consequences of nuclear weapons. On the one hand, NWS have shown some understanding over the debates on the humanitarian dimensions of nuclear weapons. In their joint statement delivered at the NPT RevCon, NWS stated: "We are ever cognizant of the severe consequences that would accompany the use of nuclear weapons. We affirm our resolve to prevent such an occurrence from happening."[52] In particular, the United States, along with the United Kingdom, attended the Third Conference on the Humanitarian Impact on Nuclear Weapons, and has occasionally reiterated that Washington seriously regards the humanitarian dimensions of nuclear weapons.[53]

At the same time, however, the attitudes of NWS on this issue in 2015 remained very cautious, and by and large critical. In the joint statement issued by the NWS as the conclusion of the NWS (P5) Conference in April 2012 in London, for instance, they used the term "severe," instead of "humanitarian," consequences, implying that they maintain a careful distance from this issue. NWS have increased their concerns that the debates on the humanitarian dimensions of nuclear weapons would bring harsh condemnation vis-à-vis NWS's reluctance over nuclear disarmament, and embolden NNWS to intensify their efforts toward a legal prohibition of nuclear weapons. Therefore, at the 2015 NPT RevCon, NWS repeatedly argued that the "humanitarian consequences on nuclear weapons" should not be overly emphasized in a possible final document.

In the final draft of a final document of the 2015 RevCon, the chairperson proposed to describe as following:

> The Conference emphasizes that deep concerns pertaining to the catastrophic humanitarian consequences of any use of nuclear weapons are a key factor that should continue to underpin efforts in the field of nuclear disarmament and that awareness of these consequences should lend urgency to efforts by all States leading to a world without nuclear weapons. The Conference affirms that, pending the realization of this objective, it is in the interest of humanity and the security of all peoples that nuclear weapons never be used again.[54]

While NWS and the western NNWS argued to take into consideration the dimension of national security, it was human security that was mentioned in the final draft.

During the four-week discussion in the NPT RevCon, it became more visible that the rift between NWS and NNWS over the humanitarian dimensions of nuclear weapons has been deepening. One concern is that such a rift would bring a negative spiral—that is, NNWS making proactive, or radical to some

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[52] "Statement by the People's Republic of China, France, the Russian Federation, the United Kingdom of Great Britain and Northern Ireland, and the United States of America to the 2015 Treaty on the Non-Proliferation of Nuclear Weapons Review Conference," April 30, 2015.

[53] Regarding the U.S. view expressed before the 2015 NPT RevCon, see, for example, U.S. Department of States, "Myths and Facts Regarding the Nuclear Non-Proliferation Treaty and Regime," April 14, 2015, http://www.state.gov/t/isn/rls/fs/2015/240650.htm.

[54] NPT/CONF.2015/R.3, May 21, 2015.

extent, proposals aiming to achieve progress on nuclear disarmament; NWS reacting sharply against such proposals and refusing to accept them; leading to a more radicalized NNWS approach in response to NWS passive attitudes. Debates at the 2015 UNGA seem to indicate that such a situation has become apparent. While opposition by NWS (except China, which abstained) against three UNGA resolutions regarding the humanitarian consequences on nuclear weapons was expected beforehand,[55] it was a surprise that France, the United Kingdom and the United States abstained from the UNGA resolution on nuclear disarmament led by Japan in 2015, due to text descriptions regarding the humanitarian dimensions of nuclear weapons, as mentioned above. Nuclear-armed states also seemed to keep a distance from the NNWS which advocate the humanitarian issues. India stated, "It has been our consistent position that the process should be inclusive and do no harm to the disarmament machinery and in terms of substance promote genuine progress towards the goal of nuclear disarmament. Current indications are that on both counts the results are far less than expected and it is a matter of regret that some of the proposals tabled this year in this Committee have deepened differences instead of bridging them."[56] Pakistan also argued that the subject of nuclear weapons, "while relevant and important, cannot exclusively be reduced to the paradigm of humanitarian dimension."[57]

Besides, debates over the humanitarian dimensions of nuclear weapons through 2015 revealed a difference of opinions and stances among NNWS. For instance, many western NNWS allying with the United States opposed, or at least abstained on, three resolutions on the humanitarian consequences of nuclear weapons. Germany, on behalf of 27 countries including Australia, Belgium, Canada, Germany, South Korea, Poland and Turkey, explained their voting behavior as follows: "security and humanitarian principles co-exist. Realistic progress can only be achieved if both are given due consideration. This is clearly not the case with the present draft resolutions as they do not take into consideration the distinct security situation of various states."[58] After the First Committee of the UNGA, Japan also explained that while it did not oppose those resolutions, Japan's position was to promote nuclear disarmament in cooperation with both NWS and NNWS.[59] During the debates in the First Committee, Canada, for example, argued that "progress on nuclear disarmament requires that both the humanitarian and strategic dimensions of nuclear weapons be taken into account."[60] Furthermore,

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[55] Regarding voting behaviors to three resolutions on the humanitarian dimensions of nuclear weapons, France, the United Kingdom and the United States said, "Many have argued that devastating humanitarian consequences could result from the use of nuclear weapons. We agree. But neither the consequences nor the concerns are new… We believe a ban on nuclear weapons risks undermining the NPT, creating a far less certain world of the sort we inhabited before the NPT's entry into force and near universality, when many regions were faced with the prospect of nuclear proliferation, and uncertainty and mistrust impeded access to the peaceful uses of nuclear energy." France and Russia have stated more cautiously vis-à-vis arguments of the humanitarian dimensions of nuclear weapons.

[56] "Statement by India," at the First Committee of the UN General Assembly, Thematic Discussion on Nuclear Weapons, October 20, 2015.

[57] "Statement by Pakistan," at the First Committee of the UN General Assembly, Thematic Discussion on Nuclear Weapons, October 20, 2015.

[58] "Explanation of Vote on the 3 Humanitarian Impact of Nuclear Weapons Resolutions, Delivered by Germany on Behalf of 27 Delegations," at the First Committee of the UN General Assembly, November 2, 2015.

[59] "Adopting the Resolution on Elimination of Nuclear Weapons," *The Mainichi*, November 4, 2015, http://mainichi.jp/articles/20151104/ddn/002/030/017000c. (in Japanese)

[60] "Statement by Canada," at the First Committee of the UN General Assembly, Thematic Discussion on Nuclear Weapons, October 20, 2015.

Norway, which hosted the First Conference on the Humanitarian Impact of Nuclear Weapons in 2013, criticized in the following terms:[61]

> Unfortunately, the emerging common understanding of a fact-based humanitarian initiative has now been undermined, and the initiative is by many associated with efforts to achieve a legal instrument banning nuclear weapons. Under the current political circumstances, these efforts will not bring us closer to a world free of nuclear weapons.
>
> Norway is not able to support resolutions that we and our [North Atlantic Treaty Organization (NATO)] allies see as parts of a package resulting in a further polarization of the international community and aiming at a process leading to a legal ban of nuclear weapons.

Debates on humanitarian dimensions of nuclear weapons have received considerable attention since the NPT RevCon in 2010. On the one hand, through advocating this issue, NNWS have expressed their objections to a continuous stalemate in nuclear disarmament, and sought to initiate a discussion aiming to construct a legal prohibition of nuclear weapons. On the other hand, it has also made it clearer that, as mentioned above, the gap over this issues between NWS and NNWS is deepening, and with differences of opinion and stance between the western and other NNWS. As stated by the Non-Proliferation and Disarmament Initiative (NPDI) members in their joint statement upon the NPDI Ministerial Meeting in Hiroshima in April 2014, "[t]he ongoing discussion on the humanitarian impact of nuclear weapons should be inclusive and universal as well as a catalyst for a united global action towards the goal of a world free of nuclear weapons,"[62] instead of being a focus of confrontation. Still, few clues have been found so far.

(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). Besides, the United States also declared the number of each type of its strategic delivery vehicles.

According to the data on their strategic nuclear arsenals as of September 2015, the number of U.S. deployed strategic (nuclear) warheads became below the treaty's limit of 1,550 for the first time since the New START entered into force. In April 2014, the United States issued a plan of the composition and numbers of its deployed and deployed/non-deployed strategic delivery vehicles it intends to possess on the day it completes the implementation of its obligations under the New START. In June

[61] "Statement by Norway," at the First Committee of the UN General Assembly, Thematic Discussion on Nuclear Weapons, February 2, 2015. In addition, Norway did not mention the issues on the humanitarian dimensions of nuclear weapons in its speech at the First Committee of the UNGA in 2015.

[62] "Non-Proliferation and Disarmament Initiative 8th Ministerial Meeting," Hiroshima, April 12, 2014, http://www.mofa.go.jp/mofaj/files/000035199.pdf.

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

＜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

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, http://www.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, http://www.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, http://www.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, http://www.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, http://www.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, http://www.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, http://www.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, http://www.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, http://www.state.gov/t/avc/rls/247674.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

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

<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

Sources) U.S. Department of State, “New START Treaty Aggregate Numbers of Strategic Offensive Arms,” Fact Sheet, November 30, 2012, http://www.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://www.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://www.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://www.state.gov/t/avc/rls/228652.htm.

2014, it finished de-MIRVing all of its land-based Minuteman ICBM, while the Treaty does not prohibit or restrict possession of MIRVed ballistic missiles.

Russia, by contrast, has increased its deployed strategic (nuclear) warheads and launchers, although these activities do not constitute a violation against the New START.[63] In addition, some Russian officials have mentioned that the U.S. confrontational attitudes could make Russia review its approach to the New START in the future, due to the deteriorating U.S.-Russian relations, particularly after Russia's annexation of Crimea in March 2014, as well as intervention in Ukraine's turmoil.[64] However, there was no indication at least in 2015 that Russia seriously contemplated withdrawing from the Treaty.

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

After the conclusion of the New START, 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 territories of the owners of such weapons,[65] the United States has maintained its policy of reciprocal reduction of non-strategic nuclear weapons with Russia.

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. In the Report issued by the U.S. Department of State in July 2015, titled "Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments," the United States added two more points regarding the Russian non-compliance:[66]

- Paragraph 7 of Article VII provides that if a launcher has been tested for launching a [ground-launched cruse missile (GLCM)], all launchers of that type shall be considered to be launchers of that type of GLCM; and
- Paragraph 8 of Article VII of the INF Treaty provides that if a launcher has contained or launched a particular type of GLCM, all launchers of that type shall be considered to be launchers of that type of GLCM.

While the United States has yet to reveal what concrete actions by Russia are considered to constitute violations of the INF Treaty, one of them seems to be an allegation that since 2008 Russia has repeated

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[63] 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/.

[64] "Russia Could Revise Key Nuclear Arms Treaty over Growing US Antagonism – Official," *RT*, January 14, 2015, http://rt.com/politics/222463-russia-nuclear-start-treaty/.

[65] "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.

[66] U.S. Department of State, "Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments," June 2015, p. 10. See also the *Hiroshima Report 2015*.

test flights of R-500 (Iskander-K) GLCMs with a range of approximately 2,000km.[67] In September 2015, Russia reportedly flight-tested a GLCM called SSC-X-8 with flying less than 500km, but the range of the missile, which is nuclear-capable, is assessed between 500-5,500km.[68]

During the general debate at the 2015 NPT RevCon, U.S. State Secretary John Kerry stated: "I want to emphasize our deep concerns regarding Russia's clear violation of its obligations under the Intermediate-Range Nuclear Forces Treaty. We are urging Russia to return to compliance."[69] Russian Head of the Delegation Mikhail I. Uliyanov criticized that "the American side [had] once again groundlessly accused [Russia] in violating the INF Treaty," and that it was the United States that has violated the INF Treaty.[70]

Other Nuclear-Weapon/Armed States

Among nuclear-weapon/armed states except Russia and the United States, France and the United Kingdom have reduced their nuclear weapons unilaterally. The United Kingdom, which previously announced 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 in 2010, and the total number of operationally available warheads has therefore been reduced to 120.[71]

Among five NWS, China has neither declared any concrete information on the number of deployed or possessed nuclear weapons, nor its 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."[72] Main 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. It 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."[73] Still, China has yet to clarify a condition under which it would participate in such a framework.

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[67] Hans M. Kristensen, "Russia Declared in Violation of INF Treaty: New Cruise Missile May Be Deploying," Federation of American Scientists, July 30, 2014, http://fas.org/blogs/security/2014/07/russia-inf/; Michael R. Gordon, "U.S. Says Russia Tested Missile, Despite Treaty," *New York Times*, January 29, 2014, http://www.nytimes.com/2014/01/30/world/europe/us-says-russia-tested-missile-despite-treaty.html; Paul N. Schwartz, "Russian INF Treaty Violations: Assessment and Response," Center for Strategic and International Studies, October 16, 2014, http://csis.org/publication/russian-inf-treaty-violations-assessment-and- response.

[68] Bill Gertz, "Russia Again Flight Tests Illegal INF Cruise Missile," *Washington Free Beacon*, September 28, 2015, http://freebeacon.com/national-security/russia-again-flight-tests-illegal-inf-cruise-missile/.

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

[70] "Statement by Russia," at the 2015 NPT Review Conference, General Debate, April 27, 2015.

[71] "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.

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

[73] Ibid.

As for India, Pakistan, Israel and North Korea, no information, statement or analysis mentioning reduction of their nuclear weapons (capabilities) is available. As noted below, most of them are expanding their nuclear programs.

B) A concrete plan for further reduction of nuclear weapons

In 2015, there was no new proposal 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 the U.S. deployed strategic nuclear weapons of up to one-third of the level established in the New START.[74] At the 2015 NPT RevCon, U.S. Secretary of State Kerry said, "That offer remains on the table, and we urge the Russians to take us up on it."[75] However, Russia condemned the United States that "it [was] the US policy that hinders further nuclear reductions… through unilateral build-up of the global missile defense system, gradual advancement towards implementing the 'prompt global strike' concept, attempt to stop in the tracks the negotiations on banning the placement of weapons in outer space, and lack of progress in ratifying the CTBT at the national level."[76]

Russia has recently stated that other nuclear-weapon/armed states (except Russia and the United States) should participate in any future nuclear weapons reductions, including globalization of the INF Treaty.[77] 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.[78] None of the nuclear-armed states have indicated any concrete program for reducing its 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. In the final draft of a final document of the 2015 NPT RevCon, NWS were encouraged "to engage over the course of the next review cycle, with a view to achieving rapid reductions in the global stockpile of nuclear weapons." However, a sentence stating a request for cessation of any modernization of nuclear forces was deleted from earlier versions of the draft final document, due to opposition by NWS.

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[74] "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.

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

[76] Mikhail I. Uliyanov, "Statement," at the 2015 NPT Review Conference, General Debate, April 27, 2015.

[77] "Statement by Russia," at the Third Session of the Preparatory Committee for the 2015 NPT Review Conference, Cluster 1, New York, April 30, 2014.

[78] As mentioned above, the United Kingdom has been considered to dismantle approximately three nuclear warheads per year as a unilateral measure.

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.[79]

China

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

In its Annual Report on the Chinese Military in 2015, the U.S. Defense Department reported that China has MIRVed some of its DF-5As ICBM.[80] One estimate is that half of 20 DF-5As were MIRVed.[81] According to another analysis, one MIRVed DF-5 is capable to mount three or four nuclear warheads, with China having already sought to acquire basic technologies for MIRVing in the latter half of 1990s.[82] China was also reported to have conducted the fourth flight test of the DF-41 mobile ICBM in August 2015, that lofted two independently-targeted simulated nuclear warheads.[83] In December 2015, China was observed to conduct a test that involved a "cold launch" of a rail-mobile version of the DF-41 from a canister with a gas charge without the engine of the missile being ignited.[84] As for intermediate-range ballistic missiles (IRBMs), in the military parade in September 2015, China revealed the DF-26 for the first time, which had been considered to be in service for several years.[85] The DF-26s are reportedly capable of reaching Guam, and also of using as anti-ship ballistic missiles (ASBMs).

As for the sea leg of China's nuclear deterrent, the U.S. Defense Department has repeated that China would have been likely to conduct its first nuclear deterrence patrol by the JIN-class SSBN (Type 094) armed with JL-2 SLBMs for several years.[86] In September 2015, the U.S. Department of Defense

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[79] According to an analysis in 2014 by Hans M. Kristensen, nuclear-weapon/armed states conducted nuclear modernization programs for at least 27 ballistic missiles, nine cruise missiles, eight naval vessels, five bombers, eight warheads, and eight weapons factories. Hans M. Kristensen, "Nuclear Weapons Modernization: A Threat to the NPT?" *Arms Control Today*, Vol. 44, No. 4 (May 2014), pp. 8-15; Hans M. Kristensen and Robert S. Norris, "Slowing Nuclear Weapon Reductions and Endless Nuclear Weapon Modernizations: A Challenge to the NPT," *Bulletin of the Atomic Scientists*, Vol. 70, No. 4 (July/August 2014), pp. 94-107. See also, Hans M. Kristensen, "Worldwide Nuclear Weapon Modernization Programs," Presentation to Side Event on Nuclear Weapon Modernizations Organized by Alliance for Nuclear Accountability Nuclear Non-Proliferation Treaty Review Conference, United Nations, New York, April 28, 2015.

[80] U.S. Defense Department, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015," April 2015, p. 8.

[81] Hans M. Kristensen and Robert S. Norris, "Chinese Nuclear Forces, 2015," *Bulletin of the Atomic Scientists*, Vol. 71, No. 4 (2015), p. 79.

[82] Jeffrey Lewis, "Great, Now China's Got Multiple Nuclear Warhead Missiles?" *Foreign Policy*, May 26, 2015, http://foreignpolicy.com/2015/05/26/china-new-multiple-nuclear-warhead-missiles-arms-race-deterrence/.

[83] Bill Gertz, "China Just Tested a New Intercontinental Missile That Can Fire Multiple Nuclear Warheads at Once," *Business Insider*, August 18, 2015, http://www.businessinsider.com/china-conducted-two-long-range-missile-tests-2015-8#ixzz3jGa0ACCN.

[84] Richard D Fisher Jr, "China Developing New Rail-Mobile ICBM, Say US Officials," *HIS Jane's 360*, December 23, 2015, http://www.janes.com/article/56860/china-developing-new-rail-mobile-icbm-say-us-officials.

[85] "Strategic Weapons: China Produces a Guam Killer," *Strategy Page*, September 8, 2014, http://www. strategypage.com/htmw/hticbm/20140908.aspx.

[86] U.S. Defense Department, "Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2015," April 2015, p. 32.

predicted again that the first patrol would be conducted by the end of 2015.[87] It has been estimated that China would deploy about four JIN-class SSBNs. However, Admiral Samuel J. Locklear, Commander of the U.S. Pacific Command, testified before the U.S. Senate Armed Services Committee in April 2015 that "China now has three operational JIN-class [SSBNs], and up to five more may enter service by the end of the decade."[88]

France

France 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.[89]

In his speech on nuclear policies in February 2015, President François Hollande announced that: 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; 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.[90]

Russia

Russia has reiterated its policies on active development and deployment of new types of strategic delivery vehicles for replacing its aging ones. In 2015 Russia continued to actively conduct tests and deployment.

In June 2015, Russian President Vladimir Putin announced that Russia would additionally deploy more than 40 new ICBMs that year, which would be "able to overcome even the most technically advanced anti-missile defense systems."[91] It conducted flight-tests of an RS-26 (Rubezh) ICBM in March, and RS-24 (Yars) MIRVed ICBM in October.

Regarding new ICBM developments, Russia's Strategic Missile Forces announced in July 2015 that a

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[87] Anthony Capaccio David Tweed, "U.S. Says Chinese Sub That Can Hit U.S. on Patrol Soon," *Bloomberg*, September 24, 2015, http://www.bloomberg.com/news/articles/2015-09-24/pentagon-says-chinese-sub-that-can-hit-u-s-to-go-on-patrol-soon.

[88] Samuel J. Locklear, "Testimony," before U.S. Senate Armed Services Committee, April 16, 2015.

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

[90] 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.

[91] "Putin Says Russia Beefing Up Nuclear Arsenal, NATO Denounces 'Saber Rattling,'" *Moscow Times*, June 16, 2015, http://www.themoscowtimes.com/arts_n_ideas/news/article/putin-says-russia-is-beefing-up-its-nuclear-arsenal/523747.html.

new heavy ICBM would be tested within the next 18-24 months.[92] In November, it was reported that Russia had made its prototype, would conduct a test in the spring-summer 2016, and planned to put into service by late 2018.[93] A rail-mobile ICBM system, based on Yars, has also been constructed, and is planned for commissioning in 2019-2020.[94]

Russia continues to construct Borei-class SSBMs. The Pacific Fleet received new ships in 2013, with plans to deploy five more over the next decade.[95] It also announced to resume production of the Tu-160 strategic bomber, and plans to purchase no less than fifty airplanes.[96] Furthermore, Russia is co-developing a hypersonic cruise missile with India by 2023.[97]

The most noticeable news regarding Russian development of nuclear forces in 2015 was that in November a Russian television broadcasted a "secret" plan for a long-range, nuclear-armed torpedo called Status-6, with a range of 10,000km. According to the "classified document" broadcast, the Status-6 is designed to "destroy important economic installations of the enemy in coastal areas and cause guaranteed devastating damage to the country's territory by creating wide areas of radioactive contamination, rendering them unusable for military, economic or other activity for a long time."[98] Russia has not confirmed the news about this system.

The United Kingdom

While the debates on replacements of the existing Vanguard-class SSBNs have continued, David Cameron's administration announced in October 2015 that construction of a new class of four SSBN was decided. "National Security Strategy and Strategic Defence and Security Review (SDSR) 2015" published in November also confirmed this decision.[99] The SDSR states: "This will be a 20-year acquisition programme. 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."[100] The U.K. government will explore parliamentary

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[92] Kukil Bora, "Russia to Test New Intercontinental Ballistic Missile within 2 Years, Will Rearm Missile Forces by 2021," *International Business Times*, July 21, 2015, http://www.ibtimes.com/russia-test-new-intercontinental-ballistic-missile-within-2-years-will-rearm-missile-2017611.

[93] "Russia Makes Prototype of New Ballistic Missile, Tests Planned for Spring 2016 — Source," *Tass*, November 17, 2015, http://tass.ru/en/defense/837031.

[94] "Russia's Strategic Missile Forces to Get New Division with Railway-Based Missile System," *Tass*, May 7, 2015, http://tass.ru/en/russia/793389.

[95] Franz-Stefan Gady, "What to Expect from Russia's Pacific Fleet in 2015," *Diplomat*, March 2, 2015, http://thediplomat.com/2015/03/what-to-expect-from-russias-pacific-fleet-in-2015/.

[96] Zachary Keck, "Russia Is Set to Triple Nuclear Supersonic Bomber Force," *National Interest*, May 28, 2015, http://nationalinterest.org/blog/the-buzz/russia-set-triple-nuclear-supersonic-bomber-force-12988.

[97] "Russia to Field Hypersonic Cruise Missile by 2023," *Moscow Times*, February 28, 2015, http://www.themoscowtimes.com/business/article/russia-to-field-hypersonic-cruise-missile-by-2023/516170.html.

[98] "Russia Reveals Giant Nuclear Torpedo in State TV 'Leak,'" *Reuters*, November 12, 2015, http://www.bbc.com/news/world-europe-34797252.

[99] United Kingdom, "National Security Strategy and Strategic Defence and Security Review 2015: A Secure and Prosperous United Kingdom," November 2015, p. 35.

[100] Ibid., p. 36.

approval in 2016 to start building them.[101] Since the estimated budget was up from a projected cost of £25 billion in 2010 and £20 billion in 2006, it is likely that the domestic debates on the decision by the administration will be increasing.[102]

The United States

The U.S. government has also been studying the development of follow-on ICBMs, SLBMs, Long Range Strike-Bombers and Long-Range Stand-off (LRSO) weapons to replace its existing strategic delivery systems that entered service in the Cold War era.[103] Among them, the program of the LRSO, for which the Obama administration requested $1.8 billion over a decade, faces some criticism, arguing a lack of necessity in the U.S. nuclear posture and a possibility of misperception of nuclear attacks by an opponent (if the missile mounts a conventional warhead).[104]

The United States also continues to work on updating its existing nuclear warheads, even though it has committed itself "not to develop new nuclear warheads or pursue new military missions for nuclear weapons."[105] Under the so called "3+2" plan, the United States intends to rebuild the U.S. nuclear arsenal and reduce the number of warhead types from seven to five—three types of strategic ballistic missiles, one type of ALCM, and one type of nuclear gravity bomb.[106] Regarding the B61-12 nuclear gravity bomb,[107] which has been developed and tested for launching production in 2020, the United States conducted the third flight test in October 2015.[108]

The Obama administration requested $8.85 billion for maintaining and rebuilding the U.S. nuclear

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[101] Jon Rosamond, "Ministers: U.K. Royal Navy Guaranteed 4 New Nuclear Ballistic Missile Subs," *USNI News*, October 26, 2015, http://news.usni.org/2015/10/26/ministers-u-k-royal-navy-guaranteed-4-new-nuclear-ballistic-missile-subs.

[102] Ewen MacAskill and Nicholas Watt, "Trident Renewal Costs Rise by £6bn, Defence Review Reveals," *Guardian*, November 23, 2015, http://www.theguardian.com/uk-news/2015/nov/23/trident-nuclear-renewal-costs-rise-by-6bn-defence-review-reveals.

[103] On the U.S. modernization of nuclear weapons capabilities, see, for example, testimonies and debates at the Senate Armed Services Committee, Strategic Forces Subcommittee, United States Senate, April 17, 2013. See also Amy F. Woolf, "Nuclear Modernization in an Age of Austerity," *Arms Control Today*, Vol. 44, No. 2 (March 2014), pp. 20-24.

[104] 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.

[105] "Statement by Thomas Countryman, Assistant Secretary for International Security and Nonproliferation Department of State, United States of America," Second Session of the Preparatory Committee for the 2015 NPT Review Conference, General Debate, Geneva, April 22, 2013.

[106] Tom Z. Collina, "Future of '3+2' Warhead Plan in Doubt," *Arms Control Today*, Vol. 44, No. 4 (May 2014), pp. 34-35; Amy F. Woolf, "Nuclear Modernization in an Age of Austerity," *Arms Control Today*, Vol. 44, No. 2 (March 2014), pp. 20-24.

[107] The United States has planned to consolidate four variations of the existing B61 nuclear gravity bombs into a single version, named B61-12, incorporating technology for improving safety and reliability, and equipping with tail kits for increasing accuracy. The NNSA denies that a new capability or mission will be added for the B61-12, but some argue that the capabilities of the B61-12 will be increased compared to the existing B61 variants. See, for example, Hans M. Kristensen and Robert S. Norris, "The B61 Family of Nuclear Bombs," *Bulletin of the Atomic Scientists*, Vol. 70, No. 4 (July/August 2014), pp. 1-6.

[108] National Nuclear Security Administration, "NNSA, Air Force Complete Successful B61-12 Life Extension Program Development Flight Test at Tonopah Test Range," Press Release, November 16, 2015, http://nnsa.energy.gov/mediaroom/pressreleases/b61-b61-12-lep-life-extension-program-snl-lanl-sandia-national-laboratory.

warheads as its budget in FY 2016, which is an increase of more than eight percent over levels in FY 2015.[109] On the other hand, the U.S. Congressional Budget Office (CBO) estimated that the administration's plans for nuclear forces would cost $348 billion, an average of about $35 billion a year.[110] The budget has been criticized in that the administration does not propose spending cuts for nuclear weapons programs, while its overall defense budget has continued to be reduced.[111]

India

India seems to be energetically pursuing developments toward constructing a strategic nuclear triad, that is, ICBMs, SLBMs and nuclear bombers. In January 2015, the Indian Defense Research and Development Organization (DRDO) successfully conducted the first canister-based trial of the Agni-V road-mobile ICBM,[112] which is planned to be equipped with MIRVs in the future.[113] India also conducted flight tests on the Agni 3 IRBM in April and the Agni-4 IRBM in November.[114] As for the sea-leg of its nuclear forces, in February 2015, India approved plans to build six nuclear-powered submarines, which are expected to enter into service from 2020 to 2030. It also plans to start operation of the SSBN in February 2016 if tests of its sea-launched cruise missile (SLCM) and SLBM are successfully completed.[115]

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 a nuclear-capable SLCM. It inaugurated the fifth Dolphin-class diesel submarine in September 2015, which is capable of launching the SLCM.[116]

Pakistan

Pakistan seems to prioritize development and deployment of nuclear-capable short- and medium-range

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[109] Douglas Birch, "Obama Proposes to Boost Spending for Nuclear Armaments," The Center for Public Integrity, February 3, 2015, http://www.publicintegrity.org/2015/02/03/16686/obama-proposes-boost-spending-nuclear-armaments.

[110] "Projected Costs of U.S. Nuclear Forces, 2015 to 2024," Congressional Budget Office, January 2015, http://www.cbo.gov/publication/49870.

[111] See Stephen Young, "Obama's Trillion Dollar Nuclear Weapons Gamble," *Defense One*, February 1, 2015, http://www.defenseone.com/ideas/2015/02/obamas-trillion-dollar-nuclear-weapons-gamble/104217/?oref=d-mostread; Adam Mount, "The Fiscal Threat to Nuclear Strategy," *Bulletin of Atomic Scientists*, March 6, 2015, http://thebulletin.org/fiscal-threat-nuclear-strategy8080.

[112] "India Conducts First Canister-Based Trial of Agni-V Ballistic Missile," *Strategic Defence Intelligence*, February 1, 2015, http://www.strategicdefenceintelligence.com/article/BEUIQAQbHWo/2015/02/02/india_conducts_first_canister-based_trial_of_agni-v_ballisti/.

[113] Zachary Keck, "Destination Beijing: India to Test 'China-Killer' Nuke Missile," *National Interest*, January 30, 2015, http://nationalinterest.org/blog/thebuzz/designationbeijingindiatestchinakillernukemissile12156.

[114] "India Successfully Test Fires Nuclear-Capable Agni III Ballistic Missile," *Indian Express*, April 16, 2015, http://indianexpress.com/article/india/india-successfully-test-fires-nuclear-capable-agni-iii-ballistic-missile/.

[115] Franz-Stefan Gady, "India's Deadliest Sub to Test-Fire Missiles," *Diplomacy*, October 15, 2015, http://thediplomat.com/2015/10/indias-deadliest-sub-to-test-fire-missiles/.

[116] "'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.

missiles for ensuring deterrence vis-à-vis India. In 2015, Pakistan conducted flight tests of Shaheen 3 IRBM in March, Ghauri medium-range ballistic missile (MRBM) in April, and Shaheen 1A MRBM in December. Pakistan is assessed to be increasing its nuclear arsenal by about ten warheads per year, and one analysis warns that it might be the third-largest nuclear arsenal behind the United States and Russia in a decade.[117] Due to lack of confirmed data, however, the SIPRI estimates upon which the *Hiroshima Report* relies for Tables 1-1 and 1-2 have kept Pakistan's estimated arsenal status at 100-120 for three years.

North Korea

North Korea is widely considered to be continuing development of its nuclear weapons and missiles. In April 2013, North Korea announced measures for "readjusting and restarting all the nuclear facilities in Yongbyon," implying production of plutonium at the 5 MW graphite reactor and weapon-grade highly enriched uranium (HEU) at an enrichment plant.[118] North Korea emphasized in September 2015 that all of its nuclear facilities started normal operation after rearrangement and readjustment.[119] The 5 MW reactor, which had been reported to restart in September 2013, was considered to be operating at low power or intermittently during 2015.[120] The U.S. think tank Institute for Science and International Security (ISIS), for example, assessed that in October 2014 "the 5 MWe reactor was shut down or partially shut down. A more recent assessment using satellite imagery taken in January, February, March, and April 2015 shows that the reactor may be operating at low power or intermittently."[121] The Director General of the IAEA also said in October 2015 that it has observed some indications of operation of the 5 MW reactor.[122] North Korea may have finished construction of a 50 MW experimental light water reactor (LWR), but it is unclear when this will be commissioned.

As for enrichment-related activities, there is concern that North Korea has constructed additional, clandestine enrichment plants, in addition to the one where approximately 2,000 centrifuges were installed and to which U.S. scientists were invited in November 2010.[123] In August 2015, in accordance with satellite imagery taken from late 2014 and early 2015, security analysts reported that the second hall of the enrichment plant had probably become operational by early February 2015 and would

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[117] Toby Dalton and Michael Krepon, "A Normal Nuclear Pakistan," Carnegie Endowment for International Peace and Stimson Center, August 2015.

[118] "DPRK to Adjust Uses of Existing Nuclear Facilities," *KCNA*, April 2, 2013, http://www.kcna.co.jp/item/2013/201304/news02/20130402-36ee.html.

[119] "Director of Atomic Energy Institute of DPRK on Its Nuclear Activities," *KCNA*, September 15, 2015, http://www.kcna.co.jp/item/2015/201509/news15/20150915-36ee.html.

[120] David Albright and Serena Kelleher-Vergantini, "Yongbyon: A Better Insight into the Status of the 5MWe Reactor," *Imagery Brief*, Institute for Science and International Security, April 29, 2015; William Mugford, "North Korea's Yongbyon Nuclear Facility: Sporadic Operations at the 5 MWe Reactor But Construction Elsewhere Moves Forward," *38 North*, July 24, 2015, http://38north.org/2015/07/yongbyon072415/.

[121] Albright and Kelleher-Vergantini, "Yongbyon."

[122] "IAEA Detects Expanded Activities at N. Korea's Nuclear Facility," *Yonhap News Agency*, October 6, 2015, http://english.yonhapnews.co.kr/news/2015/10/06/0200000000AEN20151006009100315.html.

[123] Siegfried S. Hecker, "Extraordinary Visits, Lessons Learned from Engaging with North Korea," *Nonproliferation Review*, Vol. 18, No. 2 (July 2011), pp. 445-455.

now have been running for about six months.[124] North Korea is also considered to have expanded its capacity to mine and mill natural uranium, aiming to expand the production of enriched uranium.[125] At the uranium enrichment complex at Yongbyon, North Korea's works and efforts seems to continue at a rapid pace.[126] Since North Korea seems to have 4 million tons of high-grade uranium ore, an expansion of its enrichment plant would mean an establishment of a system of mass production of weapon-grade HEU. One analysis introduces three scenarios for the North's future nuclear capability: minimal growth scenario—increasing from a current low level of 10 weapons to 20 weapons by 2020; moderate growth scenario—growing from current levels to 50 weapons by 2020, which is considered the most probable among the three scenarios; and rapid growth scenario—growing more rapidly than in the previous scenarios to 100 weapons by 2020, with weapons design advancing significantly, allowing the North to deploy battlefield and tactical weapons if it chooses to do so.[127]

North Korea has been widely considered to be exploring miniaturized nuclear warheads for mounting on ballistic missiles, and has sometimes implied already possessing such a capability. In May 2015, for instance, a statement by a spokesman for the Policy Department of the North's National Defence Commission stated: "It is long since the DPRK's nuclear striking means have entered the stage of producing smaller nukes and diversifying them."[128] Actually, several specialists estimate that North Korea already possesses nuclear warheads that can be loaded on its No-dong MRBMs.[129]

On the other hand, a spokesman of South Korea's Defense Ministry said in February 2015, "Despite its significant technology level, we don't think the North is capable of making such nuclear weapons."[130] In May, a U.S. official of the State Department stated that North Korea had yet to develop a nuclear warhead which could be mounted on not just an ICBM but also an short- and medium-range ballistic missile.[131] However, South Korea showed its assessment in its White Paper on Defense in 2014 that North Korea had achieved a substantial level of miniaturizing nuclear warheads. In October 2014, General Curtis Scaparrotti, Commander of U.S. Forces on the Korean Peninsula, also said, "I believe [North Koreans] have the capability to miniaturize a device at this point, and they have the technology to actually deliver

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[124] Jethro Mullen and Brian Todd, "New North Korean Uranium Enrichment Hall Likely Up and Running," *CNN*, August 12, 2015, http://edition.cnn.com/2015/08/12/asia/north-korea-yongbyon-uranium-enrichment-report/.

[125] Jeffrey Lewis, "Recent Imagery Suggests Increased Uranium Production in North Korea, Probably for Expanding Nuclear Weapons Stockpile and Reactor Fuel," *38 North*, August 12, 2015, http://38north.org/2015/08/jlewis081215/.

[126] Mugford, "North Korea's Yongbyon Nuclear Facility."

[127] Joel S. Wit and Sun Young Ahn, "North Korea's Nuclear Futures Project: Technology and Strategy," US-Korea Institute at SAIS, February 2015. See also David Albright, "Future Directions in the DPRK's Nuclear Weapons Program: Three Scenarios for 2020," US-Korea Institute at SAIS, 2015; "China Warns North Korean Nuclear Threat Is Rising," *Wall Street Journal*, April 22, 2015, http://www.wsj.com/articles/china-warns-north-korean-nuclear-threat-is-rising-1429745706.

[128] "Underwater Test-fire of Ballistic Missile Is Legitimate Exercise of Right to Self-defence: DPRK," *KCNA*, May 20, 2015, http://www.kcna.co.jp/item/2015/201505/news20/20150520-13ee.html.

[129] See, for example, David Albright, "North Korean Miniaturization," *38 North*, February 13, 2013, http://38north.org/2013/02/albright021313/.

[130] "N. Korea Yet to Miniaturize Nukes: Seoul," *Korea Herald*, February 26, 2015, http://www.koreaherald.com/view.php?ud=20150226000661.

[131] "North Korean Missile Is Not Capable to Mount Nuclear Warheads," *Sankei Shimbun*, May 23, 2015, http://www.sankei.com/world/news/150523/wor1505230020-n1.html. (in Japanese)

what they say they have."[132] Japan does not seem to exclude a possibility of North's possession of nuclear warheads capable of loading on ballistic missiles. In its White Paper on Defense in 2015, Japan analyzes as following:[133]

> Over eight years have already passed since North Korea conducted its first nuclear test in October 2006. North Korea has conducted three nuclear tests to date. North Korea's duration of technology development and the number of tests are reaching levels that cannot be said to be inadequate in comparison with the processes of developing technologies to miniaturize and lighten nuclear weapons in the United States, Soviet Union, United Kingdom, France, and China.

While North Korea announced that the nuclear device it tested in January 2016 was a "hydrogen bomb," there are doubts that it has enough capability and technology to manufacture such a device. Several foreign analysts assess that North Korea more likely sought to develop a boosted fission weapon using a hydrogen isotope.[134]

As for a nuclear delivery vehicle, North Korea has focused on developing ballistic missile capabilities.[135] It is reported to have deployed more than 300 road-mobile No-dong MRBMs, which pose a direct threat to Japan. North Korea has also actively developed ballistic missiles with intention to reach U.S. territory. A road-mobile Musudan IRBM was developed based on the Russian R-27 SLBM, and is considered to be capable of reaching Guam. A Taepodong-2 missile, which is probably capable of reaching the U.S. homeland, has been tested as a space launch vehicle (SLV) named Unha. It is estimated that the Taepodong-2, which has achieved an emergency operational capability, has "1) vulnerability to attack because of likely basing on an above-ground launch pad; 2) low reliability since its SLV counterpart has only been tested four times and only succeeded once; and 3) a limited ability to deploy an advanced reentry vehicle that would carry a nuclear warhead to its target due to lack of testing."[136] Furthermore, North Korea has developed the KN-08 road-mobile ICBM. In April 2015, Admiral Bill Gortney, the commander of North American Aerospace Defense Command (NORAD), stated that it was operational.[137] North Korea has also continued new construction at the Sohae Satellite Launching Station ("Tongchangri").[138] In December 2015, it is reported that the construction appeared to be near completion, and "North Korea [would] be ready to conduct further activities at Sohae, including space launches, by the first quarter of 2016 should the leadership in Pyongyang decide to do

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[132] David Francis, "North Korea's Nuclear Program Advancing, U.S. Military Leader Says," *Foreign Policy*, October 24, 2014, http://thecable.foreignpolicy.com/posts/2014/10/24/north_korea_s_nuclear_program_advancing_us_military_leader_says.

[133] Ministry of Defense of Japan, *Defense of Japan 2015*, 2015, p. 19.

[134] See, for example, David Albright and Serena Kelleher-Vergantini, "Update on North Korea's Yongbyon Nuclear Site," *Imagery Brief*, Institute for Science and International Security, September 15, 2015.

[135] Regarding North Korea's activities on ballistic missiles, see, for instance, John Schilling and Henry Kan, "The Future of North Korean Nuclear Delivery Systems," US-Korea Institute at SAIS, 2015.

[136] Ibid., pp. 11-12.

[137] "NORAD Commander: North Korean KN-08 Missile Operational," *Stars and Stripes*, April 7, 2015, http://www.stripes.com/news/norad-commander-north-korean-kn-08-missile-operational-1.338909.

[138] Tim Browm, "North Korea: New Construction at the Sohae Satellite Launching Station," *38 North*, May 28, 2015, http://38north.org/2015/05/sohae052815.

so."[139]

As for North Korea's effort to develop a SLBM capability, the South Korean Joint Chiefs of Staff reported the North's development of a SLBM, and that North Korea may be developing a missile launch tube for submarine use at one of its naval bases.[140] In May 2015, North Korea announced that "[t]here took place an underwater test-fire of Korean-style powerful strategic submarine ballistic missile,"[141] called KN-11. However, it was analyzed that the KN-11 was launched from a submersible barge, not a Sinpo-class submarine, and it flew only 150 meters—a test usually conducted in the early stages of an SLBM program.[142] North Korea seemed to succeed with an ejection test of a KN-11 in December, after a failure in November.[143] While North Korea is unlikely to possess any submarines that can load and launch SLBMs, a South Korean official expressed a view that North Korea would be able to operationalize such a new submarine in a few years and develop SLBMs in several years.[144]

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

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

Following the NPT PrepCom in 2014, 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."[145]
- "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."[146]

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[139] Jack Liu, "Sohae Satellite Launch Facility: Three Year Upgrade Program Likely Near Completion," *38 North*, December 9, 2015, http://38north.org/2015/12/sohae120915/.

[140] "S. Korea Spots Signs of N. Korea's Submarine Rocket Development," *Yonhap*, September 14, 2014, http://english.yonhapnews.co.kr/national/2014/09/14/65/0301000000AEN20140914000500315F.html. See also Joseph S. Bermudez Jr., "North Korea: Test Stand for Vertical Launch of Sea-Based Ballistic Missiles Spotted," *38 North*, October 28, 2014, http://38north.org/2014/10/jbermudez102814/.

[141] "Kim Jong Un Watches Strategic Submarine Underwater Ballistic Missile Test-fire," *KCNA*, May 9, 2015, http://www.kcna.co.jp/item/2015/201505/news09/20150509-04ee.html.

[142] Bill Gertz, "U.S. Spy Agencies Closely Watched N. Korea Underwater Missile Test," *Washington Free Beacon*, May 11, 2015, http://freebeacon.com/national-security/u-s-spy-agencies-closely-watched-n-korea-underwater-missile-test/; Jeffrey Lewis, "DPRK SLBM Test," *Arms Control Wonk*, May 13, 2015, http://lewis.armscontrolwonk.com/archive/7631/dprk-slbm-test; Michael Elleman, "From under the Sea: North Korea's Latest Missile Test," *38 North*, June 3, 2015, http://38north.org/2015/06/mellemano60315/.

[143] Bill Gertz, "North Korea Conducts Successful Submarine Missile Test," *Washington Free Beacon*, January 5, 2016, http://freebeacon.com/national-security/north-korea-conducts-successful-submarine-missile-test/; Joseph S. Bermudez Jr., "North Korea's Ballistic Missile Submarine Program: Full Steam Ahead," *38 North*, January 5, 2015, http://38north.org/2016/01/sinpo010516/#_edn1.

[144] "North Korea to Complete the SLBM Program by Several Years," *The Mainichi*, May 12, 2015, http://mainichi.jp/shimen/news/20150512ddm002030091000c.html?inb=ra. (in Japanese)

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

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

- "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 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…."[147]
- "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."[148]
- "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." [149]

Most of the explanations above are basically repeated statements, which were described in the reports of the previous year.

As an issue on the roles of nuclear weapons, it should be noted that Russia continued to repeat nuclear saber-rattling statements in 2015. For example, in March, in the interview of a program aired by the state-run TV channel, titled, "Crimea: the Path to the Motherland," when asked if President Putin would have put his nuclear arsenal on alert in March 2014 when Russia annexed Crimea, he said, "We were ready to do that … That's why I think no one wanted to start a world conflict."[150] Although he did not specifically mention the actual status or possible targets, this statement, touching upon nuclear forces, clarified his strong intention that Russia would never compromise on the Ukrainian issue to the United States and the European countries. In the same month, Russia's ambassador to Denmark, Mikhail Vanin, warned in an op-ed that if Denmark participated in the U.S.-led missile defense program, "Danish warships [would] be targets for Russian nuclear missiles."[151]

In addition to verbal comments, Russia also demonstrated actual use of nuclear forces. Russian strategic bombers, albeit unknown whether they were loaded with nuclear weapons or not, have frequently approached and sometimes violated the airspace of European NATO members, including

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[147] 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."

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

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

[150] Andrew Rettman, "Russia Says Ready to Use Nuclear Weapons in Ukraine Conflict," *EU Observer*, March 16, 2015, https://euobserver.com/foreign/128001.

[151] "Russia Threatens to Aim Nuclear Missiles at Denmark Ships If It Joins NATO Shield," *Reuters*, March 22, 2015, http://www.reuters.com/article/2015/03/22/us-denmark-russia-idUSKBN0MI0ML20150322.

Norway, Turkey and the United Kingdom. In 2014, "Russian bombers forced NATO to scramble jets to intercept Russian military aircraft over 400 times…more than twice as often as in 2013, according to Secretary General Jens Stoltenberg."[152] In February 2015, Russia carried out the exercise featuring the presence of several Borei-class SSBNs,[153] and was reported to put on combat patrol mission its mobile ICBMs in six Russian regions.[154] Furthermore, Russia reportedly "conducted a large-scale exercise… that included test firings of several long-range missiles along with dual-capable shorter range ballistic and cruise missiles," including SS-N-18 or SS-N-23 and SS-25.[155]

On the other hand, the United States temporarily deployed B-52 heavy bombers to Europe,[156] and its SSBN Wyoming to make a port call at the U.K. naval base at Faslane, Scotland in 2015.[157] In June 2015, NATO was "preparing to re-evaluate its nuclear weapons strategy in response to growing tension with Russia over Ukraine."[158] The United Kingdom proposed "a return to Cold War-style planning exercises to test [NATO] readiness to escalate from conventional to nuclear war."[159] U.S. Defense Secretary Ashton Carter also said, "[W]e must write a new playbook which includes preparing to counter new challenges like cyber and hybrid warfare, better integrating conventional and nuclear deterrence as well as adjusting our posture and presence to adapt and respond to new challenges and new threats,"[160] bearing in mind Russia, though he did not touch upon the detail.

The United States, which indicated a policy of reducing the role of nuclear weapons in its Nuclear Posture Review in 2010 and the Nuclear Weapons Employment Strategy Report in 2013, has continued to review its operational plans, including target selection.[161] However, no new policy or plan was announced in 2015.

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[152] Matthew Bodner, "Russia's Strategic Bomber Fleet on Global Intimidation Drive," *Moscow Times*, March 19, 2015, http://www.themoscowtimes.com/arts_n_ideas/business/article/russias-strategic-bomber-fleet-on-global-intimidation-drive/517749.html.

[153] Jeremy Bender, "Russia Conducted Nuclear Submarine Exercises Beneath the North Pole," *Business Insider*, February 9, 2015, http://www.businessinsider.com/russian-nuclear-submarine-exercises-under-north-pole-2015-2.

[154] "Topol, Yars Ballistic Missile Launchers on Combat Patrol in 6 Russian Regions," *Itar-Tass*, February 4, 2015, http://itar-tass.com/en/russia/775419.

[155] Bill Gertz, "Russia Test-Fires Series of Nuclear Missiles During Strategic Drills," *Washington Free Beacon*, November 5, 2015, http://freebeacon.com/national-security/russia-test-fires-series-of-nuclear-missiles-during-strategic-drills/.

[156] "U.S. Deploys B-52s to Europe," *Air Force Times*, June 4, 2014, http://www.airforcetimes.com/article/20140604/NEWS08/306040053/U-S-deploys-B-52s-Europe.

[157] Bill Gertz, "U.S. Nuclear Missile Submarine Surfaces in Scotland," *Washington Free Beacon*, September 17, 2015, http://freebeacon.com/national-security/u-s-nuclear-missile-submarine-surfaces-in-scotland/.

[158] Ewen MacAskill, "Nato to Review Nuclear Weapon Policy As Attitude to Russia Hardens," *Guardian*, June 24, 2015, http://www.theguardian.com/world/2015/jun/24/nato-to-review-nuclear-weapon-policy-as-attitude-to-russia-hardens.

[159] Matthew Holehouse, "Britain Backs Return of 'Cold War' Nuclear Drills as NATO Hardens against Russia," *Telegraph*, October 8, 2015, http://www.telegraph.co.uk/news/uknews/defence/11920563/Britain-backs-return-of-Cold-War-nuclear-drills-as-Nato-hardens-against-Russia.html. On the U.K. proposal, see also Kingston Reif, "NATO Weighs Nuclear Exercises," *Arms Control Today*, Vol. 45, No. 9 (November 2015), p. 24.

[160] "Press Conference by Secretary Carter at NATO Headquarters, Brussels, Belgium," U.S. Department of Defense, October 8, 2015, http://www.defense.gov/News/News-Transcripts/Transcript-View/Article/622454/press-conference-by-secretary-carter-at-nato-headquarters-brussels-belgium.

[161] Tomotaro Inoue, "U.S. Military Reviewing Plan to Diminish Role of Nuclear Weapons," *Kyodo News*, April 25, 2015, https://english.kyodonews.jp/news/2015/04/349246.html.

In his speech on French nuclear policy, President Hollande announced a clear determination of maintaining nuclear forces, stating: "The international context does not allow for any weakness. That is why the era of nuclear deterrence is not over. There must be no question of lowering our guard, even in this field." He also mentioned that France keeps an option to use nuclear weapons as warning: "I cannot exclude the possibility of an adversary misunderstanding the delimitation of our vital interests. That's why I wish to issue a reminder here, that France can as a last resort indicate her will to defend our vital interests, by means of a warning of a nuclear nature aimed at reestablishing deterrence."[162]

The United Kingdom, in its SDSR published in November 2015, reaffirmed to maintain its current nuclear posture, including: minimum deterrence; Continuous at Sea Deterrence (CASD) with at least one of four nuclear-armed submarines are on patrol at all times; and carrying 40 nuclear warheads and no more than eight operational missiles per a SSBN.[163] At the 2015 NPT RevCon, the United Kingdom stated that it would "retain a credible and effective minimum nuclear deterrent for as long as the global security situation makes that necessary."[164]

China announced in December 2015 that the People's Liberation Army (PLA) established the PLA Rocket Force, practically replacing its Second Artillery Force, which had been in charge of China's missile forces. China's President Xi Jinping emphasized that the PLA Rocket Force is China's core strategic deterrence power, and tasked it with enhancing China's nuclear deterrence and counter-strike capabilities, and thus maintaining a strategic balance.[165] The PLA Rocket Force "will command all three legs of China's nuclear triad, rather than just controlling land-based nuclear missiles…[and] be in charge of conventional missiles."[166] In 2015, China maintained its existing declaratory nuclear policies. Some observers, however, watch carefully whether and how China would change its nuclear policies, including no-first-use of nuclear weapons, de-mating nuclear warheads from delivery vehicles, and its command and control system of nuclear weaponry, when it has been introducing MIRVed ICBMs and launching strategic patrol by SSBNs.

Among the nuclear-armed states, Pakistan's nuclear posture has been a concern. In October 2015, Pakistani Foreign Secretary Aizaz Chaudhary, stated that Pakistan was "formalizing its plans to use these low-yield nuclear bombs to forestall the advance of Indian troops under New Delhi's 'Cold Start' doctrine."[167] At the U.S.-Pakistani summit held in October, it was reported that U.S. President Obama

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[162] François Hollande, "Nuclear Deterrence—Visit to the Strategic Air Forces."

[163] SDSR, pp. 34-36.

[164] "Statement by the United Kingdom," General Debate, 2015 NPT Review Conference, April 27, 2015.

[165] "China Establishes Rocket Force and Strategic Support Force," Ministry of National Defense of the People's Republic of China, January 1, 2016, http://eng.mod.gov.cn/ArmedForces/second.htm; Shannon Tiezzi, "The New Military Force in Charge of China's Nuclear Weapons," Diplomat, January 5, 2016, http://thediplomat.com/2016/01/the-new-military-force-in-charge-of-chinas-nuclear-weapons/.

[166] Tiezzi, "The New Military Force in Charge of China's Nuclear Weapons."

[167] Ankit Panda, "Pakistan Clarifies Conditions for Tactical Nuclear Weapon Use Against India," *Diplomat*, October 20, 2015, http://thediplomat.com/2015/10/pakistan-clarifies-conditions-for-tactical-nuclear-weapon-use-against-india/.

"urged Pakistan…to avoid developments in its nuclear weapons program that could increase risks and instability,"[168] implying low yield, small nuclear weapons. However, in the joint statement after the meeting, President Obama and Prime Minister Nawaz Sharif just stated: "[They] recognized the shared interest in strategic stability in South Asia. The two leaders underscored that all sides should continuously act with maximum restraint and work jointly toward strengthening strategic stability in South Asia."[169] According to a news article, one Pakistani official said Pakistan needed small tactical nuclear weapons to deter a sudden attack by India, and would not accept any limitations to its nuclear weapons program.[170]

North Korea has repeated nuclear coercions since it declared possession of a nuclear deterrent in 2003. In February 2015, it demanded cessation of U.S.-South Korea joint military exercise "Key Resolve," by launching two short-range ballistic missiles (SRBMs) and implying its possession of nuclear attack capabilities against the U.S. homeland by stating, "Nuclear weapons are not a monopoly of the U.S. The U.S. is seriously mistaken if it thinks its mainland is safe."[171] North Korean Foreign Minister Ri Su Yong also stated at the CD in March: "The DPRK…cannot but bolster its nuclear deterrent capability to cope with the ever-increasing nuclear threat of the U.S… Now the DPRK has the power of deterring the U.S. and conducting a pre-emptive strike as well, if necessary."[172]

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

In 2015, no nuclear-weapon/armed state changed or transformed their policies regarding a no first use (NFU) or the "sole purpose" of nuclear weapons. 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"[173] though it could not adopt a NFU or a "sole purpose" policy. The earlier version of draft final document of the 2015 NPT RevCon included the encouragement to abandon concepts, doctrines and policies that envisage the first use of nuclear weapons, and to undertake not to be first to use them. However, such a sentence was deleted from the later draft document, which implied that the NWS, except China, were opposed to stating a NFU 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.

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[168] David Brunnstrom and Idrees Ali, "Obama Urges Pakistan to Avoid Raising Nuclear Tensions with New Weapons," *Reuters*, October 22, 2015, http://www.reuters.com/article/us-usa-pakistan-idUSKCN0SG29020151023.

[169] "Joint Statement by President Barack Obama and Prime Minister Nawaz Sharif," Washington, DC, October 22, 2015, https://www.whitehouse.gov/the-press-office/2015/10/22/2015-joint-statement-president-barack-obama-and-prime-minister-nawaz.

[170] David Brunnstrom and Idrees Ali, "Obama Urges Pakistan to Avoid Raising Nuclear Tensions with New Weapons," *Reuters*, October 22, 2015, http://www.reuters.com/article/us-usa-pakistan-idUSKCN0SG29020151023.

[171] "DPRK to Fight Merciless Sacred War against U.S.: Rodong Sinmun," *KCNA*, February 27, 2015, http://www.kcna.co.jp/item/2015/201502/news27/20150227-13ee.html.

[172] Stephanie Nebehay, "North Korea Warns U.S. about Pre-Emptive Strike 'If Necessary,'" *Reuters*, March 3, 2015, http://www.reuters.com/article/2015/03/03/us-korea-north-ri-idUSKBN0LZ0TD20150303.

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

C) Negative security assurances

While China is the only NWS that has declared an unconditional negative security assurance (NSA) for NNWS, other NWS add a condition to their NSA policies. The United Kingdom and the United States, which have 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 review this assurance if the future threat, development and proliferation of these weapons make it necessary."[174]

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."[175] 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."[176] 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 the 2015 NPT RevCon, the NAM states urged that "urgent negotiations on the provision of the effective, unconditional, non-discriminatory, irrevocable, universal and legally binding security assurances by all the nuclear-weapon States to all non-nuclear-weapon States parties to the Treaty against the use or threat of use of nuclear weapons under all circumstances should…be pursued as a matter of priority and without further delay."[177] 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. France stated that it "considers [the] commitment [in its statement in April 1995] legally binding, and has so stated."[178]

The draft final document at the 2015 RevCon included the following paragraph—repeating one from the 2010 Final Document: "The Conference notes the urgency for the Conference on Disarmament to consider effective, universal, nondiscriminatory, unconditional, legally binding arrangements to assure non-nuclear-weapon States against the use or threat of use of nuclear weapons by all nuclear-weapon States, with a view to elaborating recommendations dealing with all aspects of this issue, including an internationally legally binding instrument, and recognizes the need to fully honour and uphold all existing security assurances given unilaterally and multilaterally." However, progress toward the conclusion of an internationally legally binding instrument cannot be expected, at least for a near

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

[175] 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."

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

[177] NPT/CONF.2015/WP.2, March 9, 2015.

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

future, partly because of the 20-year deadlock of negotiating disarmament issues in the CD and partly because of four NWSs' passive attitudes on this issue.

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 its NSA unconditional. 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.

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]

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 RevCon that it had submitted the Protocol to the U.S. Senate for its advice and consent to ratification,[179] 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. At the 2015 NPT RevCon, China stated that, "We have resolved all pending issues of the Protocol to the Treaty on the Southeast Asia Nuclear Weapon-Free Zone with [Association of Southeast Asian Nations (ASEAN)]

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

countries and are ready to sign the Protocol at an early date."[180] However, NWS, including China, have yet to sign the Protocol. Considering from the Russian statement that NWS "expect[ed] ASEAN countries to take a position on reservations and statements of the [NWS] to the Protocol in a short time and [they would] be able to complete the signing procedure,"[181] one of the remaining issues to be solved is about possible NWS reservations to the Protocol.

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.[182] 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.'"[183]

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 its territory except in the European NATO countries mentioned above.

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."[184] 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) Almost the same paragraph was also written in the Japan-led UNGA resolution on nuclear disarmament in 2015.

Whereas few significant changes in extended deterrence policies were apparent in 2015, the United States and allies, facing with deterioration of the security situations in Asia and Europe, intensified

[180] "Statement by China," General Debate, 2015 NPT Review Conference, April 27, 2015.

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

[182] NPT/CONF.2015/WP.4, March 9, 2015.

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

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

their efforts for enhancing reliability of extended (nuclear) deterrence. In June, NATO was reported to contemplate a re-assessment of its nuclear strategy. According to the article, potential topics include an enhanced role for nuclear weapons in NATO military exercises; a way to better interpret Russian warnings about nuclear weapons—whether they should be taken seriously or whether these amount to no more than rhetoric.[185] It was also reported that eight Committees, including the Nuclear Planning Group, would analyze the Russian nuclear weapons capabilities, and contemplate whether the existing deterrent posture of NATO comprising small number of nuclear weapons and strong conventional weapons would be still effective vis-à-vis Russian (nuclear) forces.[186] As mentioned above, actions include resuming planning exercises to test NATO readiness of escalation.

On the matter of nuclear sharing, Russia criticized it as violating the spirit of the NPT,[187] 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 1 of the NPT by those transferor NWS and under Article 2 by those recipient NNWS.[188] 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."[189] While NATO countries discussed the issues of the U.S. tactical nuclear weapons in Europe in 2009-10, they agreed to reduce them along with Russian non-strategic nuclear weapons reciprocally, and to decide by the NATO members' consensus if they are to be withdrawn. Thus, NATO maintains the existing nuclear posture, including nuclear sharing.

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

In reports submitted to the 2014 NPT PrepCom, NWS except Russia summarized the alert status of their respective nuclear arsenals. In the report to the 2015 NPT RevCon, Russia very briefly touched upon this issue. In 2015, no NWS made substantial changes in its policies on the alert status; rather, they issued statements as follows:

- "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

[185] Ewen MacAskill, "Nato to Review Nuclear Weapon Policy As Attitude to Russia Hardens," *Guardian*, June 24, 2015, http://www.theguardian.com/world/2015/jun/24/nato-to-review-nuclear-weapon-policy-as-attitude-to-russia-hardens.

[186] "NATO to Review Its Nuclear Posture," *The Mainichi*, June 24, 2015, http://sp.mainichi.jp/shimen/news/20150624dde001030063000c.html. (in Japanese)

[187] "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.

[188] "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.

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

resolute nuclear counter-attack against the enemy."[190]

- 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 LOW, LUA or hair-trigger alert.[191]
- "[The] steps by the Russian Federation [regarding non-strategic nuclear weapons] have… served as a very important practical measure for 'de-alerting' nuclear weapons."[192]
- "[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."[193]
- 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.[194]

According to one U.S. expert, about 1,800 nuclear weapons possessed by Russia and the United States are considered to be on high alert status, either Launch on Warning (LOW) or Launch under Attack (LUA).[195] It is not clear whether and how the United States has been considering measures for de-alerting. At the testimony before the U.S. Congress in April 2015, Robert Scher, Assistant Secretary of Defense for Strategy, Plans, and Capabilities, argued "it did not make any great sense to de-alert forces" because nuclear missiles "needed to be ready and effective and able to prosecute the mission at any point in time."[196] According to a representative of the Strategic Rocket Forces, Russia keeps 96 percent of its ICBMs on high alert.[197] Forty U.K. nuclear warheads and 80 French ones are also kept on

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

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

[192] NPT/CONF.2015/PC.III/17, April 25, 2014.

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

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

[195] 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.

[196] Robert Burns, "Former US Commander: Take Nuclear Missiles off High Alert," *Associated Press*, April 29, 2015, http://bigstory.ap.org/article/2ae0a33fa1c7402999afb6d55046e2cc/former-us-commander-take-nuclear-missiles-high-alert.

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

alert under their continuous SSBN patrols, albeit at lower readiness levels than those of the two nuclear superpowers.[198] It is assumed that because China keeps nuclear warheads de-mated from delivery vehicles, its nuclear forces are not on a hair-trigger alert posture. The key question, however, is whether Chinese nuclear warheads will be de-mated from the new SLBM JL-2 loaded onto the deployed Type 094 SSBNs.

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."[199] It is widely considered that India's nuclear forces are not on a high alert status.

A number of NNWS have urged NWS to alter their alert posture. At the 2015 NPT RevCon, for example, the "De-alerting Group" (Chile, Malaysia, Nigeria, New Zealand and Switzerland) proposed again to reduce alert levels in a concrete and measurable way, and to report on measures taken regarding operational readiness/alert levels."[200] The Netherlands stated that one of the keys for promoting nuclear disarmament is whether the LOW concept can be taken out of nuclear strategy.[201]

Proponents of de-alerting have often argued that such a measure is useful to prevent accidental use of nuclear weapons.[202] Their concerns, for instance, were reflected in a session titled "Risk Drivers for deliberate or inadvertent Nuclear Weapons Use" at the Third Conference on the Humanitarian Impact of Nuclear Weapons. At the 2015 NPT RevCon, the NPDI proposed to include in a draft document that:

> The Conference, recognizing that de-alerting is important not only as a step towards a world free of nuclear weapons but also to avoid and reduce the risk of the catastrophic humanitarian consequences from any unauthorized or accidental launch of a nuclear weapon, urge all nuclear-weapon States to take concrete and meaningful steps, whether unilaterally, bilaterally or regionally, to further reduce the operational status of nuclear weapons. Practical steps to that end would promote international stability and security and reduce the risk of

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

[199] 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/.

[200] NPT/CONF.2015/WP.21, April 9, 2015.

[201] "Statement by the Netherlands," at the 2015 NPT Review Conference, Main Committee I, May 6, 2015.

[202] 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.

accidental use of nuclear weapons.[203]

On the other hand, NWS emphasize that they have taken adequate measures for preventing such accidental use, and express confidence regarding the safety and 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."[204]
- France: "Strict procedures have been instituted to ensure that no weapons can be used without an order from the President of the Republic."[205]
- 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."[206]
- 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."[207]
- 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.[208]

The earlier proposal of a final document of the 2015 NPT RevCon in terms of de-alerting mentioned: "Pending the total elimination of nuclear weapons, the Conference emphasizes the need to reduce rapidly, as an interim measure, the operational status of nuclear weapon system, leading to a phased removal of all nuclear weapons from high alert levels, which would, in the view of many States parties, increase international stability and security while lowering the humanitarian risks associated with

[203] NPT/CONF.2015/WP.16, March 20, 2015.
[204] NPT/CONF.2015/32, April 27, 2015.
[205] NPT/CONF.2015/PC.III/14, April 25, 2014.
[206] NPT/CONF.2015/48, May 22, 2015.
[207] NPT/CONF.2015/29, April 22, 2015.
[208] NPT/CONF.2015/38, May 1, 2015.

nuclear weapons." However, the final draft of a final document referred only to "risks associated with unintended nuclear detonations," and deleting the sentence in the earlier version, "those stemming from threats posed by non-state actors."

(6) CTBT

A) Signing and ratifying the CTBT

As of December 2015, 164 countries among 183 signatories have deposited their instruments of ratification of the Comprehensive Nuclear-Test-Ban Treaty (CTBT). 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.

The United States has reiterated its intent to strive for ratifying the CTBT, and in October 2015 State Secretary Kerry stated, "I am determined that in the months to come, we're going to reopen and re-energize the conversation about the treaty on Capitol Hill and throughout our nation."[209] However, the Obama administration has yet to submit it to the Senate for ratification. At a conference in March 2015, Israel, another non-ratifying country, listed three central reservations: Israel addresses its ratification, like all other security-related issues, mainly in the regional context; due to incomplete nature of the verification regime, it is concerned that Israel would be falsely accused of having conducted a nuclear test; and some of the countries in the Middle East do not recognize the existence of Israel.[210] Israeli ambassador Merav Zafary-Odiz also said in June, "The CTBT is a treaty that Israel intends to ratify. It will do when the time is ripe, when certain considerations are met," including recognition of the existence of Israel by the regional countries.[211] There was no new progress toward signing and ratifying the CTBT by other countries that are listed in the Annex 2 but have yet to sign or ratify the Treaty.

Some of non-ratifiers may intend to decide their attitudes regarding the CTBT on the basis of a determination whether the United States can ratify the Treaty. Reflecting such a situation, the final draft of the final document of the 2015 NPT RevCon included, "the Conference calls upon the eight remaining States listed in Annex 2 of the Comprehensive Nuclear-Test-Ban Treaty to take individual initiatives to sign and ratify that Treaty without further delay and without waiting for any other State to do so."

In September 2015, the Ninth Conference on Facilitating the Entry into Force of the CTBT (namely,

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[209] John Kerry, Secretary of State, "Remarks at the Department of Energy's Stockpile Stewardship Event," Washington, DC, October 21, 2015, http://www.state.gov/secretary/remarks/2015/10/248421.htm. See also Rose Gottemoeller, Under Secretary for Arms Control and International Security, "The End of Nuclear Testing?" Alaska, October 19, 2015, http://www.state.gov/t/us/2015/248427.htm.

[210] Mitch Ginsburg, "For Israel, Nuclear Test Ban Looks Better in Theory Than Practice," *Times of Israel*, April 20, 2015, http://www.timesofisrael.com/for-israel-nuclear-test-ban-looks-better-in-theory-than-practice/.

[211] "Israel Links Ratifying Nuclear Test Ban to Iran Ties," *Reuters*, June 24, 2015, http://www.reuters.com/article/2015/06/24/us-israel-nuclear-ctbt-iran-idUSKBN0P42DR20150624.

the Article XIV conference) was held as an effort to achieve early entry into force of the Treaty.[212] The Conference, co-chaired by Foreign Minister Fumio Kishida of Japan and Foreign Minister Erlan Idrissov of Kazakhstan, adopted the Final Declaration in which participating countries "reaffirm [their] determination to take concrete and actionable steps towards early entry into force and universalization of the Treaty."[213] In this Conference, Foreign Minister Kishida proposed "Three Promotions" as followings:[214]

- "[T]he promotion of political efforts, at highest levels possible, to invite signature and ratification of the CTBT by those states which have not yet done so, focusing in particular on Annex 2 States"
- "[F]urther development of the International Monitoring System (IMS) towards its completion. In particular, it is crucial to provide further training for operators of the National Data Centre, who support the IMS"
- "[S]haring the awareness in the civil society, across borders and generations, of the catastrophes resulting from the use of nuclear weapons."

Other efforts for promoting the entry into force of the CTBT in 2015 included the CTBT's Group of Eminent Persons (GEM) meeting in Hiroshima; the International Day against Nuclear Test; and ATOM (Abolish Testing. Our Mission) campaign led by Kazakhstan. In addition, top leaders of Japan and Kazakhstan issued a joint statement in June, in which they urged to continue efforts toward realizing the early entry into force of the CTBT.[215]

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 the bilateral activities related to the 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), those pertaining to the 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), the 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 the regional-level activities (by Australia, Belgium, Brazil, France, Indonesia, Japan, South Korea, Mexico, New Zealand, Norway, the Philippines, Sweden, Turkey, the U.K., the U.S. and

[212] Australia, Hungary, Indonesia, Japan, Kazakhstan and Nigeria called for participating in the Article XIV conference actively. NPT/CONF.2015/WP.23, April 13, 2015.

[213] CTBT-Art.XIV/2015/WP.1, September 24, 2015, https://www.ctbto.org/fileadmin/user_upload/Art_14_2015/FINAL_DECLARATION.pdf.

[214] "Remarks by H.E. Mr. Fumio Kishida, Minister for Foreign Affairs of Japan at the Ninth Conference on Facilitating the Entry into Force of the Comprehensive Nuclear-Test-Ban Treaty," September 29, 2015.

[215] "Joint Statement by President of Kazakhstan Nursultan Nazerbayev and Prime Minister of Japan Shinzo Abe on the Comprehensive Test-Ban Treaty," October 27, 2015, https://www.ctbto.org/fileadmin/user_upload/public_information/2015/151027JP_KZ_joint_statement_set.signed.pdf.

others).[216]

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

The five NWS plus India and Pakistan maintain a moratorium on nuclear test explosions. Israel, which has kept its nuclear policy opaque, has not disclosed the possibility of conducting nuclear tests.

North Korea has repeatedly implied it would soon be conducting a fourth nuclear test in 2015. After the North Korea's third nuclear test explosion in February 2013, the UN Security Council "decide[d] that the DPRK shall not conduct any further launches that use ballistic missile technology, nuclear tests or any other provocation" in the Resolution 2094 adopted in March 2013.[217] However, North Korea has not declared a moratorium. Instead, it repeatedly implied the possibility of conducting further nuclear tests and appeared to be making test preparations. In August 2015, North Korean Foreign Minister said, "Nobody will feel safe if somebody comes up with massive, more sophisticated nuclear weapons. Nobody will be safe and DPRK has no other option but to have self-defensive means to safeguard sovereignty, national dignity and to protect our people from nuclear disaster," implying a future nuclear test by the communist country would depend on its threat perception concerning the United States.[218] On January 6, 2016, North Korea conducted the fourth nuclear explosion test, whose detail is to be 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 December 23, 2015, is as follows.[219]

- Fully paid: Australia, Austria, Belgium, Canada, Chile, China, Egypt, France, Germany, Israel, Japan, Kazakhstan, South Korea, Mexico, the Netherlands, New Zealand, Norway, Poland, Russia, South Africa, Sweden, Switzerland, Turkey, UAE, the U.K. and the U.S.
- Partially paid: The Philippines
- 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 International Monitoring System (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.[220]

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

[217] S/RES/2094, March 7, 2013.

[218] "N. Korea Says Future Nuclear Test Depends on U.S. Attitude," *Korea Times*, August 6, 2015, https://www.koreatimes.co.kr/www/news/nation/2015/08/116_184347.html.

[219] "CTBTO Member States' Payment as at 23-Dec-2015," https://www.ctbto.org/fileadmin/user_upload/treasury/52._23December2015_Member_States__Payments.pdf.

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

The following are examples of efforts for the establishment of the verification system conducted in 2015.

- Japan: The CTBTO certified the noble gas system in the radionuclide monitoring station for the CTBT in Takasaki
- The United States: Conducted the fourth in a series of experiments designed to improve the ability to detect underground nuclear explosions, using a chemical explosive equivalent to 196 pounds of TNT in a contained, confined environment 286 feet below ground[221]
- EU: Provided a new voluntary contribution to the CTBTO, aiming to help sustain the International Monitoring System Network; upgrading on-site inspection capabilities; outreach and country-level capacity building[222]

In June 2015, the biennial CTBTO Science and Technology Conference was held, in which specialists belonging to the governmental organizations as well as academic/research institutes participated, with more than 500 presentations on the CTBT-related verification technologies.[223]

Regarding on-site inspection, the second Integrated Field Exercise (IFE14) took place from November to December 2014, mainly in Jordan's Dead Sea area, in which more than 200 experts and observers participated. In April 2015, a follow-up workshop was convened in Israel. Around 100 experts specializing in nuclear physics, geophysics, seismology, communication, health/safety and other verification-related areas from 30 countries reviewed and analyzed the IFE14.[224]

E) Nuclear testing

No nuclear explosive test was attempted in 2015, although North Korea continued activities preparing for nuclear testing. North Korea was considered to be conducting active maintenance of its nuclear test site as well as related facilities,[225] with reports that it was "digging a new tunnel at its nuclear test site with an eye to conducting more tests of atomic devices in the future."[226] According to a report published by a research institute in December 2015,

> Recent commercial satellite imagery indicates that North Korea is excavating a new tunnel for nuclear testing at the Punggye-ri nuclear test site. This tunnel is in a new area of the site in

[221] "NNSA Conducts Experiment to Improve U.S. Ability to Detect Foreign Nuclear Explosions," *Your Defense News*, May 27, 2015, http://www.yourdefencenews.com/nnsa+conducts+experiment+to+improve+u.s.+ability+to+detect+foreign+nuclear+explosions_116931.html.

[222] CTBTO, "EU Adopts 3M EURO Voluntary Contribution," October 19, 2015, http://www.ctbto.org/press-centre/press-releases/2015/eu-adopts-3m-euro-voluntary-contribution/.

[223] "CTBTO Science and Technology 2015 Conference," Vienna, June 22-26, 2015, https://www.ctbto.org/specials/snt2015/.

[224] CTBTO, "On-Site Inspection Workshop in Israel to Evaluate IFE14," April 2015, https://www.ctbto.org/press-centre/highlights/2015/on-site-inspection-workshop-in-israel-to-evaluate-ife14/.

[225] See, for example, Jack Liu and Nick Hansen, "North Korea's Nuclear and Rocket Test Sites: Limited Activity, No Tests Likely in the Near Future," *38 North*, March 10, 2015, http://38north.org/2015/03/sohaepunggye031015/; Jack Liu, "North Korea's Punggye-ri Nuclear Test Site: Spring Construction and Maintenance Activities Continue," *38 North*, June 5, 2015, http://38north.org/2015/06/punggye060415/.

[226] "North Korea Digging Tunnel at Nuclear Test Site, Possibly for Future Test," *Reuters*, October 29, 2015, http://www.reuters.com/article/2015/10/30/us-northkorea-nuclear-idUSKCN0SO09N20151030.

> addition to the three others where the North has either conducted nuclear tests or excavated tunnels in the past. While there are no indications that a nuclear test is imminent, the new tunnel adds to North Korea's ability to conduct additional detonations at Punggye-ri over the coming years if it chooses to do so.[227]

On January 6, 2016, North Korea announced that it successfully conducted a nuclear explosion test in the "special announcement" on state TV. In this announcement, it trumpeted that "the DPRK 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."[228] While many analysts doubt about North's using a "hydrogen bomb," it is considered highly likely that North Korea actually conducted the nuclear test since CTBT's IMS detected an "unusual seismic event" in the country. An estimated explosive yield is approximately 6.0 kilotons, which is smaller than that of the third nuclear test—7.9 kilotons.

Regarding experimental activities other than a nuclear explosion test, the United States continues to develop and 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. The U.S. National Nuclear Security Administration (NNSA), which is part of the U.S. Department of Energy, has released quarterly reports on such experiments. In FY 2015, information on the activities during the first quarter of the year was released (as of December 15, 2015). According to this information, the United States did not conduct a subcritical test, or an experiment 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.[229]

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."[230] 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.[231] 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.

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[227] Jeffrey Lewis, "New Nuclear Test Tunnel Under Construction at North Korea's Punggye-ri Nuclear Test Site," *38 North*, December 2, 2015, http://38north.org/2015/12/punggye120215/.

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

[229] See NNSA, "Summary of Experiments Conducted in Support of Stockpile Stewardship," Quarter 1, FY2015, http://nnsa.energy.gov/sites/default/files/Quarterly%20SSP%20Experiment%20Summary-Q1FY15.pdf. See also NNSA "Stockpile Stewardship Program Quarterly Experiments," http://nnsa.energy.gov/ourmission/managingthestockpile/sspquarterly.

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

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

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."[232] However, issues on nuclear tests except nuclear explosion tests were not mentioned in the draft final document of the Conference.

(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 2015 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 continues to insist that the mandate of the FMCT negotiation must not only prohibit fissile material production for nuclear weapons but also cover the existing stockpiles, and that it could not accept the adoption of the program of work in which the issues of the existing stockpile were not included.[233] 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 objectives,"[234] they did not block the CD from commencing negotiation of an FMCT.[235] Pakistan voted against the 2015 UNGA resolution on the FMCT, with North Korea, Egypt, Iran, Israel and Syria in abstention.

China supports 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. Israel has a similar

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[232] NPT/CONF.2015/WP.7, March 9, 2015.

[233] See, for example, "Statement by Pakistan," at the First Committee of the UN General Assembly, Thematic Discussion on Nuclear Weapons, October 20, 2015.

[234] 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.

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

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."[236] 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.

Facing difficulties to resolve the impasse, during the 2012 session of the UNGA, a resolution proposed by Canada was adopted, in which the establishment of a group of governmental experts (GGE) on an FMCT was requested.[237] The GGE launched in March 2014, and was convened for totally eight weeks until March 2015.[238] Its report, submitted to the CD in June 2015, "outlines the details of the Group's deliberations, characterizes the range of expert views on aspects of a treaty—notably in relation to the dynamic correlation between a future treaty's scope, definition, verification requirements and associated legal obligations and institutional arrangements—and presents the Group's conclusions and recommendations."[239] At the CD, Pakistan stated that it would not participate in the GGE, arguing that its mandate is limited to discussing a ban on a production of fissile material for nuclear weapons.[240]

In April 2015, France formally deposited at the CD a draft FMCT that would require adherents to, among other provisions, cease all production of fissile material for nuclear weapons or other nuclear explosive devices and to refrain from using the materials produced thereafter for nuclear weapons or other nuclear explosive devices," and to establish a "Organization of the Treaty Banning the Production of Fissile Material for Nuclear Weapons or Other Nuclear Explosive Devices."[241]

As mentioned above, because of the strong objection made by Pakistan, the FMCT negotiation has not been able to start for 20 years after the 1995 NPT Review and Extension Conference. Unless such an impasse can be broken, some countries have suggested exploring a possibility to negotiate in a forum other than the CD. At the 2015 NPT RevCon, for example, the NPDI urged negotiations "preferably in the Conference on Disarmament."[242] Nordic countries proposed more explicitly that "the United Nations disarmament machinery as a whole, including the General Assembly, subsidiary bodies and expert groups, should be used to pursue multilateral disarmament, especially when the Conference on Disarmament remains stalled."[243] However, there seems to be no insignificant objection to such a proposal: even earlier versions of a final document of the 2015 NPT RevCon did not mention a

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

[237] A/RES/67/53, January 4, 2013.

[238] Experts attended from Australia, Brazil, Canada, China, Egypt, France, Germany, India, Japan, Kazakhstan, South Korea, Mexico, the Netherlands, Russia, the United Kingdom and the United States, among other states.

[239] CD/2023, June 24, 2015.

[240] "Statement by Pakistan," Conference on Disarmament, May 20, 2014.

[241] The draft FMCT is posted on the homepage of the French government (http://www.francetnp.gouv.fr/IMG/pdf/2015-04-09_projet_traite_fmct_version_finale_eng.pdf). It is also attached to a working paper submitted by France to the 2015 NPT RevCon (NPT/CONF.2015/WP.28, April 21, 2015).

[242] NPT/CONF.2015/WP.16, March 20, 2015.

[243] NPT/CONF.2015/WP.15, March 13, 2015.

possibility of convening a negotiation in any other forum but the CD.

B) The moratorium 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 produce 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."[244] 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, which may have become operational by mid-2015. India seems to have a capability to produce weapons-grade uranium to twice the amount needed for its planned nuclear-power submarine fleet. In 2011, India made clear that the SMEF would not be subject to the IAEA safeguards.[245]

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.[246]

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).

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[244] "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.

[245] 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.

[246] 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.

The NWS submitted their respective reports on their 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.

As pointed out in the previous *Hiroshima Report*, the "common themes and categories" were a sort of "chapters" summary at most. The topics covered and level of concreteness were different among the NWS. Furthermore, not much information was unfolded in their reports. However, if NWS continue to submit reports on nuclear issues periodically, it is expected that contents and details of the reports, along with the level of transparency, may be improved.

The U.S. report was more detailed than the others and contains a number of concrete descriptions and disclosures. Furthermore, in the report in 2015, the United States highlighted points which were added to and updated from the report in 2014, which are valuable in order to clarify how and to what extent the United States made efforts for nuclear disarmament and non-proliferation. In its report in 2015, the following information is newly declassified or updated, *inter alia*:[247]

- Its current nuclear stockpile is the smallest since 1956;
- The United States declassified and reported its nuclear warhead stockpile in 2010 and 2014;
- As of September 30, 2014, the total stockpile of active and inactive nuclear warheads was 4,717;
- An additional 299 warheads have been dismantled since September 30, 2013, with a total of 10,251 warheads dismantled between 1994 and 2014;
- In 2015, the United States reported that approximately 2,500 warheads are retired and awaiting dismantlement; and
- The United States announced in April 2015 that President Obama will seek funding to accelerate dismantlement of retired U.S. nuclear warheads by 20 percent.

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

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

Source) U.S. Department of State, "Transparency in the U.S. Nuclear Weapons Stockpile," Fact Sheet, April 29, 2014, http://www.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.

[247] NPT/CONF.2015/38, May 1, 2015; John Kerry, "Remarks," at the 2015 NPT Review Conference," April 27, 2015. As an analysis of the declaration, see 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/.

To a lesser extent, the French and the U.K. reports were also comprehensive and concrete. In 2015, France reported its nuclear forces components—three sets of 16 SLBMs and 54 middle-range ALCM—which had been for the first time declassified by President Hollande in February.[248] France also mentioned that it organized visits to its former facilities for the production of fissile materials for nuclear weapons by other countries, non-governmental experts and international journalists, and that it would propose a visit to additional sites from which all nuclear weapons have been removed.[249]

On the other hand, in China's report, there was little concrete information regarding nuclear weapons capabilities (including fissile material for nuclear weapons) or their reduction. China argues that "nuclear transparency should be guided by the important principle of 'undiminished security for all,' and that relevant measures should be adopted by countries on a voluntary basis in line with their national situation, taking full consideration of their specific security conditions."[250]

Russia's 2015 report demonstrated improvement on some of concrete actions taken by Russia regarding nuclear disarmament and strategy, compared to the 2014-version of its report, which did not include measures taken toward disarmament efforts, number of deployed warheads and related matters.[251] Still, the level of transparency is less than those of the western NWS since no information on its nuclear arsenals, for instance, was contained in the Russian report.

In its working paper submitted to the 2015 NPT RevCon, Japan proposed, among other suggestions, that: the NWS, in consultation with NNWS, agree on a "standard reporting form" to report on the implementation of nuclear disarmament obligations of NWS by the 2017 NPT PrepCom; the NWS would report, based on the agreed "standard reporting form," at the 2018 NPT PrepCom; and that at the 2019 PrepCom parties hold a review session focusing on the nuclear disarmament reports in time allocated to the specific issue of nuclear disarmament. It also requested that "[t]o the extent possible, reports must be specific and include numerical information to provide a baseline against which their nuclear disarmament measures can be concretely reviewed," in terms of the following issues as examples:[252]

- The number, types (strategic or non-strategic) and status (deployed or non-deployed) of nuclear warheads;
- The number and, if possible, types of delivery vehicles;
- The number and types of weapons and delivery systems dismantled and reduced as part of nuclear disarmament efforts;
- The amount of fissile material produced for military purposes; and
- The measures taken to diminish the role and significance of nuclear weapons in military and security concepts, doctrines and policies.

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

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

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

[251] See, for example, Andrea Berger, "The P5 Nuclear Dialogue: Five Years on," *Occasional Paper*, Royal United Services Institute, July 2014.

[252] NPT/CONF.2015/WP.32, April 22, 2015.

The NAC also made following proposals in its working paper to the 2015 NPT RevCon:[253]

- The Conference should call upon the nuclear-weapon States to implement their nuclear disarmament commitments, both qualitative and quantitative, in a verifiable, transparent and irreversible manner that enables the States parties to regularly monitor progress, including through a detailed standard reporting format, thereby enhancing confidence and trust not only among the nuclear-weapon States but also between the nuclear-weapon States and the non-nuclear-weapon States; and
- The Conference should urge the nuclear-weapon States to commit to report on an annual basis concrete progress concerning their implementation of steps leading to nuclear disarmament contained in the Final Document of the 2010 Review Conference.

The final draft of a final document of the 2015 RevCon included the following paragraph:

> The Conference calls upon the nuclear-weapon States to provide regular report on their nuclear disarmament-related undertakings in accordance with actions 5 and 20 of the 2010 action plan and further calls upon the nuclear-weapon States to continue their engagement on a standard reporting form and to report to the 2017 and 2019 sessions of the Preparatory Committee, encouraging them to take into account the following items, without prejudice to national security: (i) the number, type (strategic or non-strategic) and status (deployed or non-deployed) of nuclear warheads; (ii) the number and the type of delivery vehicles; (iii) the measures taken to reducing the role and significance of nuclear weapons in military and security concepts, doctrines and policies; (iv) the measures taken to reduce the risk of unintended, unauthorized or accidental use of nuclear weapons; (v) the measures taken to de-alert or reduce the operational readiness of nuclear weapon systems; (vi) the number and type of weapons and delivery systems dismantled and reduced as part of nuclear disarmament efforts; (vii) the amount of fissile material for military purposes. The Conference agrees that the 2020 Review Conference and the 2017 and 2019 sessions of the Preparatory Committee should allocate specific time to review the reports submitted by the nuclear weapon States.

One reservation is that NWS could provide information "without prejudice to national security," which leaves sufficient space for control or even refusal of reporting concrete actions and status regarding their nuclear arsenal and disarmament. While a final document could not be adopted at the 2015 RevCon, one of the focuses on future nuclear disarmament would be whether and how NWS address issues on regular reporting in the next NPT review process.

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.[254] Using the draft form, the following table summarizes the degree of transparency taken by the nuclear-weapon/armed states.

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

[254] 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 6, 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]

The NWS have also undertaken some efforts for increasing transparency. Under the New START, Russia and the United States have exchanged data and information through the Nuclear Risk Reduction Centers (NRRC), and transferred approximately 6,000 notifications since the signing of the Treaty.[255]

Another effort was that the five NWS submitted the "P5 Glossary of Key Nuclear Terms," a glossary of definitions of the key nuclear terms, to the 2015 NPT RevCon.[256] While this is a first step to increase transparency and mutual trust among the NWS, the Glossary is criticized in that it contains only 227 words (their original goal was to define more than 500 terms), and mostly consists of nuclear fuel cycle terms.[257]

Lastly, not just NWS but also NNWS are required to increase their transparency on nuclear disarmament and non-proliferation. The following NNWS surveyed in this *Hiroshima Report* submitted their National Report to the 2015 NPT RevCon: Australia, Austria, Belgium, Brazil, Canada, Iran, South Korea, the Netherlands, New Zealand, Poland, South Africa, Switzerland and Syria.[258]

(9) Verifications of Nuclear Weapons Reductions

Russia and the United States have implemented verifications under the New START. Among them, more than 150 on-site inspections have been conducted.[259]

Three of the NWS introduced their efforts on nuclear disarmament verifications in their reports submitted to the 2015 NPT RevCon, as follows:

- China:[260]
  - Developing the mobile Argon-37 rapid measuring and detection system (MARDS) and the radio xenon sampling, purification and measurement system (XESPM), which would be used for the IFE14 of the CTBT in 2014; and
  - Conducting research on a reasonable, effective and cost-effective verification system for an FMCT.
- The United Kingdom:[261]
  - Conducting the U.K.-Norway Initiative, which is to address some of the technical and procedural challenges posed by effective verification of warhead dismantlement, and hosting a P5 expert-level meeting on verification, to discuss lessons learned from the Initiative in 2012;
  - Continuing an active partnership with the United States in monitoring and verification research for more than a decade, through which to apply policy, technology and program

[255] NPT/CONF.2015/PC.III/17, April 25, 2014.

[256] "P5 Glossary of Key Nuclear Terms," P5 Working Group on the Glossary of Key Nuclear Terms, April 2015.

[257] Gabriella Irsten, "Event: Glossary of Key Nuclear Terms," *NPT News in Review*, Vol. 13, No. 4 (May 6, 2015), p. 6.

[258] Australia, Austria, Canada, Iran, the Netherlands, New Zealand and Switzerland also submitted their report to the 2014 PrepCom. Germany, Japan and Mexico submitted not to the 2015 RevCon but to the 2014 PrepCom.

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

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

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

expertise to develop and evaluate targeted approaches for transparent reductions and monitoring of nuclear warhead, fissile material and associated facilities for potential disarmament and non-proliferation initiatives; and

- ✧ Conducting two technical exchange visits with China, and intending to continue collaborative exchanges into arms control and verification research.

➢ The United States:[262]

- ✧ Examining procedures and technology required for the monitored dismantlement of nuclear weapons, building on a three-year chain-of-custody project that culminated in demonstration experiments in January 2014:
  - developing a representative environment for testing and evaluating technology research and development (R&D) of chain-of-custody technologies and carrying out a series of technical evaluations; and,
  - developing technologies to support accountability of warheads including evaluating the potential feasibility of a real-time system for counting items of inspection using radio-frequency identification (RFID) tags and testing its potential use in an inspection scenario.
- ✧ Supporting a range of research and development activities to expand work on verification technologies—including capabilities to enable monitoring of warheads (including non-deployed one in storage) as well as capabilities to distinguish warheads by type—and investing multimillion dollars;
- ✧ Conducting a comprehensive nuclear warhead modelling and measurement campaign to establish a comprehensive nuclear warhead and component signature set—the resulting data will support assessment of sensitive information that could be revealed as a result of future treaty verification activities, and will further guide future research and development in the areas of radiation detection and information protection;
- ✧ Conducting field demonstrations and evaluations of nuclear warhead lifecycle "end-to-end" monitoring capabilities, to include warhead storage and transportation monitoring demonstrations and evaluations;
- ✧ Developing the on-site inspection element of the CTBT verification regime;
- ✧ Developing monitoring capabilities for defined fissile material production facilities and for possible inspections at sensitive U.S. sites;
- ✧ Continuing the U.K.-U.S. active partnership in monitoring and verification research, including a joint technical cooperation program to apply policy, technology and programme expertise to develop and evaluate targeted approaches for transparent reductions and monitoring of nuclear warheads, fissile material and associated facilities for potential disarmament and non-proliferation initiative; and
- ✧ Funding over $110 million for research, development, test and evaluation for arms control and non-proliferation verification technology in 2013.

According to a report published in 2015, the United Kingdom and the United States have conducted

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

joint research and development on measures for nuclear disarmament verifications, including: managed access exercise; joint measurement and data analysis; warhead campaign and comprehensive data set development; and portal monitor for arms control.[263] 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.[264]

One of the noticeable activities on verification is the "International Partnership for Nuclear Disarmament Verification (IPNDV)" which was launched by the United States in December 2014. The inaugural meeting was held in Washington D.C. in March 2015. At the subsequent meeting in Oslo in November, "the 26 countries of the Partnership agreed to form three working groups to inform closer study on verification issues that exist at all stages of the nuclear weapons lifecycle."[265]

- Working Group One: "Monitoring and Verification Objectives," will be chaired by Italy and the Netherlands.
- Working Group Two: "On-Site Inspections," will be chaired by Australia and Poland.
- Working Group Three: "Technical Challenges and Solutions," will be chaired by Sweden and the United States.

The third meeting of the IPNDV will be held in Tokyo in the summer of 2016.

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."[266] At the 2014 NPT PrepCom, the NAM called for establishing an IAEA standing committee to verify nuclear disarmament.[267]

(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

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

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

[265] Bureau of Arms Control, Verification, and Compliance, U.S. Department of State, "Updates on the International Partnership for Nuclear Disarmament Verification," Fact Sheet, September 21, 2015, http://www.state.gov/t/avc/rls/247127.htm.

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

[267] "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.

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 following activities.[268]

- 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.
- It eliminated 52 Minuteman III silos and one Peacekeeper ICBM silo in 2014.[269]

In April 2014, the United States declared that it had eliminated 9,952 nuclear warheads during 1994-2013.[270] Thus, it eliminated a further 299 warheads during the year after that declaration. The U.S. declaration also included the number of eliminated nuclear warheads: 352 in 2010, 305 in 2011, 308 in 2012, and 239 in 2013.

Due to the sequestration of the U.S. budget, the pace of dismantlement has encountered delay.[271] The United States reportedly may not be able to complete a plan to dismantle designated nuclear warheads by 2022 since the "administration's fiscal 2015 budget request would reduce spending on nuclear-armed dismantlement from a current enacted level of $54.3 million to $30 million in the coming funding cycle."[272] A report by the U.S. Government Accountability Office (GAO) criticized that "[h]ow NNSA measures progress toward its performance goal of dismantling all weapons retired prior to fiscal year 2009 by the end of fiscal year 2022 is unclear and may make its reported progress misleading."[273]

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.

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[268] 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/.

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

[270] U.S. Department of State, "Transparency in the U.S. Nuclear Weapons Stockpile," Fact Sheet, April 29, 2014, http://www.state.gov/t/avc/rls/225343.htm. See also Hans M. Kristensen, "US Nuclear Weapons Stockpile Number Declassified: Only 309 Warheads Cut by Obama Administration," *FAS Strategic Security Blog*, April 29, 2014, http://blogs.fas.org/security/2014/04/nuclearstockpile/#lightbox/0/.

[271] Diane Barnes, "DOD Nonproliferation Work to Suffer Under Budget Cuts," *Global Security Newswire*, March 4, 2013, http://www.nti.org/gsn/article/nuclear-nonproliferation-activities-suffer-under-budget-cuts-hagel/.

[272] "The U.S. Might Slow Down Warhead Disassembly for Lack of Funds," *Global Security Newswire*, March 31, 2014, http://www.nti.org/gsn/article/funding-cut-may-stretch-us-timeline-warhead-dismantlement/.

[273] United States Government Accountability Office, "Actions Needed by NNSA to Clarify Dismantlement Performance Goal," Report to the Subcommittee on Energy and Water Development, Committee on Appropriations, U.S. Senate, April 2014, p. 22. See also Diane Barnes, "GAO: U.S. Gives Clouded View of Nuclear-Arms Dismantlement," *Global Security Newswire*, May 5, 2014, http://www.nti.org/gsn/article/gao-us-risks-nuclear-arms-disassembly/.

B) Decommissioning/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.[274]
- France:[275]
  - 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 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.[276]
- The United States:[277]
  - 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;

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

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

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

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

- ✧ 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.[278]

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

In 2015, no significant progress was made regarding issues on fissile material declared excess for military purposes.

Meanwhile, the United States disclosed that it has down-blended more than 146 MT of its HEU, and more than 50 MT of this material was done under IAEA monitoring.[279] On the other hand, the U.S. plan on plutonium disposal has been criticized since the construction of the Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF) at the Savannah River Site in South Carolina, for converting surplus weapon-grade plutonium into MOX fuel, whose budget was approved in May 2015, but has repeatedly faced delays and budget over-runs. The cost for completion of the plan of converting into MOX fuel has been estimated as totaling $25.1 billion. However, according to a study conducted by a U.S. Air Force-funded research and development center known as the Aerospace Corporation, "the effort could cost at least $30.7 billion to complete…[and] this cost might even balloon to $47.5 billion."[280] It has been concerned that such delay or major change to the program would make it difficult to implement the U.S.-Russian Plutonium Management and Disposition Agreement (PMDA) under which they are to dispose of 34 MT of weapon-grade plutonium extracted from nuclear weapons converting it to MOX fuel for commercial nuclear power plant.

Russia plans not to permanently dismantle surplus weapon-grade plutonium, but rather to dispose of it through use as fuel in BN-600 and BN-800 fast breeder reactors, which produce more fuel than they fission.[281] 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."[282] Among the NWS, the United Kingdom has announced that all nuclear material no longer deemed necessary for military purposes

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

[279] NPT/CONF.2015/38, May 1, 2015; "Statement of the United States," at the First Committee of the UN General Assembly, Thematic Discussion on Nuclear Weapons, October 19, 2015.

[280] Douglas Birch, "The Projected Cost of the Government's Most Expensive Nonproliferation Effort Rises Again," The Center for Public Integrity, April 23, 2015, http://www.publicintegrity.org/2015/04/23/17218/projected-cost-governments-most-expensive-nonproliferation-effort-rises-again.

[281] 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.

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

has been placed under international safeguards.[283]

A study conducted by a U.S. research institute estimated that:[284]

> Since the end of the Cold War, stocks of military HEU have diminished overall. As of the end of 2014, almost 650 tonnes of military HEU have been blended down into low enriched uranium (LEU), a form not usable in nuclear weapons. Another 116 tonnes are declared excess and awaiting downblending to LEU or ultimate disposal in a geological depository, (e.g. HEU in US naval spent fuel). Since the end of the Cold War, about 38 percent of the post-Cold War HEU stock has been blended down to LEU or is awaiting downblending or disposal.
>
> In the case of plutonium, there are also substantial excess stocks in addition to stocks dedicated to the nuclear weapons programs. About 111 tonnes of plutonium are slated for disposal in geological repositories or irradiation in civil nuclear reactor fuel and then disposition. About 47 percent of the plutonium in military stocks at the end of the Cold War has been committed to civil purposes or disposal as waste. However, plutonium disposition programs have encountered serious delays and little of this plutonium has been used in civil programs or disposed.

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

At the 2015 NPT RevCon, 73 countries (including Australia, Austria, Belgium, Brazil, Canada, Chile, Egypt, Germany, Indonesia, Japan, Kazakhstan, Mexico, the Netherlands, New Zealand, Nigeria, Norway, the Philippines, Poland, Sweden, Turkey, UAE, the United Kingdom and the United States) led by Japan issued the joint statement, in which they emphasized the importance of the recommendations on disarmament and non-proliferation education and cooperation with civil society written in the Final Document of the 2010 RevCon (Action 22).[285] In this joint statement, they also argued that "it is important to raise awareness both in nuclear disarmament and non-proliferation issues among the public, especially the young generations, of the catastrophic humanitarian consequences of the use of nuclear weapons, the threat of diverse risks and the challenges posed by the proliferation of nuclear weapons, as well as steps required to overcome these challenges."

A number of efforts have been made for disarmament and non-proliferation education and cooperation with civil society. For instance:

- Japan: dispatching Special Communicators and Youth Special Communicators for a World without Nuclear Weapons; posting testimonies of *Hibakusha* (atomic bomb survivors) on the

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

[284] David Albright and Serena Kelleher-Vergantini, "Military Highly Enriched Uranium and Plutonium Stocks in Acknowledged Nuclear Weapon States: End of 2014," Institute for Science and International Security, November 3, 2015, p. 3.

[285] "Joint Statement on Disarmament and Non-Proliferation Education," at the 2015 NPT Review Conference, Main Committee I, May 6, 2015.

Foreign Ministry's homepage;[286] and supporting exhibitions about atomic bombing abroad.

- The United States: hosting 6th Annual Generation Prague Conference in July 2015, aiming to educate younger generations on international security and nuclear policy.[287]
- Australia, Austria, the Netherlands, New Zealand and Switzerland: funding projects and conferences conducted by research institutes and NGOs.
- EU: funding an education program implemented by the EU Consortium on Non-Proliferation and Disarmament with €850,000 over three years, which comprises the development of an e-learning device at master course level, and an internship program for students.

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.[288] In 2015, among the states surveyed in this report: Austria, Canada, China, Egypt, France, Germany, Japan, Mexico, the Netherlands, New Zealand, Russia, Sweden, Switzerland, the United Kingdom and the United States along with others held side events at the NPT RevCon; and Australia, Austria, Chile, Mexico, the Netherlands, New Zealand, Nigeria, Sweden and the United States hosted such events at the UNGA First Committee.[289]

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 organizations or companies.[290]

(12) Hiroshima Peace Memorial Ceremony

On August 6, 2015, the Hiroshima Peace Memorial Ceremony was held in Hiroshima. Representatives from 100 countries and the EU, along with Japan, participated, including:

- Ambassadorial-level—Australia, Austria, Brazil, Canada, Chile, Egypt, France, Germany,

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[286] Ministry of Foreign Affairs of Japan, "Testimony of Hibakusha (atomic bomb survivors)," http://www.mofa.go.jp/policy/ un/disarmament/arms/testimony_of_hibakusha/index.html.

[287] Kelsey Davenport, "Profile: State Dept. Targets 'Generation Prague,'" *Arms Control Today*, Vol. 44, No. 7 (September 2014), pp. 41-43.

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

[289] "2015 NPT Calendar of Events," Reaching Critical Will, updated May 20, 2015, http://www.reachingcriticalwill.org/disarmament-fora/npt/2015/calendar; "Calendar of Events for First Committee 2015," Reaching Critical Will, updated October 22, 2015, http://reachingcriticalwill.org/disarmament-fora/unga/2015/calendar.

[290] See IKV Pax Christi and ICAN, "Don't Bank on the Bomb: A Global Report on the Financing of Nuclear Weapons Producers," October 2013.

Iran, Israel, Kazakhstan, Mexico, the Netherlands, New Zealand, Norway, Poland, the United Kingdom and the United States (along with Under Secretary of State)

- Non-Ambassadorial-level— Belgium, India, South Korea, Pakistan, the Philippines, Russia, South Africa, 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, Nigeria, Saudi Arabia, Syria, Switzerland, Turkey, UAE, North Korea (Note: underline added to denote countries whose representatives have attended the ceremony at least once in the past three years)

At the 2015 NPT RevCon, Japan and the NPDI proposed to include the following sentence in a final document: "The Conference invite the world's political leaders to visit Hiroshima and Nagasaki to witness the humanitarian consequences of nuclear weapons with their own eyes."[291] While this was included in an earlier version of a draft final document, China insisted that this sentence be omitted, arguing that: "The purpose is that they (the Japanese government) are trying to portray Japan as a victim of the Second World War, rather than a victimizer."[292] While several states supported Japan's position, it was deleted from latter versions of a draft final document. After consultations between Japan and China, the following paragraph was included in the final version of the draft final document:

> In light of the 70th year since the end of the tragic devastations of World War II, the Conference encourages all States, including in cooperation with the United Nations and other international organizations, the Red Cross and Red Crescent Movement, local non-governmental organizations, academic institutions and the private sector, to continue and intensify efforts in the field of disarmament and nonproliferation education to raise awareness of the public, in particular of younger and future generations, as well as of leaders, disarmament experts and diplomats on all topics relating to nuclear disarmament and nonproliferation, including through interactions with and directly sharing the experiences of the people and the communities affected by nuclear weapons to know their humanitarian impact. The conference also encourages all States to make use of new information and communication technology in these efforts.

[291] NPT/CONF.2015/WP.16, March 20, 2015.

[292] "U.N. Disarmament Conference Drops Call for Leaders to Visit Hiroshima after China Envoy Complains," *Japan Times*, May 13, 2015, http://www.japantimes.co.jp/news/2015/05/13/national/u-n-disarmament-conference-drops-call-leaders-visit-hiroshima/#.VqA1SfmLSUk.

Chapter 2. Nuclear Non-Proliferation[1]

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

A) Accession to the NPT

The Nuclear Non-Proliferation Treaty (NPT) has 191 member states (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. In December 2014, South Sudan's Foreign Minster Barnaba M. Benjamin "reiterated his government's commitment to adhere to global non-proliferation norms, including by acceding to the [NPT] at an early date,"[2] but South Sudan has yet to join the Treaty. North Korea declared its withdrawal from the NPT twice, in 1993 and 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 1 and 2 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 1 and 2 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 2. 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 2 and 3 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.[3] In this report, the United States also implied that Iran and Syria have not complied with Article 3-1 of the NPT, but did not touch on whether they violated obligations under Article 2. The report stated that "Iran continued to be in violation of its obligations under the NPT and its IAEA Safeguards Agreement,"[4] and "Syria remains in violation of its obligations under the NPT and its Safeguards Agreement."[5]

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

[1] Chapter 2 is written by Hirofumi Tosaki.

[2] "South Sudan: Foreign Minister Benjamin Calls for Redoubled International Commitment," Press Release, December 4, 2014, http://allafrica.com/stories/201412200148.html.

[3] U.S. Department of State, "Adherence to and Compliance with Arms Control, Nonproliferation, and Disarmament Agreements and Commitments," April 2015, p. 37.

[4] Ibid., p. 32.

[5] Ibid., p. 39.

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.[6]

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 weapon and ballistic missile-related activities. Moreover, it conducted the fourth nuclear explosion test in January 6, 2016. The Six-Party Talks have not been reconvened since 2007 due to a North Korea's posture, including its refusal to re-commit to an unequivocal determination of its denuclearization.

Iran

Background

The UNSCR 1737 in December 2006 mandated that Iran, under Chapter 7 of the UN Charter, suspend, *inter alia*: all enrichment-related and reprocessing activities, including research and development; and work on all heavy water-related projects, including the construction of a research reactor moderated by heavy water.[7] The mandate was repeated in five other UNSCRs. Iran did not comply; rather, it insisted on "the inalienable right of sovereign states to use nuclear energy for peaceful purposes" under Article 4 of the NPT, and continued to produce enriched uranium.

Since September 2013, Iran has engaged in negotiations with the E3/EU+3 (France, Germany and the United Kingdom/European Union plus China, Russia and the United States) to resolve the nuclear issue. In November 2013, the parties reached an interim deal, termed the Joint Plan of Action (JPOA),[8] in which they listed the specific elements of a six-month, first step implementation plan, as well as the broader elements of a final, comprehensive solution, with negotiations to be concluded and implementation commenced within one year.

The parties could not conclude an agreement by the July 2014 deadline, and agreed to extend negotiations for four months and to continue the first step measures in the meantime. When the E3/EU+3 and Iran could not resolve disagreements by the new November 24, 2014 target date, they agreed to further extend the deadline for concluding an "agreed framework" until the end of March 2015, and a final agreement by the end of June 2015.

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[6] S/RES/1718, October 14, 2006. The UNSCR 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)."

[7] S/RES/1737, December 23, 2006. Similar demands were made in the UNSCRs 1803 (March 2008) and 1929 (June 2010) adopted in response to Iran's nuclear issue.

[8] "Joint Plan of Action," Geneva, November 24, 2013, http://www.theguardian.com/world/interactive/2013/nov/24/iran-nuclear- deal-joint-plan-action.

Conclusion of the JCPOA

On April 2, 2015, E3/EU+3 and Iran agreed a framework (or parameters) for a Joint Comprehensive Plan of Action (JCPOA) in Lausanne, Switzerland.[9] During the successive negotiations, they struggled to overcome gaps in their opinions regarding such issues as how to verify Iranian nuclear activities, scope and timing to mitigate or lift sanctions imposed against Iran, and the extent of limiting Iran's research and development of centrifuges. After three successive extensions of the deadline (June 30, July 7 and July 10),[10] however, E3/EU+3 and Iran finally agreed the JCPOA on July 14 in Vienna.[11]

Six days later, on July 20, the UN Security Council unanimously endorsed the agreement by means of adopted Resolution 2231,[12] 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 more than 100-page JCPOA consists of Preface, Preamble and General Provisions, Nuclear, Sanctions, Implementation Plan, Dispute Resolution Mechanism, and Annex (Nuclear Related Commitments, Sanctions Related Commitments, Civil Nuclear Cooperation, Joint Commission, and Implementation Plan).

In its "Preamble and General Provisions," E3/EU+3 and Iran mentioned the bases of their agreement, including:

- "The full implementation of this JCPOA will ensure the exclusively peaceful nature of Iran's nuclear programme";
- "Iran reaffirms that under no circumstances will Iran ever seek, develop or acquire any nuclear weapons";
- "This JCPOA will produce the comprehensive lifting of all UN Security Council sanctions as well as multilateral and national sanctions related to Iran's nuclear programme";
- "Successful implementation of this JCPOA will enable Iran to fully enjoy its right to nuclear energy for peaceful purposes";
- "The E3/EU+3 and Iran will meet at the ministerial level every 2 years, or earlier if needed, in order to review and assess progress and to adopt appropriate decisions by consensus"; and
- "The E3+3 will submit a draft resolution to the UN Security Council endorsing this JCPOA affirming that conclusion of this JCPOA marks a fundamental shift in its consideration of this issue and expressing its desire to build a new relationship with Iran. This UN Security Council resolution will also provide for the termination on Implementation Day of provisions

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[9] The United States disclosed the points they agreed as "Parameters for a Joint Comprehensive Plan of Action Regarding the Islamic Republic of Iran's Nuclear Program," April 2, 2015, http://www.state.gov/r/pa/prs/ps/2015/04/240170.htm. Iranian Foreign Ministry also issued a fact sheet on their agreement. Its unofficial translation is "Translation of Iranian Fact Sheet on the Nuclear Negotiations," Harvard's Belfer Center, April 3, 2015, http://iranmatters.belfercenter.org/blog/translation-iranian-factsheet-nuclear-negotiations.

[10] Meanwhile, the E3/EU+3 and Iran continued to implement the JPOA.

[11] "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/).

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

imposed under previous resolutions; establishment of specific restrictions; and conclusion of consideration of the Iran nuclear issue by the UN Security Council 10 years after the Adoption Day."[13]

The sequence and the milestones for implementation of the JCPOA (section 34 and Annex V) are:

- Finalization Day—the date on which negotiations of this JCPOA are concluded, to be followed promptly by submission of the resolution endorsing this JCPOA to the UN Security Council for adoption without delay.
- Adoption Day—the date 90 days after the endorsement of this JCPOA by the UN Security Council, or such earlier date as may be determined by mutual consent of the JCPOA participants, at which time the JCPOA and the commitments in this JCPOA come into effect. JCPOA participants make necessary arrangements and preparations for the implementation of their JCPOA commitments. Iran officially informs the IAEA that Iran provisionally applies the Additional Protocol, and fully implements the modified code 3.1.
- Implementation Day—the date on which, simultaneously with the IAEA report verifying implementation by Iran of the 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 UN Security Council resolution, the actions described in Section 18 of Annex V occur 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).
- Transition Day—the date 8 years after Adoption Day or the date on which the Director General of the IAEA submits a report stating that the IAEA has reached the Broader Conclusion that all nuclear material in Iran remains in peaceful activities, whichever is earlier. On that date, the EU and the United States will take the actions described in Sections 20 and 21 of Annex V respectively and Iran will seek, consistent with the Constitutional roles of the President and Parliament, ratification of the Additional Protocol.
- UN Security Council resolution Termination Day—the date 10 years from Adoption Day. The UN Security Council resolution endorsing this JCPOA terminates according to its terms. The EU will take the actions described in Section 25 of Annex V.

Limitations on Iran's nuclear activities

Under its main objective—preventing Iran from acquiring nuclear weapons, the JCPOA stipulates strict restrictions on Iranian nuclear activities during a specific period of time. These restrictions were designed to ensure that for over ten years Iran would not be able to produce highly enriched uranium (HEU) sufficient for a nuclear weapon in less than one year's time. Agreed restrictions on uranium enrichment and plutonium production along with strict verification measures gave the E3/EU+3 confidence that the agreement met their goal of blocking all potential Iranian paths to a nuclear weapon for the time being.

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[13] The previous UNSCRs are 1696 (2006), 1737 (2006), 1747 (2007), 1803 (2008), 1835 (2008), 1929 (2010) and 2224 (2015).

Regarding uranium enrichment activities (Section 27-63 of Annex I), Iran will "keep its enrichment capacity at Natanz at up to a total installed uranium enrichment capacity of 5,060 IR-1 centrifuges," and "Excess centrifuges and enrichment related infrastructure at Natanz [are] stored under IAEA continuous monitoring" (Section 2). Iran can carry out its uranium enrichment-related activities only at Natanz, including research and development (R&D), based on its own long-term plan, but has to keep its level of uranium enrichment at up to 3.67% (Section 5). The Fordow facility, which is built deep in a mountain for protection against possible bombing, is to be converted into a nuclear, physics and technology center (Section 5 and 6). Some of the 1,011 IR-1 centrifuges there will spin without uranium (Section 6).

As for the amount of enriched uranium stockpile, Iran can possess under 300kg of up to 3.67% enriched uranium hexafluoride (UF6) or the equivalent in other chemical forms during the 15 year period, and has to sell the excess quantities based on international price or down-blend to natural uranium level. Iran's stockpile of enriched uranium was thus to be reduced by 98%. All remaining uranium oxide enriched to between 5% and 20% will be fabricated into fuel for the Tehran Research Reactor (Paragraph 7). The so called "breakout time"—defined as the amount of time that it would take Iran to produce sufficient weapons-grade uranium for one nuclear weapon after it decides to acquire nuclear weapons—is considered to be extended from current two months to approximately one year by implementing those measures.

Iran can continue to conduct enrichment R&D in a manner that does not accumulate enriched uranium for 10 years, using only IR-4, IR-5, IR-6 and IR-8 centrifuges. It will be able to commence testing of up to 30 IR-6 and IR-8 centrifuges after eight and a half years (Section 3), whose manufacturing (without rotors) is to be permitted from the eighth year (Section 4).

For preventing Iran from producing weapon-grade plutonium, the JCPOA stipulates, *inter alia*, that: Iran will redesign and rebuild a modernized heavy water research reactor in Arak (IR-40) in a form of an international partnership; all spent fuel from Arak will be shipped out of Iran for the lifetime of the reactor; and Iran will neither possess additional heavy water reactors nor accumulate heavy water for 15 years (Sections 8-10). According to the Annex I, the redesigned/rebuilt IR-40 will use up to 3.67% enriched uranium in the form of uranium dioxide (UO2), and its power will not exceed 20 MWth (Section 2-13 of Annex I).[14]

Furthermore, the JCPOA states that "[f]or 15 years Iran will not, and does not intend to thereafter, engage in any spent fuel reprocessing or construction of a facility capable of spent fuel reprocessing, or reprocessing R&D activities leading to a spent fuel reprocessing capability, with the sole exception of separation activities aimed exclusively at the production of medical and industrial radio-isotopes from irradiated enriched uranium targets" (Section 12). Annex I of the JCPOA also stipulates that "Iran

[14] A reactor whose power exceeds 20 MWth is considered to be able to produce a "significant quantity" of plutonium per year.

will not produce, seek, or acquire separated plutonium, highly enriched uranium (defined as 20% or greater uranium-235), or uranium-233, or neptunium-237 (except for use as laboratory standards or in instruments using neptunium-237) for 15 years."

It should also be noted that Iran agrees not to "engage in activities, including at the R&D level, that could contribute to the development of a nuclear explosive device, including uranium or plutonium metallurgy activities," as transparency and confidence-building measures (Section 16; Section 82 of Annex I[15]). These limits go beyond the requirements of the NPT.

Verification

The issues on verification of Iran's implementation of its commitments under the JCPOA are stipulated in a section titled "Transparency and Confidence-Building Measures." First of all, Iran agreed to provisionally apply the IAEA Additional Protocol,[16] which was officially informed on Adoption Day. The provisional application of the Additional Protocol becomes effective on Implementation Day. Meanwhile, Iran is to "[s]eek, consistent with the Constitutional roles of the President and Parliament, ratification of the Additional Protocol" by Transition Day. Iran will also fully implement the modified code 3.1 of the IAEA Safeguards Agreement on Adoption Day (Section 13; Section 8 and 22 of Annex V).

In addition, "Iran will allow the IAEA to monitor the implementation of the voluntary measures for their respective durations, as well as to implement transparency measures, as set out in this JCPOA and its Annexes. These measures include" (Section 15; Section 67-69 of Annex I):

- a long-term IAEA presence in Iran;
- IAEA monitoring of uranium ore concentrate produced by Iran from all uranium ore concentrate plants for 25 years;
- containment and surveillance of centrifuge rotors and bellows for 20 years;
- use of IAEA approved and certified modern technologies including on-line enrichment measurement and electronic seals; and
- a reliable mechanism to ensure speedy resolution of IAEA access concerns for 15 years, as defined in Annex I.

On the Iranian enrichment-related activities, Iran is to "permit the IAEA to implement continuous monitoring, including through containment and surveillance measures, as necessary, to verify that stored centrifuges and infrastructure remain in storage…[and] the IAEA regular access, including daily access as requested by the IAEA, to relevant buildings at Natanz…for 15 years" (Section 70-71 of Annex I).

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[15] As activities that could contribute to the development of a nuclear explosive device, Iran will not engage in: designing, developing, acquiring, or using computer models to simulate nuclear explosive devices; designing, developing, fabricating, acquiring, or using multi-point explosive detonation systems suitable for a nuclear explosive device, unless approved by the Joint Commission for non-nuclear purposes and subject to monitoring; designing, developing, fabricating, acquiring, or using explosive diagnostic systems (streak cameras, framing cameras and flash x-ray cameras) suitable for the development of a nuclear explosive device, unless approved by the Joint Commission for non-nuclear purposes and subject to monitoring; and designing, developing, fabricating, acquiring, or using explosively driven neutron sources or specialized materials for explosively driven neutron sources (Section 82 of Annex I).

[16] Iran already signed the IAEA Additional Protocol in 2003, but yet to ratify.

Regarding requests of access to the Iran's facilities, the purpose should "be exclusively for resolving concerns regarding fulfilment of the JCPOA commitments and Iran's other non-proliferation and safeguards obligations," without aiming at interfering with Iranian military or other national security activities. With regard to access to undeclared facilities, the process stipulated in Annex I of the JCPOA is:[17]

- The IAEA will provide Iran the basis for concerns regarding undeclared nuclear materials or activities, or activities inconsistent with the JCPOA, at locations that have not been declared, and request clarification; and
- "If Iran's explanations do not resolve the IAEA's concerns, the Agency may request access to such locations for the sole reason to verify the absence of undeclared nuclear materials and activities or activities inconsistent with the JCPOA at such locations. The IAEA will provide Iran the reasons for access in writing and will make available relevant information."

As for procedures when problems on the IAEA verification and surveillance may arise, JCPOA stipulates (Section 78 of Annex I) as follows:

> If the absence of undeclared nuclear materials and activities or activities inconsistent with the JCPOA cannot be verified after the implementation of the alternative arrangements agreed by Iran and the IAEA, or if the two sides are unable to reach satisfactory arrangements to verify the absence of undeclared nuclear materials and activities or activities inconsistent with the JCPOA at the specified locations within 14 days of the IAEA's original request for access, Iran, in consultation with the members of the Joint Commission, would resolve the IAEA's concerns through necessary means agreed between Iran and the IAEA. In the absence of an agreement, the members of the Joint Commission, by consensus 24 or by a vote of 5 or more of its 8 members, would advise on the necessary means to resolve the IAEA's concerns. The process of consultation with, and any action by, the members of the Joint Commission would not exceed 7 days, and Iran would implement the necessary means within 3 additional days.

If the problems cannot be resolved via the procedures above, the participants will consult within the dispute resolution mechanism envisaged by the JCPOA.

Besides the verification measures mentioned above, Iran agrees to carry out two measures on nuclear-related export/import controls as confidence-building measures. One is that Iran is to apply nuclear export policies and practices in line with the internationally established standards for the export of nuclear material, equipment and technology (Section 73 of Annex I). More importantly, Iran is to cooperate and act in accordance with the procurement channel in the JCPOA regarding Iran's procurement and transference of material, equipment, goods and technology needed for its nuclear-related activities. To this end, the JCPOA stipulates (Section 17; and Section 6 of Annex IV) that, *inter*

[17] According to the JCPOA, the procedures for access "are for the purpose of JCPOA implementation between the E3/EU+3 and Iran and are without prejudice to the safeguards agreement and the Additional Protocol thereto" (Section 74 of Annex I). It could be interpreted that verifications, including access to undeclared facilities, to the activities dealing with nuclear material are to be conducted in accordance with the Additional Protocol after its provisional application or entry into force by Iran.

alia, "Iran will provide to the IAEA access to locations of" items listed in INFCIRC/254/Rev.12/Part 1 (NSG Guidelines Part I), and "permit the exporting state to verify the end-use of [them] set out in INFCIRC/254/Rev.9/Part 2" (NSG Guidelines Part II).

Finally, as for one of the most contentious issues during the negotiation of the JCPOA, participants agreed that Iran was to implement a "Roadmap for Clarification of Past and Present Outstanding Issues" agreed with the IAEA (Section 14).[18] According to the JCPOA:

- Iran's implementation of the "Roadmap for Clarification of Past and Present Outstanding Issues" agreed with the IAEA;
- Completion of Iran's implementation of activities undertaken by the Roadmap by October 15, 2015; and
- The IAEA Director General's final assessment by December 15, 2015, and submission of a resolution to the Board of Governors.

In the Framework of the JPCOA in April 2015, addressing the possible military dimensions (PMD) concerns was one of the conditions for lifting sanctions against Iran. "Addressing" did not mean clarifying all of Iran's past nuclear activities. U.S. State Secretary John Kerry said in June 2015, "[W]e're not fixated on Iran specifically accounting for what they did at one point in time or another. We know what they did… What we're concerned about is going forward. It's critical to us to know that going forward, those activities have been stopped, and that we can account for that in a legitimate way."[19] This was seen by some critics as a change of policy but supporters of the accord argued it would be unrealistic to expect Iran to admit to weapons-related work that contravened the Supreme Leader's fatwa against nuclear weapons.[20]

Lifting sanctions

As a reward for accepting restrictions on Iran's nuclear activities, the sanctions against Iran will be partially lifted in a phased manner.[21] Firstly, the UNSCR 2231 endorsing the JCPOA stipulates to "terminate all provisions of previous UN Security Council resolutions on the Iranian nuclear issue" on Implementation Day, and to establish certain "specific restrictions, as specified in Annex V" of the JCPOA (Section 18). Under the UNSCR 2231, the following sanctions are lifted: prohibition of supplying, purchasing and transferring items, material, equipment and technologies in relation to

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[18] According to the "Road-map for the Clarification of Past and Present Outstanding Issues Regarding Iran's Nuclear Program" agreed by Iran and the IAEA on the same day when the JCPOA was concluded, Iran was to provide its explanations in writing and related documents to the IAEA by August 15, 2015; the IAEA would review this information by September 15, and will submit to Iran questions on any possible ambiguities regarding such information; all activities would be completed by October 15; and by December 15, 2015, the IAEA Director General would provide, for action by the Board of Governors, the final assessment on the resolution of all past and present outstanding issues. "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.

[19] John Kerry, "Secretary Kerry's Press Availability," June 16, 2015, http://www.state.gov/secretary/remarks/2015/06/243892.htm.

[20] Kelsey Davenport, "The P5+1 and Iran Nuclear Deal Alert, December 4", Arms Control Association, December 4, 2015, http://www.armscontrol.org/blog/ArmsControlNow/2015-12-04/The-P5-1-and-Iran-Nuclear-Deal-Alert-December-4.

[21] Annex II of the JCPOA stipulates concrete commitments on lifting sanctions.

the Iranian nuclear activities;[22] and freezing assets and prohibiting foreign voyages of designated totally 36 persons and entities subject to nuclear-related sanctions. However, Iran has to provide prior notifications to the Panel of Experts assisting the UNSCR 1737 Iran Sanctions Committee, the JCPOA Joint Committee, and the IAEA, when Iran imports nuclear-related items, material and so on.

Regarding non-nuclear related UN sanctions,[23] no provision is stipulated in the JCPOA. However, it was reported that the participants agreed to maintain an arms embargo for a maximum of five years, and limitations on acquiring missile-related technology for a maximum of eight years.

Some of the sanctions imposed by the EU and the United States, respectively, were to be eased in a phased manner (Section 19-29; Annexes II and V). For instance, on Implementation Day, the EU "terminate[s] all provisions of the EU Regulation…implementing all nuclear-related economic and financial sanctions" (Section 19; Annex II), and the United States ceases the application of its financial measures, an oil embargo and others listed in the JCPOA (Section 21).[24] In addition, eight year after the Adoption Day, or when the IAEA has reached the broader conclusion, "the EU will terminate all provisions of the EU Regulation implementing all EU proliferation-related sanctions" (Section 20), and "the United States will seek such legislative action as may be appropriate to terminate, or modify to effectuate the termination of, the sanctions…on the acquisition of nuclear-related commodities and services for nuclear activities contemplated in this JCPOA, to be consistent with the U.S. approach to other non-nuclear-weapon states under the NPT" (Section 23). Furthermore, the E3/EU+3 also agreed to "refrain from any policy specifically intended to directly and adversely affect the normalisation of trade and economic relations with Iran inconsistent with their commitments not to undermine the successful implementation of this JCPOA" (Section 29). On the other hand, the JCPOA does not refer to the U.S. sanctions against Iran in terms of Iran's support for terrorism and for human right abuses; therefore, those sanctions will not be directly affected or removed as a result of Iran implementing the JCPOA.

The JCPOA stipulates a so-called "snapback" mechanism: until UN Security Council resolution Termination Day (10 years from Adoption Day), the sanctions on Iran that were stipulated in the past UNSCRs will be re-imposed if allegations of Iranian significant violation of the JCPOA cannot be resolved within 65 days, at the earliest, after starting the Dispute Resolution Process. The sequence of the Process is that (Sections 36-37):

- If any of the E3/EU+3 believed that Iran was not meeting its commitments under this JCPOA, any of the E3/EU+3 could refer the issue to the Joint Commission for resolution.

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[22] Such nuclear activities, according to the UNSCR 2231, include: the modification of two cascades at the Fordow facility for stable isotope production; the export of Iran's enriched uranium in excess of 300 kilograms in return for natural uranium; and the modernization of the Arak reactor based on the agreed conceptual design and, subsequently, on the agreed final design of such reactor.

[23] This is one of the issues that delayed the conclusion of the JCPOA. Iran insisted the arms embargo be lifted as well as limitations on transferring missile-related technologies, which China and Russia supported. The United States and the European participants sought to keep these restrictions as a means of ensuring Iranian compliance.

[24] The U.S. sanctions lifted under the JCPOA are mainly secondary sanctions imposed on foreign entities and countries engaged in prohibited activities with Iran. Ongoing restrictions on U.S. entities dealing with Iran are not affected by the JCPOA (except U.S. import of Iranian-origin carpets and foodstuffs including pistachios and caviar).

- The Joint Commission would have 15 days to resolve the issue, unless the time period was extended by consensus.
- After Joint Commission consideration, any participant could refer the issue to Ministers of Foreign Affairs, if it believed the compliance issue had not been resolved. Ministers would have 15 days to resolve the issue, unless the time period was extended by consensus.
- After Joint Commission consideration—in parallel with (or in lieu of) review at the Ministerial level—either the complaining participant or the participant whose performance is in question could request that the issue be considered by an Advisory Board, which would consist of three members (one each appointed by the participants in the dispute and a third independent member). The Advisory Board should provide a non-binding opinion on the compliance issue within 15 days.
- If, after this 30-day process, the issue is not resolved, the Joint Commission would consider the opinion of the Advisory Board for no more than 5 days in order to resolve the issue.
- If the issue still has not been resolved to the satisfaction of the complaining participant, and if the complaining participant deems the issue to constitute significant non-performance, then that participant could treat the unresolved issue as grounds to cease performing its commitments under this JCPOA in whole or in part and/or notify the UN Security Council that it believes the issue constitutes significant non-performance.
- The UN Security Council, in accordance with its procedures, shall vote on a resolution to continue the sanctions lifting.[25] If the resolution described above has not been adopted within 30 days of the notification, then the provisions of the old UN Security Council resolutions would be re-imposed, unless the UN Security Council decides otherwise.

At the same time, the JCPOA also mentions that "Iran has stated that if sanctions are reinstated in whole or in part, Iran will treat that as grounds to cease performing its commitments under this JCPOA in whole or in part" (Section 36).

Progress after concluding the JCPOA

The provisions of the JCPOA were carried out smoothly for duration of the calendar year. October 18, 2015 marked "Adoption Day" for the JCPOA after completion of each participant's domestic procedure for endorsement. Toward "Implementation Day," Iran started decommissioning its centrifuges.[26] According to the IAEA Report on November 18, 4,530 centrifuges were removed in a month after "Adoption Day."[27] This was quicker than many outside experts had anticipated. The E3/EU+3 and Iran reached an agreement regarding the redesigning of IR-40 in Arak, under which China is in charge of the design and construction of modernized reactor and other E3/EU+3 participants play supporting

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[25] Under the UNSCR 2231, the Security Council is to take a vote on a draft resolution within 30 days of receiving a notification by a JCPOA participant State. Unless any members of the Security Council submit a draft resolution for a vote, the President of the Security Council submits a draft resolution within 10 days of the notification, and put it to a vote with 30 days of the notification.

[26] Thomas Erdbrink, "Iran Begins Deactivating Centrifuges Under Nuclear Deal's Terms," *New York Times*, November 2, 2015, http://www.nytimes.com/2015/11/03/world/middleeast/iran-nuclear-deal-centrifuges.html.

[27] GOV/2015/65, November 18, 2015. See also David Albright, Serena Kelleher-Vergantini, Andrea Stricker, and Daniel Schnur, "Analysis of IAEA Iran Safeguards Report," Institute for Science and International Security, November 18, 2015.

roles.[28] Furthermore, in August Iran and Russia agreed to exchange Iran's excess enriched uranium for Russia's natural uranium.[29] In the late December, 11 tons of Iran's LEU were shipped from Iran to Russia (with the acknowledged assistance of Kazakhstan and Norway).[30]

Meanwhile, Iran and the IAEA continued to address the "outstanding issues" of Iran's past and present nuclear activities.

Since the signing of the JCPOA, no country has accused Iran of any violations of the agreement. Controversy arose over Iran's test-firing of an Emad medium-range ballistic missile (MRBM) in October and a Ghadr-110 intermediate-range ballistic missile (IRBM) in November.[31] Previous UNSCRs prohibited any tests of nuclear-capable missiles, which most experts judged these missiles to be. However, the language of UNSCR 2231 in Annex B only calls upon Iran not to undertake any activity related to ballistic missiles that are "designed to be capable" of delivering nuclear weapons. Iran insists it is not the case for the missiles in question.

Withdrawal from the NPT

Although Article 10-1 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.

At the 2015 NPT Review Conference (RevCon), countries (including Australia, Austria, Belgium, Canada, China, France, Germany, Japan, South Korea, the Netherlands, Poland, Russia, Sweden, the United Kingdom and the United States) proposed the following measures in their joint working paper, *inter alia*:[32]

- "A 'notice of withdrawal' should be given in writing…The statement should be as detailed and specific as possible. The three-month period starts from the date of transmission of the note verbal to the Parties to the Treaty and the United Nations Security Council…"
- "In the event of a notice of withdrawal from the Treaty, the Parties…should hold consultations in order to assess the consequences of such withdrawal…"
- "The Parties should request that the IAEA Board of Governors be convened in the shortest

[28] "Agreement Reached on Redesign of Iran's Arak Reactor," *Nuclear Engineering International*, November 12, 2015, http://www.neimagazine.com/news/newsagreement-reached-on-redesign-of-irans-arak-reactor-4716284.

[29] "Iran, Russia Agree Exchange of Surplus Low-Enriched Uranium," *Sputnik News*, August 4, 2015, http://sputniknews.com/politics/20150804/1025377837.html#ixzz3hvgiXA5h.

[30] David Smith, "Iran Ships 25,000lb of Low-Enriched Uranium to Russia As Part of Nuclear Deal," *Guardian*, December 28, 2015, http://www.theguardian.com/world/2015/dec/28/iran-ships-uranium-russia-nuclear-deal. Nahal Toosi, "Iran Ships Uranium to Russia under Nuclear Deal," *Politico*, December 28, 2015, http://www.politico.com/story/2015/12/iran-ships-uranium-russia-nuclear-deal-217170. See also "Salehi: Iran to Export 9 Tons of Enriched Uranium to Russia Soon," *Islamic Republic News Agency*, December 19, 2015, http://www.irna.ir/en/News/81885677/.

[31] "Iran Tested Missile, Breaching U.N. Council Resolutions: Officials," *Reuters*, December 8, 2015, http://www.reuters.com/article/us-iran-missiles-idUSKBN0TQ2O220151208#PMa0uUZiGHCFmjQr.97.

[32] NPT/CONF.2015/WP.47, May 1, 2015.

possible time in order to assess the IAEA Secretariat's verification of the withdrawing Party's compliance with its obligations under its safeguards agreement, as well as the IAEA Secretariat's final inventory of items under IAEA safeguards in the withdrawing Party…"

- "All nuclear materials, equipment, technologies, and facilities established for peaceful purposes of a Party withdrawing from the Treaty should be restricted to peaceful uses only and remain subject to IAEA safeguards. Therefore, consistent with their international commitments and national law or procedures, NPT Parties could seek specific mechanisms, including government-to-government supply agreements, contracts, or other arrangements, if appropriate, ensuring that any nuclear material or equipment or any material or equipment derived from items they supply remain subject to safeguards in perpetuity in the event the recipient State's safeguards agreement is terminated as a consequence of withdrawal."
- "Supplier States could also develop appropriate and effective mechanisms to require that a Party withdrawing from the Treaty return and/or dismantle nuclear materials, equipment, and technologies received from abroad prior to withdrawal, if so requested by the supplier State. If the supplier State does not make such a request, or if for technical reasons is unable to accept return and/or dismantle, the nuclear equipment and materials, including derived nuclear materials, should remain subject to IAEA lifetime safeguards or other bilateral lifetime safeguards, if any, as well as any other related nonproliferation conditions agreed to by the recipient and supplier State."
- "NPT Parties should consider adopting a policy to refrain from further supply of nuclear facilities, material, or equipment to a withdrawing Party."

The Vienna Group of Ten (Australia, Austria, Canada, the Netherlands, New Zealand, Norway, Sweden and others) also proposed as follows:[33]

- Withdrawal is a right for States parties governed by article X of the Treaty;
- The right is governed by international law; the withdrawing State is still liable for violations of the Treaty perpetrated prior to withdrawal;
- Withdrawal should not affect any right, obligation or legal situation between the withdrawing State and each of the other States parties created through implementation of the Treaty prior to withdrawal, including those related to IAEA safeguards;
- Every diplomatic effort should be made to persuade the withdrawing State to reconsider its decision, including by addressing its legitimate security needs and encouraging regional diplomatic initiatives;
- All nuclear materials, equipment and technology acquired by a State party under article IV prior to withdrawal must remain under IAEA safeguards or fall-back safeguards even after withdrawal; and
- Nuclear-supplying States should be encouraged to exercise their right, in accordance with international law and their national legislation, to incorporate dismantling and/or return clauses or fall-back safeguards in the event of withdrawal in contracts or other arrangements concluded with the withdrawing State, and to adopt standard clauses for that purpose.

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

Five nuclear-weapon states (NWS), joining the working paper on the withdrawal issue with non-nuclear-weapon states (NNWS) as mentioned above, also argued in their joint statement that "[w]hile States Parties have the right to withdraw from the NPT, such a withdrawal must be done in accordance with Article X of the Treaty."[34] However, Chinese and Russian positions on this issue seem more cautious than those of France, the United Kingdom and the United States. For instance, Russia stated:[35]

> [W]e consider the issue of withdrawal from the NPT to be an important one. We believe that any decisions in this respect should not lead to a revision of Article X, reopening of the text of the Treaty or undermining of one of the fundamental principles of a State's sovereign right to withdraw from an international agreement. However, we support the need for a constructive exchange of views on the defining of agreed recommendations regarding the procedures for and consequences of a possible withdrawal from the Treaty. We believe that making States more accountable for a decision to withdraw from the Treaty in accordance with Article X thereof could be one of the ways to strengthen the NPT.

Some NNWS, including the Non-Aligned Movement (NAM) countries, argue that there is no need to revise or reinterpret Article 10 on a withdrawal from the NPT, which is the right of all state parties. For example, Brazil reiterated its proposal to focus less on punishment for withdrawing and more on incentives for staying within the Treaty.[36]

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 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.[37] All the states eligible to join the NWFZs in Latin America, Southeast Asia and Central Asia are parties to the respective NWFZ treaties.

One of the most significant issues that determined success or failure of the 2015 NPT review process was regarding a Middle East Zone Free of Weapons of Mass Destruction (WMD). Toward convening a Conference on a Middle East Zone Free of WMD, agreed at the 2010 NPT RevCon, up until 2015 NPT RevCon, Ambassador Jaakko Laajava, Finland's Undersecretary of State for Foreign and Security Policy and the Facilitator of the Middle East Conference, continued intensive consultations with regional and other countries concerned, and Middle Eastern countries—including Israel—together with the conveners and facilitator, held five unofficial meetings in Glion, Switzerland. Despite some progress,

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[34] "Statement by the People's Republic of China, France, the Russian Federation, the United Kingdom of Great Britain and Northern Ireland, and the United States of America," at the 2015 NPT Review Conference, April 30, 2015.

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

[36] Mia Gandenberger, "News in Brief," *NPT News in Review*, Vol. 12, No. 8 (May 7, 2014), p. 5.

[37] 53/77D, December 4, 1998.

Israel and the Arab states could not narrow a wide gap on an agenda, modality or procedure for a Conference, which therefore could not be convened.[38]

At the 2015 RevCon, Israel, attending as an observer for the first time since the 1995 NPT Review and Extension Conference, submitted a paper in which it argued that: Israel agreed to the request of the facilitator to engage in consultations to advance a regional dialogue, and participate in the unofficial meetings in Switzerland; that "if agreement is reached on the agenda, the concluding document and terms of reference of a conference in Helsinki, the regional states could proceed to set a date for such an event"; and that "[d]espite Israel's positive attitude towards continued engagement, the sixth round of consultations in Geneva was postponed several times and did not take place." Furthermore, it stated that:[39]

> Direct contact, combined with trust and confidence building, is an essential basis for the creation of a new security paradigm in a region… A meaningful process will require that: Regional states assume responsibility for the promotion of a direct regional dialogue, without external auspices that do not emanate from the region; Regional states address the broad range of security challenges facing the region; All decisions will be reached by consensus between the regional parties.

On the other hand, Egypt, which has played a leading role on this issue among the Arab countries, criticized the unofficial meetings in Glion as "an open-ended and futile pre-negotiation process lacking a specified time-frame"; and said the attempt for convening the Helsinki Conference was "compromised by the lack of sufficient political will by some of the depositaries of the 1995 Resolution," implying the United States. Furthermore, Egypt harshly argued:[40]

> [T]he consultations in Geneva and Glion merely aimed at giving a false impression to the international community that there was progress, while at the same time eroding confidence and entrenching divergence and differences that can only block any effort to achieve the resolution's objective… We cannot continue to attend meetings and agree on outcomes that do not get implemented, yet to be expected to abide by the concessions we gave for such outcomes… In this context, it is important to underline the fact that, with the failure to hold the 2012 Conference and the end of the 2015 Review cycle, the mandate of the Facilitator, as stipulated in the 2010 Action Plan, has elapsed.

The focus of discussion on the matter then moved on to whether and how participating countries could agree on the convening of the Helsinki Conference. An Egypt-led working paper by the Arab League called upon the Secretary-General to convene a conference within 180 days from the adoption of a Final Document of the 2015 RevCon, aimed at launching a process to conclude a legally binding treaty establishing a Middle East zone free of WMD.[41] The proposed mandate stated, *inter alia*:

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[38] The report by the facilitator submitted to the 2015 NPT RevCon is NPT/CONF.2015/37, April 30, 2015.

[39] NPT/CONF.2015/36, April 30, 2015.

[40] "Statement by Egypt," at the 2015 NPT Review Conference, Main Committee II, May 4, 2015.

[41] NPT/CONF.2015/WP.33, April 22, 2015.

- The Secretary-General shall invite States of the Middle East region to attend the conference, and exert all efforts and take all necessary measures with a view to ensuring the success of the conference.
- In addition to States of the region (members of the League of Arab States, Israel and Iran), the five NWS, the IAEA and so on will be invited as observers.
- The conference is to establish two working groups.
  - Working Group I: dealing with the scope, geographic demarcation of the zone, prohibitions and interim measures
  - Working Group II: dealing with verification measures and implementation mechanisms
- The conference will meet annually in its plenary format and working group.
- The permanent five members of the Security Council shall provide all necessary support for the implementation of this mandate.

The paper added that while the conference should not be postponed, any postponement agreed by participating countries should not last more than 90 days. On the other hand, it did not mention decision-making approach; therefore, it was not clear whether the Arab states could accept that any decisions would be made by consensus, as Israel demanded.

In the final version of a draft final document of the NPT RevCon, a Conference on a WMD Free Zone in the Middle East was proposed as per the following:[42]

- The Review Conference entrusts the Secretary-General of the United Nations to convene the conference no later than 1 March 2016, to which all States of the Middle East will be invited.
- The Secretary-General of the United Nations, the co-sponsors of the 1995 Resolution and all other States parties ensure that the conference will not be postponed.
- In order to ensure adequate preparation and a successful outcome of this conference, the Review Conference urges all States of the Middle East, to engage without delay in direct consultations through preparatory meetings to which all States of the region shall be invited.
- The purpose of these consultations is to reach a consensus on the agenda of the conference.
- All substantive decisions emerging from the preparatory process and the conference will be made by consensus by the States of the region.
- The conference shall define follow up steps leading to the establishment of a [WMDFZ].

However, the United States, the United Kingdom and Canada objected to the language. Without consensus, a final document could not be adopted at the 2015 NPT RevCon. The U.S explanation of its opposition was that:[43]

> [T]he proposed language for a final document did not allow for consensus discussions among the countries of the Middle East for an agreement on the agenda and the modalities of the conference and set an arbitrary deadline for holding the conference… We regret that we were not able to support the draft consensus document tabled by the President of the conference. The blame for the inability of this conference to produce a forward-looking consensus

[42] NPT/CONF.2015/R.3, May 21, 2015.

[43] Rose Gottemoeller, "Remarks at the Conclusion of the 2015 Nuclear Nonproliferation Treaty Review Conference," May 22, 2015, http://www.state.gov/t/us/2015/242778.htm.

> document, however, lies squarely with those states that were unable to show any flexibility in pursuit of the convening of a Middle East conference that enshrined the principles of consensus and equality.

Canada also stated that "the outcome document proposed for the 2015 NPT Review Conference contained elements that fail to ensure an inclusive and consensus-based approach to holding a conference on the establishment of a zone free of weapons of mass destruction (WMD) in the Middle East."[44] Egypt expressed strong disappointment that three countries blocked a final document as well as a proposal on a Middle East Conference.

Half a year on from the NPT RevCon, the 2015 UNGA adopted the resolution titled "Establishment of a nuclear-weapon-free zone in the region of the Middle East"[45] without a vote, as had happened in the past. However, few concrete measures are required 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.[46] 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."[47]

(2) IAEA Safeguards Applied to the NPT NNWS

A) Conclusion of the IAEA Safeguards Agreements

Under Article 3-1 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 2015, 11 NPT NNWS have yet to conclude CSAs with the IAEA.[48]

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 2015, 120 NPT NNWS have ratified Additional Protocols. A state's faithful implementation of the Additional Protocol, along with the CSA,

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[44] Foreign Affairs, Trade and Development Canada, "Canada Joins U.S. and U.K. in Breaking Consensus at 2015 Nuclear Non-Proliferation Treaty Review Conference," Press Release, May 23, 2015, http://www.international.gc.ca/media/aff/news-communiques/2015/05/23b.aspx?lang=eng.

[45] A/RES/70/24, December 7, 2015.

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

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

[48] The 11 NNWS either have nuclear material in small quantity or conduct no nuclear activity.

allows the IAEA Secretariat to draw 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."

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 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 2015, the IAEA General Conference called on all States with unmodified SQPs to either rescind or amend them.[49] As of September 2015, 61 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.

B) Compliance with the IAEA Safeguards Agreements

Under Article 12-C of the Statute of the IAEA, the IAEA Board shall report any non-compliance with safeguards agreements to the Security Council and General Assembly of the United Nations. Three cases of non-compliance that have been reported to the UN Security Council in recent years remain to be formally resolved, involving North Korea, Iran and Syria. As described above, owing to the conclusion of the JCPOA, the situation regarding the Iranian nuclear issues has much improved.

North Korea

The IAEA Director General summarized the current situation of the North Korea's nuclear issues in relation to the implementation of the IAEA safeguards in August 2015, as follows:[50]

- "From the end of 2002 until July 2007, the Agency was not able, and since April 2009 has not been able, to implement any safeguards measures in the DPRK."
- "The Agency continues to monitor, mainly through satellite imagery, developments at the Yongbyon site."
- "Without access to the site, the IAEA is unable to assess or confirm the exact current status of nuclear activities that North Korea seems to conduct."

[49] GC(59)/RES/13, September 18, 2015.

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

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

(as of the end of July 2015)

	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.
** North Korea has refused to accept comprehensive safeguards since it announced its withdrawal from the NPT in 1993.

Source) IAEA, “Safeguards Statement for 2014,” https://www.iaea.org/sites/default/files/sir_2014_statement.pdf; IAEA, “Status List: Conclusion of Safeguards Agreements, Additional Protocols and Small Quantities Protocols,” as of July 3, 2015.

Iran

Although the reporting failures that led to the 2005 IAEA Board finding of non-compliance have by all accounts been rectified, there has been no formal Board action to overturn the finding. The IAEA Secretariat has announced other conclusions regarding the Iranian nuclear issues, however. According to the report by the IAEA Director General in August 2015: "[w]hile the Agency continue[d] to verify the non-diversion of declared nuclear material at the nuclear facilities and LOFs declared by Iran under its Safeguards Agreement, the Agency [was] not in a position to provide credible assurance about the absence of undeclared nuclear material and activities in Iran, and therefore to conclude that all nuclear material in Iran is in peaceful activities,"[51] due to the lack of Iran's ratification and implementation of the Additional Protocol. However, under the JCPOA, Iran officially informed to provisionally apply the Additional Protocol on Adoption Day (October 18, 2015), which is to become effective on Implementation Day of the JCPOA.

On the so-called "outstanding issues" (or PMD), Iran and the IAEA concluded a "Roadmap for Clarification of Past and Present Outstanding Issues" on the same day when the JCPOA was agreed. This Roadmap stipulated:[52]

- Iran will provide, by 15 August 2015, its explanations in writing and related documents to the IAEA;
- After receiving Iran's written explanations and related documents, the IAEA will review this information by 15 September 2015, and will submit to Iran questions on any possible ambiguities regarding such information;
- All activities, as set out above, will be completed by 15 October 2015; and
- By 15 December 2015, the Director General will provide, for action by the Board of Governors, the final assessment on the resolution of all past and present outstanding issues.

One of the most difficult issues for resolution among the "outstanding issues" were alleged nuclear activities at the Parchin military base and whether IAEA inspectors would be allowed to visit the site. Iran and the IAEA was reportedly agreed that Iran, instead of the IAEA but in accordance with procedures that the IAEA established, would conduct environmental sampling at the site, and provide it to the IAEA.[53] Sampling took place in this manner in September 2015 and showed no evidence of nuclear activity having taken place. In response to criticism that Iran was "allowed to inspect itself,"[54] Deputy IAEA Director General Tero Varjoranta said that "there have been more than 40 instances of letting a country being inspected use their own nationals to do the sampling and that the process is

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[51] GOV/2015/50, August 27, 2015.

[52] "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.

[53] Thomas Erdbrink and David E. Sanger, "Atomic Agency Defends How Iran Collected Evidence at Secret Base," *New York Times*, September 21, 2015, http://www.nytimes.com/2015/09/22/world/middleeast/iran-gives-un-nuclear-inspectors-samples-from-secret-military-base.html. The agreement was not public, but a "draft" was leaked. See "Text of Draft Agreement between IAEA, Iran," *Associated Press*, August 20, 2015, http://bigstory.ap.org/article/bedd428e26924eed95c5ceaeec72d3a4/text-draft-agreement-between-iaea-Iran.

[54] "Text of Draft Agreement between IAEA, Iran," *Associated Press*, August 20, 2015, http://bigstory.ap.org/article/bedd428e26924eed95c5ceaeec72d3a4/text-draft-agreement-between-iaea-Iran.

only a small part of a rigid regimen established by the agency to make sure there is no cheating."[55] On September 20, Iran accepted a visit to Parchin by IAEA Director General Yukiya Amano.[56] The IAEA announced on October 15 that activities set out in the "Roadmap" were completed.[57]

On December 2, 2015 the IAEA circulated a report, titled "Final Assessment on Past and Present Outstanding Issues regarding Iran's Nuclear Programme."[58] The main conclusion was:

> The Agency's overall assessment is that a range of activities relevant to the development of a nuclear explosive device were conducted in Iran prior to the end of 2003 as a coordinated effort, and some activities took place after 2003. The Agency also assesses that these activities did not advance beyond feasibility and scientific studies, and the acquisition of certain relevant technical competences and capabilities. The Agency has no credible indications of activities in Iran relevant to the development of a nuclear explosive device after 2009.

The IAEA Board of Governors then adopted a resolution on December 15, in which it decided, upon receipt of the report mentioned above, to terminate its activities for clarifying the "outstanding issues."[59] At the same time, however, it should be also noted that, according to the IAEA's "Final Assessment," Iran provided neither the complete declaration nor the kind of transparency or cooperation required for the IAEA to conclude its investigation. Therefore, some analysts consider that the IAEA's investigation must continue.[60]

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."[61] In August 2014, the IAEA reported that "no new information has come to the knowledge of the Agency that would have an impact on the Agency's

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[55] "Iran: UN Nuclear Watchdog Did Not Oversee Parchin Sampling," *Associated Press*, September 22, 2015, http://www.timesofisrael.com/iran-un-nuclear-watchdog-did-not-oversee-parchin-sampling/.

[56] After the visit Director General Yukiya Amano said, "Inside the building, we saw indications of recent renovation work. There was no equipment in the building. Our experts will now analyse this information and we will have discussions with Iran in the coming weeks, as foreseen in the Road-map…As I have stated in my reports to the Board, the extensive work that has been conducted at the location since early 2012 undermines the Agency's ability to conduct effective verification there." "IAEA Director General's Remarks to the Press on Visit to Iran," September 21, 2015, https://www.iaea.org/newscenter/statements/iaea-director-generals-remarks-press-visit-iran.

[57] "IAEA Statement on Iran," October 15, 2015, https://www.iaea.org/newscenter/news/iaea-statement-iran-0.

[58] GOV/2015/68, December 2, 2015.

[59] GOV/2015/72, December 15, 2015.

[60] See, for example, David Albright, Andrea Stricker and Serena Kelleher-Vergantini, "Analysis of the IAEA's Report on the Possible Military Dimensions of Iran's Nuclear Program," Institute for Science and International Security, December 8, 2015, pp. 1-2.

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

assessment that it was very likely that a building destroyed at the Dair Alzour site was a nuclear reactor that should have been declared to the Agency by Syria."[62] While the IAEA repeatedly called on Syria to cooperate fully with the Agency so as to solve the outstanding issues, Syria has not responded to that request. The *IAEA Annual Report 2014*, published in September 2015, stated:[63]

> In 2014, Syria indicated its readiness to receive Agency inspectors, and to provide support, for the purpose of performing a physical inventory verification (PIV) at the Miniature Neutron Source Reactor in Damascus. The Agency—after considering the United Nations Department of Safety and Security's assessment of the prevailing security level in Syria and the small amount of nuclear material declared by Syria to be at the reactor — decided to postpone the PIV at the reactor until the security level had sufficiently improved. By the end of 2014, the assessment of the security level in Syria had not changed.

(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 2014* (Annex) lists facilities in NWS under Agency safeguards or containing safeguarded nuclear material.[64] 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."[65] 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

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."[66] 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

[62] GOV/2014/44, September 3, 2014.

[63] *IAEA Annual Report 2014*, September 2015, p. 103.

[64] *IAEA Annual Report 2014*, GC(59)/7/Annex, Table A30(a).

[65] *IAEA Annual Report 2014*, September 2015, p. 100.

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

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 purposes" and undertook to publish information on any such withdrawals.[67]

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, 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 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.[68]

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.[69]

Comparing to the three NWS mentioned above, applications of the IAEA safeguards to nuclear facilities by China and Russia are more limited. No provision for complementary access visits is stipulated in their Additional Protocols. Meanwhile, China reported that it has proposed 20 nuclear facilities to the IAEA for inspections, including six new facilities after 2010.[70] Russia also reported such numbers as more than 30.[71] Russia also announced that the International Uranium Enrichment Center (IUEC) was chosen to start applying the IAEA safeguards by the IAEA in July 2010, and the latest inspection was conducted in August 2014.[72]

The non-NPT states have concluded 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 2014*, the facilities placed under IAEA safeguards or containing

[67] NPT/CONF.2015/29, April 22, 2015.
[68] NPT/CONF.2015/10, March 12, 2015.
[69] NPT/CONF.2015/38, May 1, 2015.
[70] NPT/CONF.2015/32, April 27, 2015.
[71] NPT/CONF.2015/48, May 22, 2015.
[72] Ibid.

safeguarded nuclear material in non-NPT states as of December 31, 2014 are as follows:[73]

- 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."[74]

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 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 submitted to the 2015 NPT RevCon:[75]

- 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.[76] 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.[77] Furthermore, the NAM countries proposed that: NWS declare to IAEA all weapons-grade fissile material and to place such material under the supervision of IAEA; and that a standing committee be established to monitor and

[73] *IAEA Annual Report 2014*, GC(59)/7/Annex, Table A30(a).

[74] *IAEA Annual Report 2014*, September 2015, p. 100.

[75] NPT/CONF.2015/WP.16, March 20, 2015.

[76] NPT/CONF.2015/WP.3, March 9, 2015.

[77] Ibid.

verify the nuclear disarmament steps undertaken by NWS.[78]

(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.[79] China also has promoted universality of the Comprehensive Safeguards Agreement and the Additional Protocol.[80]

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."[81]

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 again at the IAEA General Conference in 2015, important assurances about the SLC mentioned below were welcomed:[82]

- 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.

[78] Ibid.

[79] See, for example, statements made by those countries at the 2015 NPT RevCon.

[80] NPT/CONF.2015/PC.III/WP.41, May 6, 2014.

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

[82] GC(59)/RES/13, September 18, 2015.

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."[83] 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 was critical, saying that "the State Level Concept (SLC) in safeguard[s] is still ambiguous and its implementation should not contradict the NPT and disrupt the rights and obligations of the member States in a prejudiced and discriminatory manner."[84]

Regarding research and development of safeguards technologies, under its long-term plan,[85] the IAEA conducted the "Development and Implementation Support Programme for Nuclear Verification 2014-2015,"[86] 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,[87] 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." Regarding states surveyed in this project, Australia, Austria, Belgium, Canada, France, Germany, South Korea, the Netherlands, New Zealand, Norway, Poland, Sweden, Switzerland, the United Kingdom and the United States are considered as "white countries." Like Japan, these countries also have their 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 22nd Asian Export Control Seminar in February 2015. The purpose of this annual seminar is to

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

[84] "Statement by Iran," IAEA General Conference, September 2015.

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

[86] IAEA, "Development and Implementation Support Programme for Nuclear Verification 2014-2015," December 2013.

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

"[step] up Asian and international efforts toward non-proliferation of [WMD] by raising common awareness of the importance of such non-proliferation and export controls over such weapons across Asia and by consolidating the export control capabilities there." Persons in charge of export control from 24 countries and regions participated in the 2015 Seminar.[88]

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 previous *Hiroshima Reports*, concerns have been expressed about Russia's and China's implementation of export controls. There are few indications that their implementation has significantly improved. However, it is reported that China established a bureau in the Ministry of Commerce to focus on strategic trade, and has also launched the process of adopting a comprehensive export control law, which is expected in 2020. The author of that report analyzes that "China's non-proliferation commitments have gradually expanded over the decades, with implementation following behind, albeit with a substantial lag. There are signs that a tipping point may have been reached but China still has much to do to build confidence in its ability to manage strategic technology."[89]

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 suspect 500 companies in 2011.[90] However, it is considered that the UAE "lack[s] the necessary expertise, and possibly the financial resources, to institute an effective [export control] system."[91] Saudi Arabia's legal framework on export controls remains rudimentary and lacks, among other things, catch-all mechanisms.[92] Regarding Egyptian export control activities, no reliable information could be found since its February 2008 national report to the UN 1540 Committee. It is widely considered that Egypt has not instituted a strategic trade control system.[93]

Among the Asian countries surveyed in this report, Indonesia and the Philippines have neither prepared a control list of dual-use items/technologies, nor implemented catch-all controls. Along with

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[88] 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/2014/asian_ec/).

[89] Ian J. Stewart, "China and Non-Proliferation: Progress at Last?" *The Diplomat*, March 25, 2015, http://thediplomat.com/2015/03/china-and-non-proliferation-progress-at-last/. See also Shirley A. Kan, "China and Proliferation of Weapons of Mass Destruction and Missiles: Policy Issues," *CRS Report*, January 5, 2015.

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

[91] "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).

[92] "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/.

[93] Ibid.

economic developments in Southeast Asia, trading in sensitive items and technologies by the regional countries has been increasing. However, no Southeast Asian country, except Malaysia and Singapore, has established an adequate export control system.

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 the group has not yet made a decision. Israel has established national legislation and national implementation systems for its export controls, based on all four multilateral export control regimes.[94] 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.[95] Pakistan contends that its "export control regime is compatible with the guidelines of the [Missile Technology Control Regime (MTCR)], NSG and [Australia Group (AG)]."[96] However, it is still unclear how robust or successfully implemented such export control systems are in practice.[97]

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 is alleged to have been involved in constructing a graphite-moderated reactor in Syria to produce plutonium.

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

Article 3-2 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 2011:[98]

> 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

[94] S/AC.44/2013/1, January 3, 2013.

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

[96] "Pakistan Confers with Export Control Groups," *Global Security Newswire*, February 21, 2013, http://www.nti.org/gsn/article/pakistan-mulls-joining-missile-export-group/.

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

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

> 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.

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.[99] 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."[100] 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."[101]

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 is to cease to exist, at the insistence of Iran, and the UN Security Council will have responsibility of oversight.[102]

A 2015 report by the UN Panel of Experts on North Korea sanctions pointed out that the state "continues to attempt to procure or transfer items relating to its nuclear and missile programmes." According to the report, Ocean Maritime Management (OMM),[103] which was designated to be subject to sanctions in 2014, attempted to evade sanctions by re-naming and re-registering 13 of its 14 vessels, and continues to operate them. Such registration changes were submitted by officials of the North Korean Embassy in

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

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

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

[102] 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.

[103] OMM was involved in operating the vessel Chong Chon Gang, which was seized by Panama as shipping concealed arms and related material from Cuba to North Korea in July 2013.

London. Through using a wide range of individuals and entities based in at least 10 countries, including Brazil, China, Egypt, Greece, Japan, Malaysia, Peru, Russia, Singapore and Thailand, "OMM has operated a global network covering Asia, Europe, the Middle East and South America."[104] In December 2015, a Singaporean state court judge found OMM guilty of two offenses: providing financial services or transferring financial assets or resources "that may reasonably be used to contribute to the nuclear-related, ballistic missilerelated, or other weapons of mass destructionrelated programs or activities of the Democratic People's Republic of Korea" (Regulation 12b of Singapore's United Nations Regulations 2010); and carrying on a remittance business without a valid remittance license.[105]

The report of the North Korea Panel of Experts also pointed out, *inter alia*, the following issues:

- Only five countries submitted their national implementation reports in accordance with the UNSCR during the reporting period—one year from February 2014;
- North Korean diplomats continue to play key roles in facilitating the trade of prohibited items, including arms and related materiel and ballistic missile-related items. In addition to brokering activities, they often serve as shipping companies' agents or cash carriers; and
- In February 2014, DPRK officials were caught travelling back to North Korea via Southeast Asia with suitcases containing $450,000 in cash payment for an arms deal.

The Iran Panel of Experts 2015 report pointed out, *inter alia*:[106]

- "Unlike every previous mandate, during the current mandate no transfers of conventional arms and related materiel by the Islamic Republic of Iran were reported to the Committee. The Panel however notes media reports pointing to continuing military support and alleged arms transfers to the Syrian Arab Republic, Lebanon, Iraq, and Yemen, and to Hizbullah and Hamas."
- "During the current mandate, the Committee and the Panel have not received any new reports of incidents of non-compliance from Member States… The Panel cannot with confidence identify the reasons for the observed drastic reduction in reporting and information-sharing."
- "However, some Member States informed the Panel that, according to their assessment, the Islamic Republic of Iran's procurement trends and circumvention technique remain basically unchanged and that the Islamic Republic of Iran was continuing to procure below control threshold items."
- "[T]he Panel continued to receive information from Member States and the private sector about methods used by the Islamic Republic of Iran to carry out financial transactions."

Separate from the report, some news articles covered the following alleged cases of Iranian illicit transfers in 2015:

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[104] "Report of the Panel of Experts Established Pursuant to Resolution 1874 (2009)," S/2015/131, February 23, 2015. See also Andrea Berger, "Further Shades of Grey: North Korea Sanctions and the 2015 UN Panel of Experts Report," *38 North*, March 4, 2015.

[105] Andrea Berger, "Thanks to the Banks: Counter-Proliferation Finance and the Chinpo Shipping Case," *38 North*, December 16, 2015, http://38north.org/2015/12/aberger121615/.

[106] "Report of the Panel of Experts Established Pursuant to Resolution 1929 (2010)," S/2014/401, June 2, 2015.

- The United Kingdom informed the UN Panel of Experts of an Iranian nuclear procurement network for illicitly obtaining centrifuge-related technologies;[107] and
- The Czech Republic blocked an attempted purchase by Iran of a large shipment of sensitive technology useable for uranium enrichment.[108]

It is well established that Iran and North Korea have been engaged in missile development cooperation for many years. In 2015, it was alleged that "North Korea supplied several shipments of missile components to Iran during recent nuclear talks and the transfers appear to violate United Nations sanctions on both countries, according to U.S. intelligence officials… One official said the transfers between North Korea and Iran included large diameter engines, which could be used for a future Iranian long-range missile system."[109] Suspicions have also been raised about the possibility of nuclear cooperation between the two countries[110] but clear evidence of such cooperation is illusive. Iran denied speculation that it has had such cooperation with North Korea.[111] The United States assessed that while "there is no public evidence that Iran and North Korea have engaged in nuclear-related trade or cooperation with each other, …ballistic missile technology cooperation between the two is significant and meaningful."[112]

Finally, it should be noted that under the JCPOA on the Iranian nuclear issue, Iran is to cooperate and act in accordance with the so-called "procurement channel" for obtaining material, equipment, goods and technology needed for its allowed nuclear-related activities. To this end, the JCPOA stipulates (Section 17; and Section 6 of Annex IV) that, "Iran will provide to the IAEA access to locations of" all such items as listed in INFCIRC/254/Rev.12/Part 1 (NSG Guidelines Part I), and "permit the exporting state to verify the end-use of [them] set out in INFCIRC/254/Rev.9/Part 2" (NSG Guidelines Part II). The UNSCR 2231 makes the provisions of the procurement channel binding on all member states (not only JCPOA parties), and subjects these provisions to oversight by the Security Council.[113] To prevent any illicit nuclear transfer to Iran, every country, including Iran, is obliged to comply with the obligations.

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[107] Louis Charbonneau, "Britain Told U.N. Monitors of Active Iran Nuclear Procurement: Panel," *Reuters*, April 30, 2015, http://www.reuters.com/article/2015/04/30/us-iran-nuclear-idUSKBN0NL09220150430.

[108] Louis Charbonneau and Robert Muller, "Czechs Stopped Potential Nuclear Tech Purchase by Iran," *Reuters*, May 13, 2015, http://www.reuters.com/article/2015/05/14/us-iran-nuclear-czech-exclusive-idUSKBN0NY2K720150514.

[109] Bill Gertz, "North Korea Transfers Missile Goods to Iran During Nuclear Talks," *Washington Free Beacon*, April 15, 2015, http://freebeacon.com/national-security/north-korea-transfers-missile-goods-to-iran-during-nuclear-talks/.

[110] John Irish, "North Korean Nuclear, Missile Experts Visit Iran-Dissidents," *Reuters*, May 28, 2015, http://www.reuters.com/article/2015/05/28/iran-northkorea-dissidents-idUSL5N0YJ56720150528.

[111] "Iran Sees No linkage to N. Korea's Nuke Program: Envoy," *Yonhap News*, September 25, 2014, http://english.yonhapnews. co.kr/search1/2603000000.html?cid=AEN20140924008651315.

[112] Paul K. Kerr, Mary Beth D. Nikitin and Steven A. Hildreth, "Iran-North Korea-Syria Ballistic Missile and Nuclear Cooperation," *CRS Report*, May 11, 2015.

[113] See, for example, 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.

D) Participation in the PSI

As of June 2015, 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.[114]

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 November 2015, New Zealand hosted an interdiction exercise, named the "Exercise MARU 2015."[115]

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. Major, concrete developments regarding cooperation with India in 2015 include:

- The first shipment of uranium from Canada under a five-year contract signed in April, under which it is to supply 2,730 tons of uranium concentrate, arrived in India in December;[116] and
- India concluded an agreement with Kazakhstan in July to receive 5,000 tons of uranium over the next four years.[117]

"India has already received roughly 4,914 tons of uranium from France, Russia, and Kazakhstan, for example, and it has agreements with Canada, Mongolia, Argentina, and Namibia for additional shipments."[118]

Regarding the Australia-India Nuclear Cooperation Agreement signed in September 2014, both

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[114] 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.

[115] "Proliferation Security Initiative—Exercise MARU 2015," New Zealand Custom Service, November 2015, http://www.customs.govt.nz/features/PSI-Exercise-MARU/Pages/default.aspx.

[116] "India Receives First Uranium Shipment from Canada," *World Nuclear News*, December 4, 2015, http://www.world-nuclear-news.org/UF-India-receives-first-uranium-shipment-from-Canada-0412155.html.

[117] "Nuclear Friendship: Kazakhstan to Deliver 5K Kons of Uranium to India," *Nuclear Power Daily*, July 9, 2015, http://www.nuclearpowerdaily.com/reports/Nuclear_Friendship_Kazakhstan_to_Deliver_5k_Tons_of_Uranium_to_India_999.html.

[118] 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/.

Prime Ministers announced the completion of procedures in November 2015,[119] after they agreed not to conduct an additional, bilateral safeguards agreement between two countries. There was concern that the possibility of diverting supplied nuclear material to non-peaceful purpose would increase unless their locations, amount or purposes could be strictly monitored. However, India argued that all imported nuclear material would be subject to the IAEA safeguards and that further bilateral measures were unnecessary.[120]

Japan and India continue to negotiate on a bilateral Nuclear Cooperation Agreement. While Japan has demanded to include conditions of supply, such as India's signing of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), suspending cooperation upon any nuclear test by India, and India's provision of information on fissile material (as a condition to admit reprocessing spent fuel produced by nuclear reactors that Japan supplies), India has been reluctant to accept such conditions.[121] However, at the Japan-India summit meeting on December 12, 2015, both countries basically concluded negotiations for an agreement. Reportedly, Japan informed its position to suspend civil nuclear cooperation in case of India's nuclear test,[122] and Japan and India agreed to refer in the agreement that a nuclear test constitutes one of the "security threats" as conditions for such suspension.[123] However, no details of the terms of agreement have yet been disclosed. No information was released either in terms of the issue regarding India's reprocessing of spent fuel produced by Japan's supplied reactor.

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." They also concluded an arrangement for the tracking of U.S. material exported to India.[124]

In the NSG, debates on whether India should be invited as a member, or not, have yet to be concluded. The NSG participating countries could not achieve consensus at the Plenary in June 2015, since several

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[119] "India-Australia Agreement Complete," *World Nuclear News*, November 16, 2015, http://www.world-nuclear-news.org/NP-India-Australia-agreement-complete-1611157.html.

[120] Jaideep A Prabhu, "India's Nuclear Deal with Australia Running into Turbulence over Fuel Safeguards," *F.India*, March 31, 2015, http://www.firstpost.com/world/indias-nuclear-deal-australia-running-turbulence-fuel-safeguards-2180599.html.

[121] "In a Reversal, Japan to Let India Reprocess Spent Fuel from Japanese Reactors," *Japan Times*, June 19, 2015, http://www.japantimes.co.jp/news/2015/06/19/national/reversal-japan-let-india-reprocess-spent-fuel-japanese-reactors/#.VYh_kRPtmkp.

[122] Jayanth Jacob, "India, Japan Fast-Track Ties with Bullet Train, Civil Nuclear Deal," *Hindustan Times*, December 13, 2015, http://www.hindustantimes.com/india/india-japan-ink-mou-on-civil-nuclear-energy-bullet-train/story-mKen9n93PKaGv85oeSmiwM.html.

[123] "Japan-India Civil Nuclear Cooperation Agreement," *The Mainichi*, December 21, 2015, http://mainichi.jp/articles/20151221/k00/00m/010/117000c. (in Japanese).

[124] Daniel Horner, "India, U.S. Cite Progress on Nuclear Deal," *Arms Control Today*, Vol. 45, No. 2 (March 2015), http://www.armscontrol.org/ACT/2015_03/News/India-US-Cite-Progress-on-Nuclear-Deal.

countries, including China, remain against accepting India's participation in the NSG.[125]

Pakistan, also a non-member of the NSG, criticizes countries that concluded civil nuclear cooperation agreements with India as discriminatory,[126] and argues that a "country-specific exemption from NSG rules to grant membership to India would further compound the already fragile strategic stability environment in South Asia, and further undermine the credibility of NSG and weaken the non-proliferation regime."[127] At the same time, however, Pakistan has insisted that it is qualified to be included in the NSG as "a responsible nuclear state."[128] China has reportedly assured that if India is allowed NSG membership, it will do whatever is necessary to ensure that Pakistan also joins the group.[129] It was also reported in October 2015 that Pakistan sounded out the United States about a civil nuclear cooperation agreement. While some Pakistan-based press reports said the United States was contemplating the possibility,[130] other unconfirmed reports indicated that the United States asked Pakistan to accept certain limits, including on tactical nuclear weapons, as a condition for any cooperation.[131]

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.[132] Their construction started in November 2013 in Karachi, and because all other Chinese reactors were built at Chashma, there is a question about whether the earlier agreement to build them "grandfathered" the new ones for NSG guideline purposes.[133]

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

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[125] "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.

[126] "Statement by Pakistan," at the First Committee of the UN General Assembly, Thematic Discussion on Nuclear Weapons, October 20, 2015.

[127] "Indo-US Nuclear Deal to Impact Deterrence Stability in South Asia: Pakistan," *The Economic Times*, January 27, 2015, http://economictimes.indiatimes.com/news/politics-and-nation/indo-us-nuclear-deal-to-impact-deterrence-stability-in-south-asia-pakistan/articleshow/46032929.cms.

[128] "Statement by Pakistan," at the 58th IAEA General Conference, September 22-26, 2014; "Pakistan Be Made Part of Nuclear Suppliers Group, Says Nawaz," *The News*, March 25, 2014, http://www.thenews.com.pk/Todays-News-13-29286-Pakistan-be-made-part-of-Nuclear-Suppliers-Group-says-Nawaz.

[129] Naveed Miraj, "China Assures Pakistan of Help to Join Nuclear Suppliers Club," *Express Tribune*, http://tribune.com.pk/story/999286/china-assures-pakistan-of-help-to-join-nuclear-suppliers-club/.

[130] Mateen Haider, "Pakistan Seeks International Cooperation for Nuclear Energy: FO," *Dawn*, October 8, 2015, http://www.dawn.com/news/1211709/pakistan-seeks-international-cooperation-for-nuclear-energy-fo.

[131] David E. Sanger, "U.S. Exploring Deal to Limit Pakistan's Nuclear Arsenal," *New York Times*, October 15, 2015, http://www.nytimes.com/2015/10/16/world/asia/us-exploring-deal-to-limit-pakistans-nuclear-arsenal.html.

[132] "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/.

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

material and technologies to those states which do not accept IAEA comprehensive safeguards.

(6) Transparency in the Peaceful Use of Nuclear Energy

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.[134] 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 the end of 2015, all nine countries had declared their civilian plutonium holdings as of December 2014.[135] France, Germany and the United Kingdom had reported their holdings of not only civil plutonium but also HEU.

At the First Committee of the 2015 UNGA, China argued that, "Over the years, Japan has accumulated a huge amount of sensitive nuclear materials, giving rise to grave risks both in terms of nuclear security and nuclear proliferation."[136] Japan strongly refuted this criticism, pointing out that all nuclear materials of Japan are under the IAEA safeguards and have been assessed to be of a strictly peaceful nature. Japan has made a number of efforts to increase transparency of its nuclear activities. 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.[137]

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.

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[134] 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.

[135] "2014 Civilian Plutonium (and HEU) Reports Submitted to IAEA," *IPFM Blog*, October 12, 2015, http://fissilematerials.org/blog/2015/10/2014_civilian_plutonium_a.html.

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

[137] See, for example, Secretariat of the Atomic Energy Commission, Cabinet Office, "Current Situation of Plutonium Management in Japan," July 21, 2015, http://www.aec.go.jp/jicst/NC/iinkai/teirei/siryo2015/siryo28/siryo3_e.pdf.

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,[138] and will physically reserve up to 90 MT of LEU, sufficient to run a 1,000 MW light-water reactor.[139] 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.[140]

[138] "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.

[139] 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.

[140] "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.

Chapter 3. Nuclear Security[1]

Because the year 2015 was an intersession period of major international conferences on nuclear security, there were very few noteworthy meetings on the issue. However, there were some discussions on future international architecture of nuclear security beyond 2016. Some states announced improvement and reinforcement of their domestic nuclear security measures.

As for numerous international events related to nuclear security in 2015, a new project of "Decommissioning and Remediation of Damaged Nuclear Facilities" was set out at the International Atomic Energy Agency (IAEA) on February 4.[2] On February 9, the "Vienna Declaration on Nuclear Safety" was issued.[3] On April 6, the IAEA and Russia co-organized a workshop to support the amended Convention on the Physical Protection of Nuclear Material (CPPNM) and to promote its implementation.[4] On April 20, the "25th International Training Course (ITC) on the Physical Protection of Nuclear Materials and Nuclear Facilities" was held in the United States.[5] The ITC has been considered as one of the world's pre-eminent courses on physical protection, and over the past 37 years, some 800 experts from 70 countries have taken part in this course.[6]

On May 8, as part of a joint project with the IAEA, Sweden conducted an exercise focusing on safe transportation of spent nuclear fuel. This exercise was recognized as one to test and evaluate a new IAEA guide of planning, conducting and evaluating secure transportation.[7] On June 1, the "International Conference on Computer Security in the Nuclear World" was held, with more than 700 computer experts from 92 member states and 17 organizations participating. The aim of the conference was to provide a platform for sharing information and experiences, and enhancing international cooperation to protect nuclear installations and materials and associated facilities from cyber-attacks.[8] Some of the key arguments in the conference were as follows; the IAEA should continue to play a leadership role and to support its member states to develop international nuclear security guidance on computer security; coordinated research and information exchange are needed to prevent attacks to computer security

[1] Chapter 3 is written by Sukeyuki Ichimasa.

[2] Patrick O'Sullivan, "New IAEA Project Focuses on Decommissioning and Remediation of Damaged Nuclear Facilities," IAEA Website, February 4, 2015, https://www.iaea.org/newscenter/news/new-iaea-project-focusses-decommissioning-and-remediation-damaged-nuclear-facilities.

[3] Diplomatic Conference to consider a proposal to amend the Convention on Nuclear Safety Vienna Declaration on Nuclear Safety, CNS/DC/2015/2/Rev.1, February 9, 2015, https://www.iaea.org/sites/default/files/cns_viennadeclaration090215.pdf.

[4] Rodolfo Quevenco, "Bringing the Realization of a Strengthened Global Nuclear Security Framework Ever Closer," IAEA Website, April 22, 2015, https://www.iaea.org/newscenter/news/bringing-realization-strengthened-global-nuclear-security-framework-ever-closer.

[5] Jeffrey Donovan, "IAEA and the National Nuclear Security Administration Mark a Milestone in Nuclear Security Training," IAEA Website, May 8, 2015, https://www.iaea.org/newscenter/news/iaea-and-national-nuclear-security-administration-mark-milestone-nuclear-security-training.

[6] "Press Release: NNSA and IAEA Celebrate the 25th International Training Course," NNSA Website, April 17, 2015, http://nnsa.energy.gov/mediaroom/pressreleases/itc-0.

[7] Stig Isaksson and Nicole Jawerth, "Action at Sea: Transport Security Exercise Conducted Off the Coast of Sweden," IAEA Website, May 8, 2015, https://www.iaea.org/newscenter/news/action-sea-transport-security-exercise-conducted-coast-sweden.

[8] Jeffrey Donovan, "IAEA's Amano Calls for Strengthened Computer Security in a Nuclear World," IAEA Website, June 1, 2015, https://www.iaea.org/newscenter/news/iaea%E2%80%99s-amano-calls-strengthened-computer-security-nuclear-world.

systems and to respond to them if necessary; human resources development is needed, through such programs in education and training, to sustain computer expertise in the nuclear security domain.[9]

At the 2015 NPT RevCon, nuclear security was an important agenda item. Although the NPT review conference closed without the final document adopted, a number of important issues were dealt with in the paragraphs 39 to 47 of its final draft, which were available on the web (NPT/CONF.2015/R.3). Some of the matters that were stipulated in the final draft were: urging all states to consult the IAEA's Nuclear Security Series publications constantly and to strengthen their efforts for nuclear security (paragraph 40); reaffirming the central role of the IAEA in reinforcing the nuclear security framework globally (paragraph 41); encouraging states to make further use of assistance and services of the IAEA for their nuclear security (paragraph 42); and persuading all states that have not yet ratified the CPPNM to adopt the amendment as soon as possible.[10]

The Nuclear Security Report 2015 (GOV/2015/42-GC(59)/12),[11] which was distributed in the IAEA Board of Governors General Conference on July 13, urged all parties of the CPPNM to ratify, accept or approve the 2005 Amendment and to take legally binding or non-binding international measures for nuclear security. It also encouraged all states to join and participate actively in the IAEA Incident and Trafficking Database (ITDB) program and to persuade the states that have yet to do so to nominate and send representatives to the Nuclear Security Guidance Committee. Moreover, it encouraged the member states to accept and make active use of the Agency's nuclear security advisory services and peer reviews for exchanging their views and getting advice on nuclear security measures.

On November 16, more than 300 participants from 56 countries gathered at the "International Conference on Research Reactors: Safe Management and Effective Utilization" in Vienna.[12] Participants in the conference suggested that the IAEA should continue its support to member states in their planning and building of new research reactors, producing and supplying radioisotopes and planning to decommission research reactors. They also argued that the IAEA should develop further guidance on various issues of the security of research reactors—for example: identification of vital areas, definition of unacceptable radiological consequences, interface between nuclear safety and nuclear security design, analysis and evaluation of contingency and emergency response, and measures to protect research reactors from cyber security threats.[13]

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[9] Rodolfo Quevenco, "Secure Computer Systems Essential to Nuclear Security, Conference Finds," IAEA Website, June 8, 2015, https://www.iaea.org/newscenter/news/secure-computer-systems-essential-nuclear-security-conference-finds.

[10] 2015 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Draft Final Document Volume 1, NPT/CONF.2015/R.3, http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/npt/revcon2015/documents/DraftFinalDocument.pdf.

[11] Nuclear Security Report 2015, GOV/2015/42-GC(59)/12, July 13, 2015, https://www.iaea.org/About/Policy/GC/GC59/GC59Documents/English/gc59-12_en.pdf.

[12] Ruth Morgart and Miklos Gaspar, "Conference Participants Discuss Safety, Security and Operation of Research Reactors," IAEA Website, November 20, 2015, https://www.iaea.org/newscenter/news/conference-participants-discuss-safety-security-and-operation-research-reactors.

[13] International Conference on Research Reactors, "Conclusions and Recommendations: Safe Management and Effective Utilization," November 16-20, 2015, https://www.iaea.org/sites/default/files/conclusions_and_recommendations.pdf.

It could be said that the international developments in promoting global nuclear security measures mentioned above resulted from eager expectations regarding a future Nuclear Security architecture. In this sense, the next Nuclear Security Summit in Washington D.C. from March to April 2016, which is likely to conclude this nuclear summit process, and the second "IAEA Nuclear Security Conference" in December 2016,[14] will become watershed events in this area. The Nuclear Security Governance Expert Group (NSGEG), which had proposed a concept of hard governance and soft governance of global nuclear security[15] at the Hague Nuclear Security Summit, in March 2015 proposed a draft International Convention on Nuclear Security (ICNS).[16] According to this draft, it is necessary to develop a mechanism that could provide an appropriate process of sustainable review and improve the nuclear security regime from 2016, since there is no established process to improve the nuclear security regime, to provide sustainable review of the issue and to address what is likely to be an escalating nuclear terrorism threat environment. Therefore, the ICNS draft proposes to create the framework of a comprehensive regime: to supplement existing legal instruments and obligations; to develop a mechanism of making decisions and improvement through a Conference of the Parties (COP); to establish binding standards to secure nuclear and other radioactive material based on IAEA recommendations, and to support the work of the IAEA and all other international contributors to the nuclear security regime, etc.[17] These proposals might suggest some basis for further arguments on global nuclear security architecture for the post-Nuclear Security Summit process.

Since 2010, Nuclear Security Summits have been held biennially in Washington D.C. (2010), Seoul (2012), and The Hague (2014). In the process of these summits, senior officials from around 50 NPT member/non-member states and relevant international organizations regularly meet, exchange information on strengthening nuclear security measures, and adopt "Joint Communiqués." Generally speaking, due to its sensitive nature, information related to the national nuclear security measures had not been officially disclosed until the nuclear security summit process began in 2010. Since then, biennially issued national reports that mainly focus on nuclear security issues in a comprehensive manner along with, for example, national statements of IAEA General Conferences, give further opportunities not only for governments, but also for civil society and academic communities to gain access to this information. There is little doubt that such developments, originating in the Nuclear Security Summit process, are helping to build momentum to invigorate international arguments on state's nuclear security regime and future global nuclear security architecture.

Furthermore, it is worth noting that through participation in the Nuclear Security Summits, states gradually get used to putting forward "Gift Basket" accomplishments and adopting Joint Communiqués.

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[14] 59th IAEA General Conference, Statement by Mr. Daniel Verwaerde, September 2015, https://www.iaea.org/sites/default/files/france2015_en.pdf.

[15] NSGEG, "Preventing Weak Links in Nuclear Security: A Strategy for Soft and Hard Governance Summary Report & Initial Policy Recommendations," March 2014.

[16] NSGEG, "Strong and Sustainable Global Nuclear Security Beyond 2016," March 2015, https://pgstest.files.wordpress.com/2015/03/icns-fact-sheet-final.pdf.

[17] NSGEG, "International Convention on Nuclear Security," March 2015, http://www.nsgeg.org/ICNSReport315.pdf.

This tendency leads to enhancing political commitments of states. Although responsibility for the establishment, implementation and maintenance of an individual national physical protection regime rests entirely with each individual state, "Gift Basket" approaches, as mentioned above, have contributed to establishing a common goal and promoting cooperation among concerned states for dealing with specific nuclear security issues.

On the other side, the Nuclear Security Summit process itself has become a point of growing tension between major powers. In November 2014, Russia made a political statement that it would not attend the preparations for the 2016 Nuclear Security Summit in Washington on the grounds of dissatisfaction with Washington's concept for preparing the summit.[18] Russia's decision not to participate reflected a growing rift with Western countries on a range of security issues.

In any case, the Nuclear Security Summit process had exerted a considerable influence in terms of drawing the attention of the international community. Furthermore, it is noteworthy that the preparation phase for the 2016 Nuclear Security Summit in Washington is stimulating discussion among concerned states regarding the future international architecture of nuclear security. For instance, on the occasion of 59th IAEA General Conference, various views were expressed by concerned member states. The United States has called upon all member states of the IAEA to combat the threat of nuclear terrorism by supporting a strengthened global nuclear security architecture built on legally binding instruments, multilateral institutions, voluntary collectives, and national actions.

On the subject of the IAEA's role, the United States has emphasized that the previous Nuclear Security Summits reaffirmed the central role of the IAEA in global nuclear security, and stressed a commitment for supporting and bolstering the IAEA's nuclear security capabilities.[19] Australia has mentioned its appreciation for the proposal of the ICNS, and expressed its view that this proposal could complement and support the already existing instruments in the field of nuclear security.[20] Brazil has pointed out that nuclear security must be in tandem with the international community's broader efforts to promote nuclear disarmament, non-proliferation and peaceful uses of nuclear energy. Also, Brazil has mentioned that a sustainable global nuclear security strategy requires not only adopting practical measures of physical protection in civilian facilities, but also taking care of the vast stocks of highly enriched uranium (HEU) and separated plutonium for military applications of states possessing nuclear weapons.[21] Canada has declared its support for the Nuclear Security Summit process of developing "Action Plans" that will transition Nuclear Security Summit commitments to the key international

[18] "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.

[19] 59th IAEA General Conference, Secretary Ernest Moniz, September 14, 2015, https://www.iaea.org/sites/default/files/usa2015.pdf.

[20] 59th IAEA General Conference, Statement by H.E. Ambassador Michael Linhart, September 15, 2015, https://www.iaea.org/sites/default/files/austria2015.pdf.

[21] 59th IAEA General Conference, Statement by H.E. Ambassador Laercio Antonio Vinhas, September 2015, https://www.iaea.org/sites/default/files/brazil2015.pdf.

institutions engaged in promoting nuclear security, in particular the IAEA.[22] Turkey has stated that the need for an effective global nuclear security regime should not be ignored, while the responsibility for nuclear security lies with the states. Turkey has also pointed out that measures commensurate with the risk and consequences of nuclear terrorism can only be achieved through international cooperation.[23]

On the other hand, concerned international experts groups and civil societies are also conducting specific deliberations on a post-2016 global nuclear security architecture. For example, the Washington-based Nuclear Threat Initiative (NTI) has issued the following four recommendations to provide a path to sustain high-level political attention on improving nuclear security after the summit process ends. (1) A core group of countries must keep nuclear security high on agendas through continued meetings focused on an ambitious program. Throgh this way, states can continue building consensus on a global system for materials security, assess implementation of nuclear security commitments, and have a forum for reporting and accountability. (2) To ensure long-term attention and accountability, CPPNM provides a mechanism for regular review conferences at intervals of at least five years. The purpose of the CPPNM review conference is to review the implementation of the CPPNM, which could include legacy activities from the Nuclear Security Summit process. (3) The IAEA's central role must be strengthened so that it can enhance its nuclear security role through its Nuclear Security Series recommendations and guidance, peer review, training, and other services including the designated convener of regular CPPNM review conferences. Member States should provide human and financial resources and additional political support to the agency. (4) States must prioritize national resources to support, coordinate and track nuclear security efforts and provide political support, staff, and financial resources to ensure that its work remains a top priority and that it can properly coordinate activities within and between governments.[24]

In the latter point, in October 2015, the Fissile Material Working Group (FMWG) issued five priorities for world leaders to achieve the expected goals for the Washington Nuclear Security Summit in 2016 regarding actions that advance global nuclear security objectives, create a mechanism for continuous and measurable progress, and provide opportunities and incentives for all stakeholders to participate. These five priorities, which have been published in nine languages are: (1) make the global nuclear security regime comprehensive, (2) share information to build global confidence, (3) implement measurable best practices and standards, (4) create sustainable mechanism for continuous progress, and (5) offer plans for eliminating civil HEU and reducing plutonium.[25] The FMWG is an international network consisting of experts from universities, think tanks, and civil societies. It also suggests the need for bold and new actions that advance global nuclear security objectives, create a mechanism for continuous and measurable progress, and provide opportunities and incentives for all stakeholders to

[22] 59th IAEA General Conference, Canadian Statement, September 2015, https://www.iaea.org/sites/default/files/canada2015_ver2.pdf.

[23] 59th IAEA General Conference, Statement by H.E. Emine Birnur Fertekligil, September 2015, https://www.iaea.org/sites/default/files/turky2015.pdf.

[24] NTI, "Nuclear Security Summit 2016," NTI Nuclear Security Index Website, http://www.ntiindex.org/overview-highlights/nuclear-security-summit-2016/.

[25] FMWG, "The Solution: 5 Priorities for Long-Term Security," 5 Priorities for Global Nuclear Security Website, http://www.5priorities.org/the-solution/.

participate.[26] On the last point, openness of participation to all stakeholders has enormous significance for the argument of future global nuclear security architecture, considering the fact that the current series of Nuclear Security Summits has been on the basis of an invitation-only basis by the host country.

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. With regard to the recent advancement of each country's nuclear security efforts over the past few years, some parts of this report appropriately refer to the past issues of the *Hiroshima Reports*.

(1) The Amount of Fissile Material Usable for Weapons

In accordance with 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."[27] The IAEA recommends that the State's physical protection requirements for nuclear material and nuclear facilities should be based on a design basis threat, 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 Design Basis Threat (DBT) for other nuclear material and nuclear facilities.[28] 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."[29]

The latest version of 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 consequences associated with the unauthorized

[26] Ibid.

[27] IAEA Nuclear Security Series No. 20, "Objective and Essential Elements of a State's Nuclear Security Regime," 2013, p. 13.

[28] 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.

[29] IAEA Nuclear Security Series No. 14, "Nuclear Security Recommendations on Radioactive Material and Associated Facilities," 2011, pp. 13-14.

removal of nuclear material and with the sabotage against nuclear material or nuclear facilities.[30] 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 to protect the targets against possible stand-off attacks consistent with the State's threat assessment or design basis threat.[31] 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.[32]

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.[33] 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 1kg 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 15 g of unirradiated plutonium, 1 kg or less but more than 15 g, less than 10 kg but more than 1 kg / 10 kg or more of unirradiated 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 unirradiated uranium-233.[34]

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 uranium 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

[30] 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.

[31] Ibid., paragraph 5.14.

[32] Ibid., paragraph 2.1.

[33] Ibid., paragraph 4.5.

[34] Ibid., paragraph 4.6, table 1.

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.

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. While the global stockpile of HEU and separated plutonium has been occupying international attention, there is little officially disclosed information about stockpiles of HEU and weapon-grade plutonium by individual states, due to its sensitivity.

In accordance with the NTI's "Civilian HEU Dynamic Map,"[35] 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)[36]: Kazakhstan (10,470-10,820 kg)
- 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), Canada (less than 500 kg), Indonesia (3-5 kg*), Iran (8 kg [updated]*), the Netherlands (730-810 kg), Nigeria (1 kg), Norway (1-9 kg), Poland (more than 10 kg), South Africa (600 kg (unspecified)*), Syria (1 kg *)
  *: New (or updated) figures in 2015

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 246 out of a total of 774 research reactors are currently in operation (157 in developed countries, 89 in developing countries). Another 19 reactors (13 in developed countries, 6 in developing countries) are temporarily shut down, 7 reactors are under construction, 11 reactors (3 in developed countries, 8 in developing countries) are scheduled for construction, 140 reactors (119 in developed countries, 21 in developing countries) have been shut down, 343 reactors (318 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.[37]

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%.[38] A large portion of those spent HEU fuel assemblies

[35] NTI, "Civilian HEU Dynamic Map," NTI Website, October 2015, http://www.nti.org/gmap/other_maps/heu/.

[36] James Martin Center for Nonproliferation Studies (CNS), "Civil Highly Enriched Uranium: Who Has What?" NTI, August 2011, http://www.nti.org/media/pdfs/HEU_who_has_what.pdf.

[37] IAEA, Research Reactor Data Base, IAEA Website, https://nucleus.iaea.org/RRDB/RR/ReactorSearch.aspx?rf=1.

[38] Ibid.

Table 3-1: Stockpiles of fissile material usable for weapons (estimates in 2015)

[Metric Tons]

	China	France	Russia	U.K.	U.S.	India
HEU	**18 ± 4***	**(max) 30.6***	**679***	**21.2**	**around 600***	**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	
・Excess (mostly for blend-down)					146.6*	
Weapon Pu	**1.8***	**6**	**128 ±8**	**3.2***	**87.6**	**5.5***
・Military stockpile	1.8	6	88	3.2	38.3*	0.4*
・Excess military material			34	0*	49.3	
Additional strategic stockpile			**6**			**5.1***
・Civilian use Pu		61.9*	52.2*	103.3*		0.59*
・Civilian stockpile, stored in country (Dec. 2010)		61.9*	52.2*	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***	**0.7-0.75***	**0.95***	**1.2-1.4**	**0***	**0.042**	**15**
・Stockpile available for weapons								
・Naval (fresh)								
・Naval (irradiated)								
・Civilian Material								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		2.9*
・Civilian stockpile, stored in country (Dec. 2010)				2.1*	10.8*			
・Civilian stockpile, stored outside country (Dec. 2010)					37*			2.9*

Source: 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; International Panel on Fissile Materials, "Global Fissile Material Report 2013: Increasing Transparency of Nuclear Warhead and Fissile Material Stocks as a Step toward Disarmament," International Panel on Fissile Materials, October 2013; Civilian HEU Dynamic Map, October 2015, http://www.nti.org/gmap/other_maps/heu/; James Martin Center for Nonproliferation Studies (CNS), "Civil Highly Enriched Uranium: Who Has What?" October 6, 2014; INFCIRC/549/Add.4/19; INFCIRC/549/Add.3/14.
*: Updated figures in 2015.

originated in the United States (4,392) and Russia (8,509). From the viewpoint of geographical distribution: 10,627 spent HEU fuel assemblies, which are over half of the total, are currently stored in Eastern Europe region, 572 are located in Africa and Middle East, 3,492 in Asia, 4,275 in Western Europe, 85 in Latin America and 1,614 in North America.[39] 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. In terms of unauthorized removal, nuclear or other radioactive material and related production facilities are also potential targets.[40] 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 and designated "in order to determine appropriate levels of physical protection taking into account existing nuclear safety and radiation protection."[41]

Furthermore, in terms of fissile material attractiveness, the issue of radiological security has received a central focus and full weight of global nuclear security discussion. It could be said that the Nuclear Security Series No. 11 "Security of Radioactive Sources,"[42] issued by the IAEA in 2009, and the Nuclear Security Summits process, have heightened the state's awareness on the issues of radiological security. In fact, on the occasion of the Hague Nuclear Security Summit, 23 countries jointly released a "Gift Basket" statement on enhancing radiological security, in particular of securing Category I radiological isotopes by 2016, in compliance with the relevant IAEA code of conduct.[43]

(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-

[39] Ibid.

[40] 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.

[41] Ibid., p. 14.

[42] IAEA Nuclear Security Series No. 11, "Security of Radioactive Sources," 2009, http://www-pub.iaea.org/MTCD/publications/PDF/Pub1387_web.pdf.

[43] The Hague Nuclear Security Summit, "Statement on Enhancing Radiological Security," March 24, 2014, http://www.nss2014.com/sites/default/files/documents/statement_on_enhancing_radiological_security_final_version_of_24_march2.pdf. In this regard, following are the surveyed countries included in the Gift Basket approach: Australia, Canada, Germany, Japan, Kazakhstan, South Korea, the Netherlands, New Zealand, Norway, Sweden, Turkey, the UAE, the United Kingdom and the United States.

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]			△ [c]	△ [d]

	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		○				○	△ [f]	○	○	○		○ [a]
Uranium Enrichment Facility						△ [c]						△ [g]
Reprocessing Facility												△ [ai]

○ : Currently operated
△ : Un-operated
* : Enrichment facilities which are located in these countries belong to the URENCO, a nuclear fuel company established jointly by Germany, the Netherlands and United Kingdom.

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

Source: IAEA, Research Reactor Database, IAEA Website, https://nucleus.iaea.org/RRDB/Content/Geo/MiddleEast.aspx; 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."

related conventions is examined: 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 September 15, 2015, 153 countries have signed and 44 countries have ratified this treaty.[44] 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. From 2014 to 2015, Iraq, the Republic of Malawi and Singapore newly ratified the treaty.

The CPPNM Amendment has not yet entered into force at the time of writing this report. As of December 16, 2015, 91 out of 151 states have approved the Amendment.[45] Ten more (two-thirds) are needed for the amendment to effect.

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 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.

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[44] Convention on the Physical Protection of Nuclear Material, September 15, 2015, http://www.iaea.org/Publications/Documents/Conventions/cppnm_status.pdf.

[45] Amendment to the Convention on the Physical Protection of Nuclear Material, December 16, 2015, http://www.iaea.org/Publications/Documents/Conventions/cppnm_amend_status.pdf.

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	○	○		○	○		○	○		○	○	△ [a]*
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	○	○		○	○		○	○		○ [b]*	○	
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

a) 59th IAEA General Conference, New Zealand Statement, September 2015, https://www.iaea.org/sites/default/files/new_zealand2015_ver1.pdf.
b) 59th IAEA General Conference, Statement by H.E. Emine Birnur Fertekligil, September 2015, https://www.iaea.org/sites/default/files/turky2015.pdf.
*: Updated figures in 2015.

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.

B) INFCIRC/225/Rev.5

In 2011, twelve years after the last revision, 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 2011. 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 an 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.

Since 2010 in Washington, the communiqués of the Nuclear Security Summits have tended to declare that all participating states should make efforts to take up these recommended measures.[46] For instance, according to the communiqué of the most recent Nuclear Security Summit in The Hague, 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.[47]

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

[46] "Washington Communiqué," 2010 Washington Nuclear Security Summit, April 13, 2010; "Seoul Communiqué," 2012 Seoul Nuclear Security Summit, March 27, 2012; "The Hague Communiqué," 2014 The Hague Nuclear Security Summit, March 25, 2014.

[47] "The Hague Communiqué.".

report refers to official statements made available in the 59th IAEA General Conference in 2015,[48] the "International Conference on Nuclear Security: Enhancing Global Efforts organized by the IAEA" (hereinafter referred to as IAEA Nuclear Security Conference) in 2013, Nuclear Security Summits, and 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[49]

In 2015, information related to the domestic application of measures recommended in INFCIRC/225/Rev.5 was generally limited among the surveyed countries. In this regard, NTI has pointed out that few improvements have been made in core issues including on-site physical protection, control and accounting, insider threat prevention, physical security during transport, or response capabilities, since 2014.[50] It is undeniable that progress in applying measures in INFCIRC/225/Rev.5 has been generally slow. However, it is also true that since the IAEA published INFCIRC/225/Rev.5 in 2011, a number of surveyed countries have stated their satisfaction with recommended measures on each occasion of the Nuclear Security Summits and Inaternational Conferences of the IAEA. The following section summarizes the states' efforts that were announced on the occasion of the Seoul Nuclear Security Summit in 2012, the IAEA Nuclear Security Conference in 2013, and the Hague Nuclear Security Summit in 2014, taken by some countries to accommodate the recommended measures of INFCIRC/225/Rev.5.

In the field of the development of legal instruments, Australia, Brazil, Germany, Japan, South Korea, Switzerland and United States have declared in their national progress reports and statements at the Seoul Nuclear Security Summit that they have also established legal instruments based on the INFCIRC/225/Rev.5. In 2013, Belgium and France joined with them, and Canada, Kazakhstan and New Zealand also expressed their commitments on it in 2014.

In the area of strengthening physical protection measures, Australia and South Africa announced to take measures corresponding to INFCIRC/225/Rev.5 in 2012 and 2013 respectively. On the occasion of the Hague Nuclear Security Summit, South Korea, Bergium and Brazil have joined with them, and also Canada and Germany declared that they have implemented the enhanced physical protection measures, without making direct mention of the INFCIRC/225/Rev.5.

As for the measures against sabotage, on the occasions of Nuclear Security Summit in 2012 and IAEA Nuclear Security Conference in 2013, the Netherlands stated that it has started to apply the risk-based categorization for nuclear material and implemented protection measures according to this categolization in Jauary 2013. In this regard, South Korea has also stated that it is working toward

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[48] 59th IAEA General Conference, Statements and Key Addresses to IAEA General Conference, IAEA Website, https://www.iaea.org/about/policy/gc/gc59/statements.

[49] Progress statements made in the Hague Nuclear Security Summit, https://www.nss2014.com/en/nss-2014/reference-documents.

[50] NTI Nuclear Security Index, "Theft/Sabotage: Building a Framework for Assurance, Accountability, and Action (3rd Edition)," January 2016, http://www.ntiindex.org/wp-content/uploads/2013/12/NTI_2016-Index_FINAL.pdf, p. 7.

applying protection measures in accordance with nuclear material categorization. Australia has declared that it has established its national database for category I and II nuclear material.

With regard to cyber-terrorism, the Netherlands has introduced a DBT concerning cyber security for the domestic nuclear sector in 2013, and it was announced that the DBT will be fully implemented in March 2014. Belgium has announced it will establish a DBT addressing the cyber threat in the upcoming years. Canada is working toward the development and issuance of a national standard for cyber protection, which reflects international best practices. Germany has announced that since 2010, a new regulatory framework concerning cyber security, including a national DBT, has entered into force. Switzerland has declared that a "National Strategy for the Protection of Switzerland against Cyber Risks" was adopted in June 2012.

In terms of transport security, the Netherlands, South Korea and Mexico reported at the Seoul Nuclear Security Summit and IAEA Nuclear Security Conference that they have recommended measures for transportation in place.

In the field of protection measures against insider threats, Indonesia has introduced the two-man rule. On the occasion of the Hague Nuclear Security Summit, Japan declared an acceleration of research and consultation toward establishing a system to determine the trustworthiness of persons, while continuing to enhance countermeasures against insider threats, with measures such as access control and the two-man rule.[51] Belgium also reported that it had organized domestic workshops devoted to the issue of insider threats, to raise awareness against possible incidents.

In terms of nuclear security culture, Indonesia announced that it has conducted a self-assessment activity in March 2013. Sweden obligates licensees to make efforts to promote nuclear security culture and applies its self-assessment as a regulatory requirement. In this regard, Russia has reported that it is working to foster a nuclear security culture through participation in related workshops. In 2014, Brazil declared that it has been making efforts with the national nuclear industry to strengthen nuclear security culture, through the organization of workshops, seminars and training courses. Germany has stressed the enhancement of national nuclear security culture through training and education for personnel in nuclear facilities, following an integrated approach to equally assure nuclear safety and security. South Korea has developed guidance on implementing nuclear security culture,[52] provided education and training in nuclear security to all its nuclear industry-related personnel, and hosted workshops in 2013 on nuclear security culture. In November 2014, Japan co-organized with the IAEA a "Regional Workshop on Nuclear Security Culture in Practice."

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[51] According to a press release from the Nuclear Regulatory Authority (NRA) of Japan in 2015, details of the system to identify trustworthiness of person will be determined in the near future by a new regulation and guideline of NRA, which are delegated by the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors. NRA of Japan, "Press Release," October 21, 2015, https://www.nsr.go.jp/data/000127063.pdf.

[52] Naoko Noro, "Summary of Country reports: Current Status of 12 FNCA Member States," paper presented at the Forum of Nuclear Cooperation in Asia, February 27, 2014, http://www.fnca.mext.go.jp/nss/NSS_int01.pdf.

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.

(3) Efforts to Maintain and Improve the Highest Level of Nuclear Security

A) Minimization of HEU in civilian use

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 its country of origin, and conversion of research reactors to operate with low enriched uranium (LEU).

The U.S. National Nuclear Security Aministration (NNSA) reported that GTRI has greatly accelerated efforts to remove vulnerable civilian nuclear and radiological materials since 2004. GTRI and its predecessor programs have removed or confirmed the disposition of more than 5,140 kg of HEU and plutonium, and clean-up activities for all HEU in 26 countries (and Taiwan) until May 2014, namely: Austria, Brazil, Bulgaria, Chile, Colombia, Czech Republic, Denmark, Georgia, Greece, Hungary,

Iraq, South Korea, Latvia, Libya, Mexico, the Philippines, Portugal, Romania, Serbia, Slovenia, Spain, Sweden, Taiwan, Thailand, Turkey, Ukraine, and Vietnam.[53]

In his 2009 "Prague Speech," U.S. President Barack Obama announced a new international effort to secure all vulnerable nuclear material around the world within four years.[54] 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. Minimization of HEU stockpiles was widely encouraged. The 2014 Hague Nuclear Security Summit Communiqué stipulates to keep state stockpiles of separated plutonium to the minimum level consistent with national requirements.[55]

In this regard, at the Hague Nuclear Security Summit, and on other occasions, the following updates on commitments to minimizing HEU and plutonium use were made:

- China conducted conversion of MNSRs from using HEU to LEU. The unloading of the HEU core has started, and it is expected that the loading and commissioning of the LEU core will be completed by the end of 2015. Under the Agreement on Assistance in the Supply of LEU to the Research Reactor in Ghana, which was signed between China, IAEA and Ghana in 2014, China provided assistance.[56]
- Russia decommissioned one of the Kurchatov Institute's HEU research reactors, Gamma. It has reported that the reactor fuel was estimated to contain about 39 kg of HEU, and the fuel has been removed from the reactor and all the equipment is being prepared for utilization.[57]
- South Korea developed new high-density LEU fuel as part of an effort to phase out HEU fuel in reactors.[58]
- Poland completed shipment of HEU spent fuel from the Polish research reactor MARIA to the Russian Federation. Since September 2014, the research reactor MARIA has been working solely on LEU fuel. The remaining HEU spent fuel is expexted to be shipped to Russia in 2016.[59]
- Swizerland announced that approximately 2.2 kg of HEU had been returned to the United States. The successful transport of this HEU made Switzerland the 27th country plus Taiwan

[53] "GTRI: Removing Vulnerable Civilian Nuclear and Radiological Material Fact Sheet," NNSA Website, May 29, 2014, http://nnsa.energy.gov/mediaroom/factsheets/gtri-remove.

[54] 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.

[55] "The Hague Communiqué," p. 4.

[56] 59th IAEA General Conference, Statement by Mr XU Dazhe, September 14, 2015, https://www.iaea.org/sites/default/files/china2015_ver1.pdf.

[57] IPFM Blog, "Gamma Research Reactor at Kurchatov Institute is Being Decommissioned," May 26, 2015, http://fissilematerials.org/blog/2015/05/gamma_research_reactor_at.html.

[58] 59th IAEA General Conference, Statement by H.E. Mr. Cho Tae-yul, September 2015, https://www.iaea.org/sites/default/files/korea2015.pdf.

[59] 59th IAEA General Conference, Statement by Janusz Wlodarski, September 2015, https://www.iaea.org/sites/default/files/poland2015.pdf.

to remove all of its HEU.[60]

- Kazakhstan's Critical stand (zero power reactor) of the Institute of Nuclear Physics (INP) in Almaty was transferred to LEU fuel, and the VVR-K reactor is planned to operate a new LEU fuel by December 2015.[61] As the culmination of a multi-year effort between the United States, Kazakhstan, Russia and the IAEA, approximately 10 kg of HEU fresh fuel was returned to Russia from the INP in September 2014, and then, 36 kg of HEU spent fuel was additionally removed to Russia in January 2015. Over the next several years, approximately 50 kg of HEU will be return to Russia, thereby eliminating all HEU research reactor fuel from Kazakhstan.[62]
- Norway sponsored the IAEA's LEU Bank in Ulba, Kazakhstan.[63]
- South Africa supplied Mo-99 manufactured from LEU for medical purposes.[64]
- Japan and United States pledged to remove and dispose all HEU and separated plutonium from the Japan Atomic Energy Agency (JAEA)'s Fast Critical Assembly (FCA).[65] Since the pledge was announced in 2014, it has been reported that 331 kg of plutonium will be securely transported to the United States by the time of the 2016 NSS and sent to a secure facility and fully converted into less sensitive forms. The plutonium will be prepared for final disposition. The HEU will be down blended to LEU and utilized for civilian purposes.[66]

Although it has not been included in the list of surveyed countries, in September 2015, Jamaica announced that it has successfully converted its research reactor to run on LEU fuel and removed approximately 1 kg of U.S.-Origin HEU core to the United States,[67] making the Caribbean region completely free of HEU.[68] Uzbekistan has also completed removal of the last remaining HEU from the country. The transfer, carried out in cooperation with Russia and the IAEA, with funding provided by the United States as part of its GTRI program, was completed in September 2015.[69] After the removal of

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[60] NNSA, "Press Release: Last HEU Removed from Switzerland under NNSA Collaboration," September 16, 2015, http://nnsa.energy.gov/mediaroom/pressreleases/last-heu-removed-switzerland-under-nnsa-collaboration.

[61] 59th IAEA General Conference, Statement by V. Shkolnik, September 2015, https://www.iaea.org/sites/default/files/kazakhstan2015_en.pdf.

[62] NNSA, "Press Release: US, Kazakhstan Cooperate to Eliminate Highly Enriched Uranium," January 7, 2015, http://nnsa.energy.gov/mediaroom/pressreleases/kazakhstan.

[63] 59th IAEA General Conference, Statement by Norway, September 2015, https://www.iaea.org/sites/default/files/norway_2015.pdf.

[64] 59th IAEA General Conference, Statement by Ms. Tina Joemat-Pettersson, September 2015, https://www.iaea.org/sites/default/files/south_africa2015.pdf.

[65] Joint Statement by the Leaders of Japan and the United States on Contributions to Global Minimization of Nuclear Material, March 24, 2014, www.mofa.go.jp/dns/n_s_ne/page18e_000059.html.

[66] Pavel Podvig, "United States and Japan to Remove plutonium and HEU from Fast Critical Assembly," IPFM Blog, March 24, 2014, http://fissilematerials.org/blog/2014/03/united_states_and_japan_t.html; Ministry of Education, Culture, Sports, Science and Technology (MEXT), "Press Release," March 25, 2014, http://www.aec.go.jp/jicst/NC/iinkai/teirei/siryo2014/siryo13/siryo1-2.pdf.

[67] NNSA, "Press Release: NNSA Removes U.S.-Origin HEU from Jamaica, Makes the Caribbean HEU Free," September 22, 2015, http://nnsa.energy.gov/mediaroom/pressreleases/nnsa-removes-u.s.-origin-heu-jamaica-makes-caribbean-heu-free.

[68] Miklos Gaspar, "International Security Strengthens as Caribbean Becomes Free of Highly Enriched Uranium," IAEA Website, October 30, 2015, https://www.iaea.org/newscenter/news/international-security-strengthens-caribbean-becomes-free-highly-enriched-uranium.

[69] IPFM Blog, "All HEU is Removed from Uzbekistan," September 28, 2015, http://fissilematerials.org/blog/2015/09/all_heu_is_removed_from_u.html.

HEU from Jamaica and Uzbekistan, following the case of Switzerland in early September 2015,[70] HEU has now been completely removed from 29 countries plus Taiwan.[71]

Although the number of HEU-free countries is increasing, more than 27 countries still possessed HEU for civilian purposes as of September 24, 2015.[72] 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.[73]

B) Prevention of illicit trafficking

In order to regulate nuclear transfers and counter illicit transfers of nuclear material, the Communiqués issued through the Nuclear Security Summits since 2010 stipulate the vital importance of using all tools to locate and secure nuclear material out of regulatory control, including effective export control arrangements and law enforcement mechanisms. In particular, measures including sharing information, best practices and expertise, subject to states' national laws and procedures, through bilateral, regional and multilateral mechanisms in relevant areas such as nuclear detection, forensics, law enforcement, development of new technologies to enhance enforcement capacity of customs personnel, participation in the IAEA ITDB, and information-sharing on best practices and expertise, have been underscored.

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. As of December 31, 2014, 128 States participate in the ITDB program. In the first three months of 2015, Cambodia, Guatemala, and Honduras joined the ITDB, raising the mid-year total to 131.[74]

According to the *IAEA Annual Report 2014*, States confirmed 186 incidents during 2014.[75] On the other hand, the IAEA Nuclear Security Report[76] specifies the following details. During the reporting period, States reported, or otherwise confirmed to the ITDB program, a total of 243 incidents. Of these, 116 occurred between July 1, 2014 and June 30, 2015, and the remaining cases had occurred prior to July 1, 2014 but were not reported by that date. Of the 243 reported incidents, 16 involved illicit possession

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[70] IPFM Blog, "All HEU Removed from Jamaica," September 21, 2015, http://fissilematerials.org/blog/2015/09/all_heu_removed_from_jama.html.

[71] IPFM Blog, "All HEU is Removed from Uzbekistan," September 28, 2015, http://fissilematerials.org/blog/2015/09/all_heu_is_removed_from_u.html.

[72] IPFM, "Materials: Highly-Enriched Uranium," IPFM Website, http://fissilematerials.org/materials/heu.html.

[73] NTI Nuclear Security Index, "Theft/Sabotage," p. 7.

[74] IAEA, Incident and Trafficking Database (ITDB) 2015 Fact Sheet, IAEA Website, http://www-ns.iaea.org/downloads/security/itdb-fact-sheet.pdf.

[75] *IAEA Annual Report 2014*, GC(59)/7, https://www.iaea.org/sites/default/files/gc59-7_en.pdf, p. 93.

[76] IAEA, *Nuclear Security Report 2015*, GOV/2015/42-GC(59)/12, July 13, 2015, https://www.iaea.org/About/Policy/GC/GC59/GC59Documents/English/gc59-12_en.pdf, p. 5.

of, and attempts to sell, nuclear material or radioactive sources, with six of these incidents involving nuclear material. There were 61 reported cases of theft or loss of radioactive sources, ten of which involved the theft of Category I, II or III radioactive sources. A total of 169 reported incidents involved other unauthorized activities. One of the reports involved HEU.

As of the year-end of 2014, the ITDB contained a total of 2,734 confirmed incidents reported by participating States. Of the 2,734 confirmed incidents, 442 incidents involved unauthorized possession and related criminal activities, 714 incidents involved reported theft or loss, and 1,526 incidents involved other unauthorized activities and events. In the remaining 86 cases, the reported information was not sufficient to determine the category of incident.[77]

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 describes some of efforts taken from 2014 to 2015 as preventive measures against illicit trafficking of nuclear and other radiological material:

- Austria has hosted an international meeting on the benefits of joining the ITDB program in November 2014. In January 2015, meetings for the ITDB web-based resources and preparatory meeting for the July 2015 ITDB Points of Contact meeting was also held in Vienna.[78]
- Sweden has been engaged, as for an assistance in addressing Nuclear Legacy issues, in cooperation with Ukraine, Georgia, the Russian Federation, Moldova and Belarus, with the efforts by other states and the IAEA, for providing technical cooperation in the area of safeguards implementation, combating illicit trafficking of radioactive and nuclear materials, etc.[79]
- Chile initiated a new project on sustainable detection systems and measures through the pilot deployment of radiation detection equipment at designated places, including border crossing points.[80]
- South Korea has engaged in a trilateral project to build a Radiation Source Location Tracking System (RADLOT) in cooperation with the IAEA and Vietnam.[81]

[77] IAEA, Incident and Trafficking Database (ITDB) 2015 Fact Sheet.

[78] IAEA, *Nuclear Security Report 2015*, GOV/2015/42-GC(59)/12, p. 6.

[79] 59th IAEA General Conference, Statement by H.E. Ambassador Helen Eduards, September 2015, https://www.iaea.org/sites/default/files/swedish2015.pdf.

[80] IAEA, *Nuclear Security Report 2015*, GOV/2015/42-GC(59)/12, p. 17.

[81] 59th IAEA General Conference, Statement by H.E. Mr. Cho Tae-yul, September 2015.

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	○	○	○ [a]	○			○	○	○	○	○	○ [d]

	Nigeria	Norway	Philippines	Poland	Saudi Arabia	South Africa	Sweden	Switzerland	Syria	Turkey	UAE	North Korea
HEU minimization for peaceful purposes	○	○	○	○		○	○	○ [b]	○ [c*]	○ [b]		
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.

a) A. M. Ali, "Legal Elements for Nuclear Security: Egyptian Nuclear Law as a Case Study," paper presented at the XI Radiation Physics & Protection Conference, November 25-28, 2012, Nasr City - Cairo, Egypt, p. 333, http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/45/099/45099916.pdf.
b) U.S. National Nuclear Security Agency, "Fact Sheet: GTRI's Convert Program: Minimizing the Use of Highly Enriched Uranium," May 29, 2014, http://nnsa.energy.gov/mediaroom/factsheets/gtri-convert.
c) Reuters, "IAEA studies Syrian Request to Switch to Lower Grade Nuclear Fuel," June 8, 2015, http://www.reuters.com/article/us-syria-nuclear-idUSKBN0OO1O920150608.
d) U.S. National Nuclear Security Administration, "Press Release: US, New Zealand Collaborate to Combat Trafficking of Nuclear Materials," July 23, 2013, http://www.nnsa.energy.gov/mediaroom/pressreleases/ nzcollaboration72313.
*: Updated figures in 2015.

In terms of the international and regional organization's efforts, "INTERPOL Counter Smuggling Workshops" in July 2014, the "Europol Regional Workshop on Response to an Emergency from a Nuclear Security Event" in October 2014, and the "Europol Regional CBRN Conference" in June 2015 were held, respectively. The outcome of these meetings included the development of plans for improvements to the ITDB user experience, raised awareness of the performance of national nuclear security detection architecture, and increased recognition of the significance of nuclear security threats around the world.[82]

Table 3-5 shows the implementation status regarding the minimization of HEU for peaceful purposes, 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 Seoul and Hague Nuclear Security Summits, IAEA Nuclear Security Conference, and any other opportunities.

C) Acceptance of international nuclear security review missions

In recent years, International Physical Protection Advisory Service (IPPAS) has a high profile among the IAEA's advisory services to its member states on development of the nuclear security system and capabilities. Upon the request of a member state, the IPPAS provides recommendations to improve the physical protection system of nuclear material, associated facilities, and transport systems of the 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.

In November 2014, the IAEA published "IAEA Services Series No. 29 IPPAS Guidelines," consisting of a general part and five modules including: national review of nuclear security regime for nuclear material and nuclear facilities (module 1), nuclear facility review (module 2), transport review (module 3), security of radioactive material, associated facilities and associated activities (module 4) and computer security review (module 5).[83] These guidelines will further enhance the processes of preparation and conduct of IPPAS missions, and facilitate self-assessment of physical protection regimes in member states. It has also been reported that the IAEA is creating a database containing information on good practices identified in IPPAS mission reports. The goal of this effort is to make this information available on the IAEA's Nuclear Security Information Portal (NUSEC).[84] Furthermore, the IAEA conducted the first international training course for potential IPPAS team members, which was attended by 62 participants in December 2014 at the IAEA.[85]

[82] IAEA, Nuclear Security Report 2015, GOV/2015/42-GC(59)/12, p. 6.

[83] International Physical Protection Advisory Service (IPPAS) Guidelines, 2014, http://www-pub.iaea.org/MTCD/publications/PDF/SVS-29_web.pdf.

[84] IAEA, Nuclear Security Report 2015, GOV/2015/42-GC(59)/12, p. 11.

[85] Ibid.

As was pointed in the previous issue of this report,[86] 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 increases from the member states to receive the IPPAS mission, the IAEA requires a new foundation to satisfy these requests. In this regard, it could be pointed out that there is a sense of trust among the member states in the confidentiality policy of the IAEA.

Since Japan completed its reception of the IPPAS mission on February 27, 2015,[87] Norway (October 16, 2015),[88] Canada (October 30, 2015)[89] and New Zealand (November 27, 2015)[90] have also completed and received the agency's review on national nuclear security practices. In addition to this, the IAEA has announced having received 12 requests for future IPPAS-related missions during 2015 to 2016, from Albania, Belarus, Canada, Jamaica, Malaysia, New Zealand, Norway, Poland, Sweden, Turkey, UAE and the United Kingdom.[91] During the above mentioned period, the IAEA also held a regional workshop in Peru and seven national IPPAS workshops in Albania, Armenia, Canada, Indonesia, New Zealand, Poland and Turkey, to establish a clear understanding among member states on the processes in preparing and conducting IPPAS missions, as well as the benefits of such missions.[92]

Except for the IPPAS mission, the IAEA provides the International Nuclear Security Advisory Service (INSServ), the IAEA State Systems for Accountancy and Control (SSAC) Advisory Service (ISSAS) 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. On the other hand, ISSAS provides those national authorities which request them with recommendations and suggestions for improvements to their SSACs of nuclear material. The missions evaluate the regulatory, legislative, administrative and technical components of the SSAC at both the state and facility level, and assess how the SSAC meets the obligations contained in the state's safeguards agreement and additional protocol, as applicable. 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

[86] Hiroshima Prefecture and Center of the Promotion of Disarmament and Non-Proliferation, The Japan Institute for International Affairs, *Hiroshima Report 2015: Evaluation of Achievement of Nuclear Disarmament, Non-Proliferation and Nuclear Security in 2014*, March 2015, p. 93.

[87] IAEA, "IAEA Completes Nuclear Security Review Mission in Japan," IAEA Website, February 27, 2015, https://www.iaea.org/newscenter/pressreleases/iaea-completes-nuclear-security-review-mission-japan.

[88] IAEA, "IAEA Completes Nuclear Security Review Mission in Norway," IAEA Website, October 16, 2015, https://www.iaea.org/newscenter/pressreleases/iaea-completes-nuclear-security-review-mission-norway-0.

[89] IAEA, "IAEA Completes Nuclear Security Review Mission in Canada," IAEA Website, October 30, 2015, https://www.iaea.org/newscenter/pressreleases/iaea-completes-nuclear-security-review-mission-canada.

[90] IAEA, "IAEA Completes Nuclear Security Review Mission in New Zealand," IAEA Website, November 27, 2015, https://www.iaea.org/newscenter/pressreleases/iaea-completes-nuclear-security-review-mission-new-zealand.

[91] IAEA, Nuclear Security Report 2015, GOV/2015/42-GC(59)/12, p. 11.

[92] Ibid.

from both a technical and a financial point of view—optimizing the use of resources and avoiding duplications.

During 2014 to 2015, the IAEA completed a modular INSServ mission to Qatar, focusing on detection and response systems and measures; an INSServ mission to South Africa, focusing on border monitoring; and a follow-up INSServ mission to Sri Lanka, focusing on updating the current INSSP and developing a sustainable detection and response strategy for the state.[93]

D) Technology development —nuclear forensics

In accordance with the "IAEA Nuclear Security Series No.2 Nuclear Forensics Support (2006)"[94] 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 includes the characterization of the material and correlation with its production history.[95] Since the Nuclear Security Summit in Washington,[96] it has been encouraged to carry out on a voluntary basis and to work together to develop national capacities for nuclear forensics, and this trend has been maintained in a consistent manner through the Seoul[97] and the Hague Nuclear Security Summits.[98]

As for a case of multilateral cooperation on nuclear forensics, 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. Workshop and tabletop exercise hosted by Finland (January 2015), international conference and mock trial hosted by the Netherlands (March 2015), emergency management workshop hosted by the Philippines (April 2015), and workshop and tabletop exercise hosted by the EU are the specific recent examples of NFWG's multilateral events.[99] In this regard, NFWG also completed a document entitled, "Nuclear Forensics Fundamentals for Policy Makers and Decision Makers," which was endorsed at the GICNT

[93] Ibid., pp. 11-12.

[94] IAEA Nuclear Security Series No.2, "Nuclear Forensics Support," 2006, http://www-pub.iaea.org/MTCD/publications/PDF/Pub1241_web.pdf.

[95] Ibid., p. 3.

[96] The White House, Office of the Press Secretary, "Work Plan of the Washington Nuclear Security Summit," April 13, 2010.

[97] "Seoul Communiqué."

[98] "The Hague Communiqué."

[99] GICNT, "Key Multilateral Events and Exercises," GICNT Website, June 2015, http://www.gicnt.org/content/downloads/iag/GICNT_Past_Multilateral_Events_June2015.pdf.

Plenary Meeting in May 2013.[100]

The Netherlands Forensic Institute has 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.[101] This project has been closely linked with the Joint Statement on Forensics in Nuclear Security, in the context of the Nuclear Security Summit 2014, and the concerned states announced support for 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.[102]

Another international cooperation initiative, 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. 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 recently published "Guidelines for Evidence Collection in a Radiological or Nuclear Contaminated Crime Scene (2011)"[103] and "Proposed Framework for National Nuclear Forensics Libraries and International Directories (2011)."[104] Also in 2014, the fourth "Comparative Material Exercise (CMX-4)," using different uranium samples, was held with 16 foreign laboratories participation, and a data evaluation meeting was held in March 2015 with some 35 experts participating from 15 countries, to discuss the results of the exercise and to draw conclusions on good practices, methodologies to be used and parameters to be measured.[105]

As reviewed in the past issues of the *Hiroshima Report*, France, the United Kingdom, the United States, Australia, Canada, Japan, South Korea, Sweden, and Switzerland are at the forefront of work on the development of nuclear forensics capability (see Table 3-6, which is based on the reports made at the ITWG-17 in 2012).[106]

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[100] U.S. Office of the Spokesperson, "Joint Statement on the Contributions of the Global Initiative to Combat Nuclear Terrorism (GICNT) to Enhancing Nuclear Security," March 20, 2014, http://www.state.gov/r/pa/prs/ps/2014/03/223761.htm.

[101] 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.

[102] Joint Statement in the context of the Nuclear Security Summit 2014: Forensics in Nuclear Security, 2014, http://nuclearsecuritymatters.belfercenter.org/files/nuclearmatters/files/joint-statement-on-forensics-in-nuclear-security_gb_2014.pdf?m=1446141233.

[103] ITWG, "Guideline," ITWG Website, http://www.nf-itwg.org/sites/default/files/pdfs/ITWG_Guideline_for_RN_Evidence_Collection_FINAL.pdf.

[104] ITWG, "Nuclear Forensics Libraries," ITWG Website, http://www.nf-itwg.org/sites/default/files/pdfs/National_Nuclear_Forensic_Libraries_TOR_FINAL.pdf.

[105] ITWG, "CMX-4," ITWG Website, http://www.nf-itwg.org/article/cmx-4.

[106] *Hiroshima Report—Evaluation of Achievement in Nuclear Disarmament, Non-Proliferation and Nuclear Security: 2014*, 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
(This table was originally shown in the *Hiroshima Report—Evaluation of Achievement in Nuclear Disarmament, Non-Proliferation and Nuclear Security: 2014*, March 2014, p. 82.)

Other than these countries, Israel announced that it would co-lead a two-year technical exchange to establish procedures and best practices for nuclear forensics with Canada during 2014-2015, which will potentially be implemented under the umbrella of the GICNT. Chile announced on the occasion of the 2014 Nuclear Security Summit, that a border drill with Argentina, on detection of radioactive material, nuclear forensics, response and mitigation, would be carried out during the first half of 2014, which would allow both countries to assess security capabilities and to gain knowledge for the strengthening thereof.

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 Centers of Excellence (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. By 2014, Brazil, Canada, China France, India, Indonesia, Japan, Kazakhstan, South Korea, the Netherlands, Pakistan, the Philippines, Russia, Saudi Arabia South Africa, Switzerland, United Kingdom and United States declared to have their own COE.

In this regard, trends in 2015 on the development of COEs for nuclear security are as follows. China has announced that the China-U.S. COE on Nuclear Security is expected to come into service by the end of 2015.[107] Pakistan has established the Pakistan Centre of Excellence for Nuclear Security (PCENS), to conduct specialized training courses in physical protection of nuclear materials and facilities, material control and accounting, personnel reliability, transport security and other security-related areas.[108] Although not officially called the COE on nuclear security, but having the same function, Nigeria has announced to finalize the institutional and technical framework for the establishment of a National Nuclear Security Centre (NNSC).[109] Nigeria has co-organized a national workshop on establishing this NNSC with the IAEA in January 2015, and also presented a proposal to the IAEA to establish an international Nuclear Security School (NSS) in Nigeria, to note the inauguration of the NNSC.[110]

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 material, various initiatives among experts have been performed. For example, in the Northeast Asian region case, experts from various countries in this region discussed the realization of effective and efficient training methodology on nuclear security at the Forum for Nuclear Cooperation in Asia (FNCA) Nuclear Security and Safeguards Workshop in 2014, and argued about the desired divisional cooperation among the nuclear security COEs in Japan, South Korea, Indonesia and China.[111]

To maintain and further facilitate exchange of experts, information and training material, the International Network for Nuclear Security Training and Support Centres (NSSC Network) was

[107] 59th IAEA General Conference, Statement by Mr XU Dazhe, September 14, 2015.

[108] 59th IAEA General Conference, Statement by Pakistan, September 2015, https://www.iaea.org/sites/default/files/pakistan2015_ver1.pdf.

[109] 59th IAEA General Conference, Statement by H.E. Dr. F. Erepamo Osaisai, September 2015, https://www.iaea.org/sites/default/files/nigeria2015.pdf.

[110] Ibid.

[111] FNCA, "Forum for Nuclear Cooperation in Asia (FNCA) Workshop on Nuclear Security and Safeguards in 2014," FNCA Website, November 2014, http://www.fnca.mext.go.jp/nss/ws_2014.html.

established in 2012 under the leadership of the IAEA. In February 2015, a "Technical Meeting: Nuclear Security Plan 2014-2017—Implementation of the International NSSC Network" was held at the IAEA Headquarters, with attendance of 60 participants from 47 member states.[112] At the meeting, information on various COE activities was shared, and issues related to the nuclear security culture and its sustainability, promotion of regional center engagement and exploration of synergies with the International Nuclear Security Education Network (INSEN) via the joint meeting of the networks and their leaderships were discussed.[113] Also, in August 2015, the "Technical Meeting: Working Group Meeting of the International NSSC Network" was held with 44 participants from 32 member states, and issues on the IAEA's support for NSSCs, reviewing the network's lessons learned and best practice, and long-term network priorities were delivered at the meeting.[114]

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.[115] 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 2014, total revenue of the NSF amounted to €24.40 million in 2013.[116] It shows a €1.30 million decrease over that of the previous year.

G) Participation in international efforts

In the present circumstances, various 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.[117] 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, in particular 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

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[112] "Report of the Outcome of the Technical Meeting: Nuclear Security Plan 2014-2017 - Implementation of the International Network for Nuclear Security Training and Support Centres (NSSC Network)," February 23-25, 2015, http://www-ns.iaea.org/downloads/security/chair-report-nssc-2015.pdf.

[113] Ibid.

[114] NSSC Network, "Technical Meeting: Annual Working Group Meeting of the NSSC Network," August 12-14, 2015, http://www-ns.iaea.org/downloads/security/chair-report-wg-meeting-2015.pdf.

[115] IAEA, "Nuclear Security Plan 2014–2017 (GOV/2013/42-GC(57)/19)," August 2, 2013.

[116] *IAEA Annual Report 2014*, https://www.iaea.org/sites/default/files/gc59-7_en.pdf, p. 95.

[117] 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/.

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 had expanded to 28 states at the end of 2015.[118]

The G8 Summit in St. Petersburg in 2006 agreed to establish the GICNT, as proposed by Russia and the United States. Its membership has expanded to 86 states (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.[119] 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.[120] 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).[121]

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.

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[118] 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.

[119] GICNT, "GICNT Partner Nations and Official Observer Organizations," June 2015, http://www.gicnt.org/content/downloads/partners/GICNT_Partner_Nation_List_June2015.pdf.

[120] GICNT, "Overview," GICNT Website, http://www.gicnt.org/index.html.

[121] GICNT, "Fact Sheet," June 2015, http://www.gicnt.org/content/downloads/sop/GICNT_Fact_Sheet_June2015.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	○ a*	○	○	○	○		○ b*	○	○		○	
Capacity Building & Support Activities	○	○	○	○	○	○		○	○	○		○
Nuclear Security Fund	○	○	○	○	○	○	○ d	○ d	○ d	○ d	○ e	
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	○	○		○	○ c*		○	○	○		○	
Nuclear Security Fund	○			○		○ f	○		○		○	○
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	○ g*	○			○	○		○			○	
Nuclear Security Fund		○					○			○ g		
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.

a) ASEAN Regional Forum, "Co-Chairs' Summary Report: Workshop on Non-Proliferation Nuclear Forensics," December 7-9, 2011, http://aseanregionalforum.asean.org/files/library/ARF%20Chairman's%20Statements%20and%20Reports/The%20Nineteenth%20ASEAN%20Regional%20Forum,%202011-2012/15%20-%20Co-Chairs%20Summary%20Report%20-%20ARF%20Workshop%20on%20Nonproliferation%20Nuclear%20Forensics,%20Bangkok.pdf.
b) GICNT, "Key Multilateral Events and Exercises," GICNT Website, http://www.gicnt.org/content/downloads/iag/GICNT_Past_Multilateral_Events_June2015.pdf.
c) 59th IAEA General Conference, Statement by H.E. Rachmat Budiman, September 2015, https://www.iaea.org/sites/default/files/indonesia.pdf.
d) IAEA, "Table-Voluntary Contributions to IAEA Nuclear Security Fund Global Cooperation for Advanced Nuclear Electricity Plants," IAEA Website, November 17, 2010, https://www.iaea.org/newscenter/news/table-voluntary-contributions-iaea-nuclear-security-fund.
e) U.S. Department of State, "Article: Preventing Nuclear Terrorism the Nuclear Security Summit and Beyond," National Press Club, March 13, 2012, http://www.state.gov/t/isn/rls/rm/185869.htm.
f) IAEA, "Table-Voluntary Contributions to IAEA Nuclear Security Fund Global Cooperation for Advanced Nuclear Electricity Plants," IAEA Website, November 17, 2010.
g) 59th IAEA General Conference, Statement by H.E. Dr. F. Erepamo Osaisai, September 2015.
*: Updated figures in 2015.

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 and 2013. However, there is no agreement among the states parties on North Korea's official status.
** Since Russia decided not to continue the Cooperative Threat Reduction (CTR) program, we do not evaluate performances of NNWS regarding "Implementing or planning dismantlement of nuclear warheads and their delivery vehicles" and "Decommissioning/conversion of nuclear weapons-related facilities" in this Hiroshima Report. Therefore, the full score of each NNWS regarding nuclear disarmament changes from 39 points for the previous *Hiroshima Reports* to 35 points for this Report.

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 the UNGA resolutions on nuclear disarmament proposed by Japan, NAC and NAM	(6)	On each resolution: 0 (against); 1 (abstention) ; 2 (in favor)

Evaluation criteria	Maximum points	Scale of measurement
B) Voting behavior on the UNGA resolutions calling for commencement of negotiations on a legal prohibition of nuclear weapons	(2)	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).
D) Humanitarian consequences of nuclear weapons	(3)	On each resolution: 0 (against); 0.5 (abstention); 1 (in favor). Add 0.5 (participating in the Joint Statements at the NPT RevCon, respectively). Maximum 3 points
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 the 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 the “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)

Evaluation criteria	Maximum points	Scale of measurement
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)
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) The moratorium 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) The moratorium 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)

Evaluation criteria	Maximum points	Scale of measurement
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)
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 the 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 the Nuclear Non-Proliferation Obligations	**20**	
A) Accession to the NPT	(10)	0 (not signing or declaring withdrawal); 3 (not ratifying); 10 (in force)

Evaluation criteria	Maximum points	Scale of measurement
B) Compliance with Articles 1 and 2 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)
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 the 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)

Evaluation criteria	Maximum points	Scale of measurement
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)

Evaluation criteria	Maximum points	Scale of measurement
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; relying 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

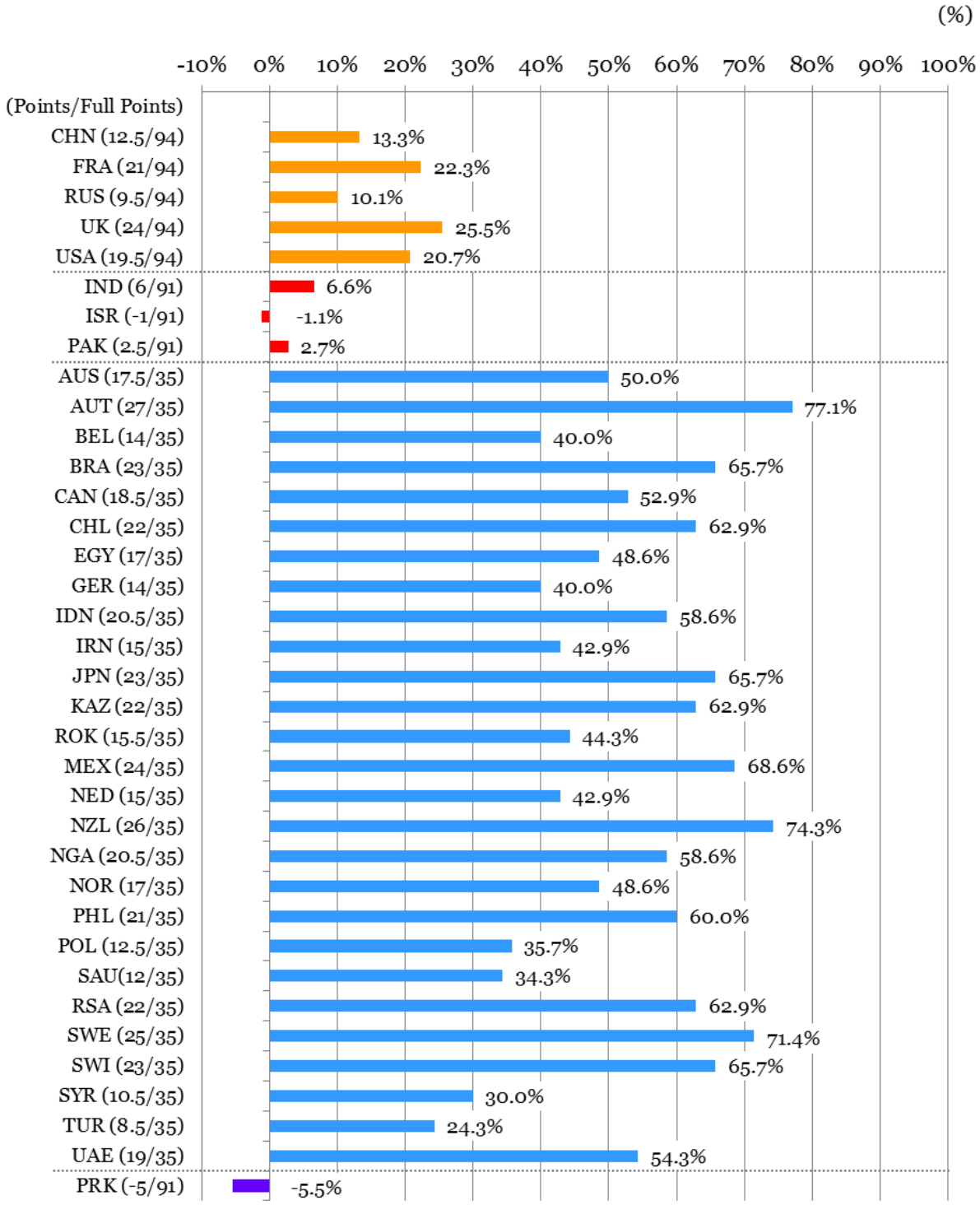
be taken as indicative of the performances in general but by no means as an exact representation or precise assessment of different countries' performances. Since the *Hiroshima Report 2014*, such items as "relying on extended nuclear deterrence" and "nuclear testing" have been negatively graded if applicable.

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
Relevant 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

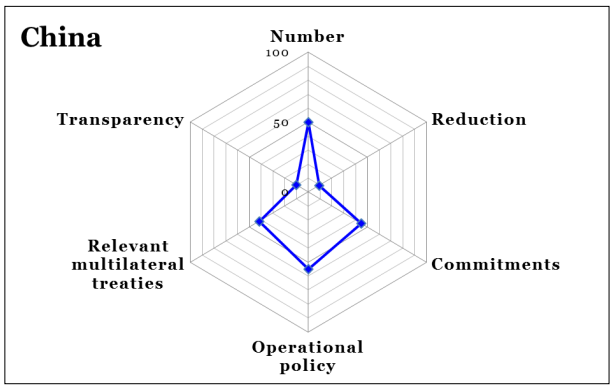
Chapter 1. Area Summary

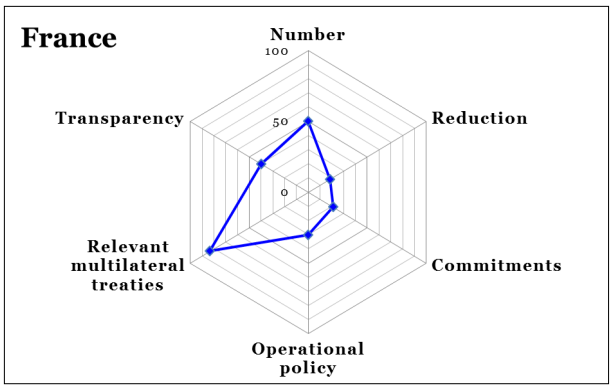
(1) Nuclear Disarmament

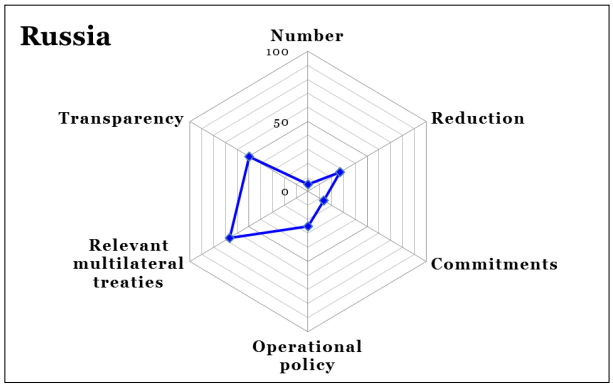


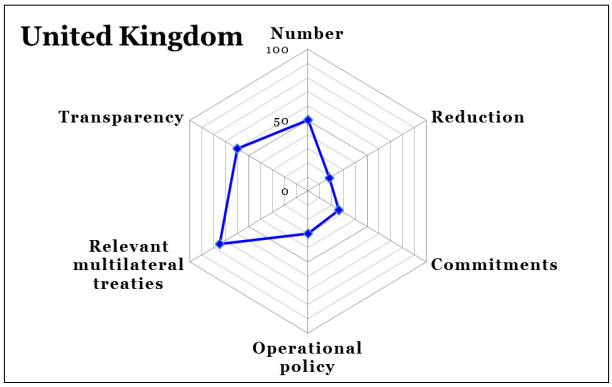
6-point Nuclear Disarmament Radar Charts

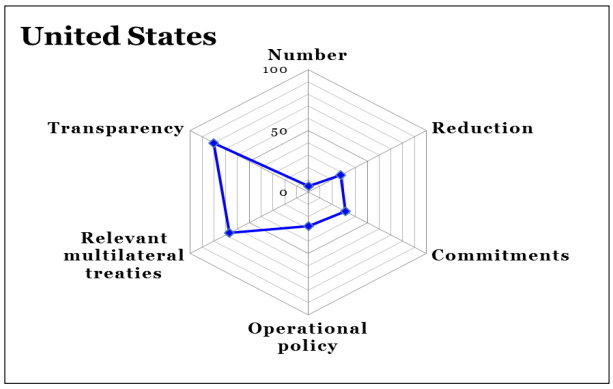
According to the following radar charts illustrating where each nuclear-weapon state stands in different aspects of nuclear disarmament, China is required to improve its efforts for nuclear weapons reduction and transparency. To a lesser extent, France could be more transparent regarding its nuclear 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.



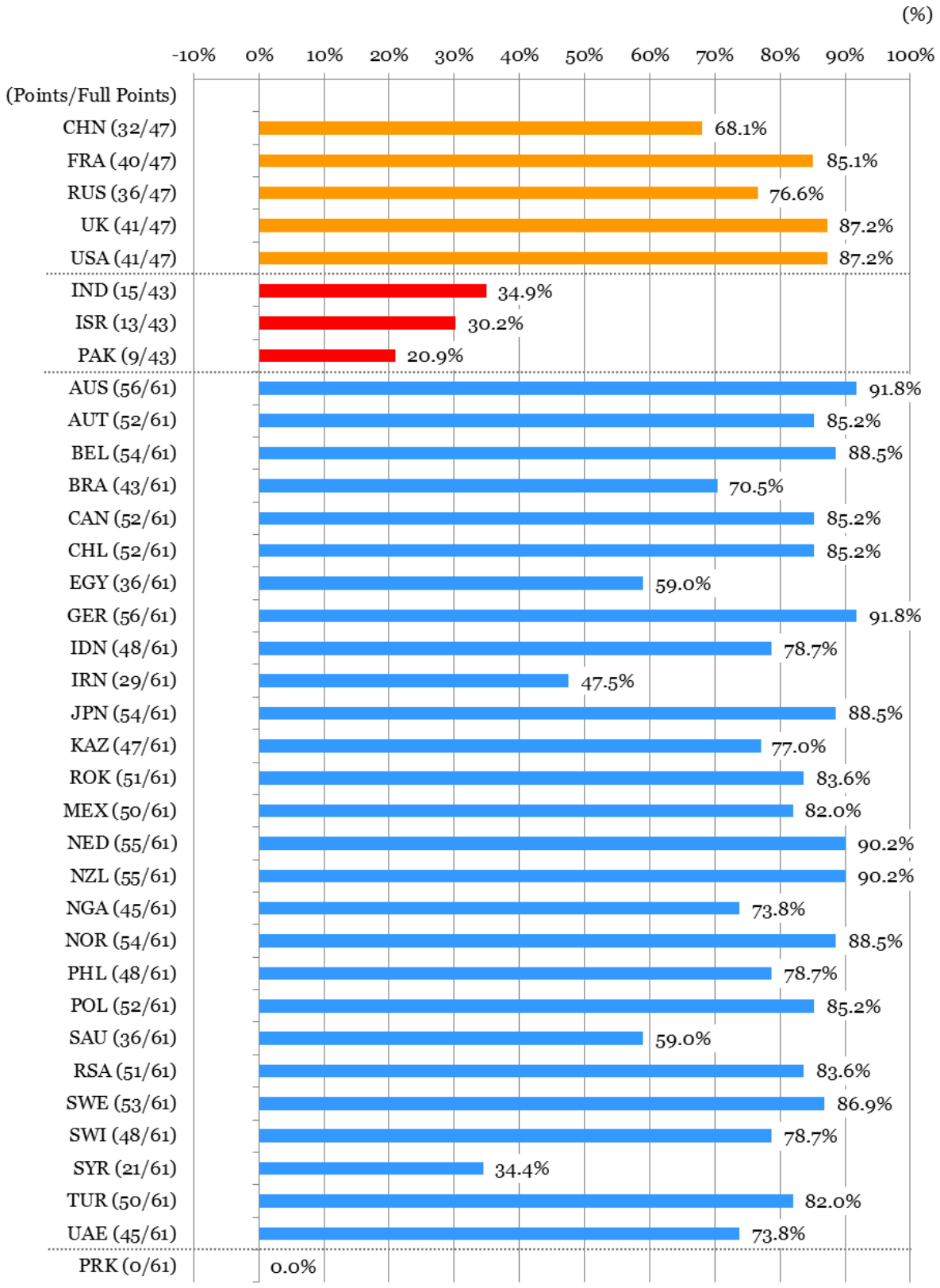




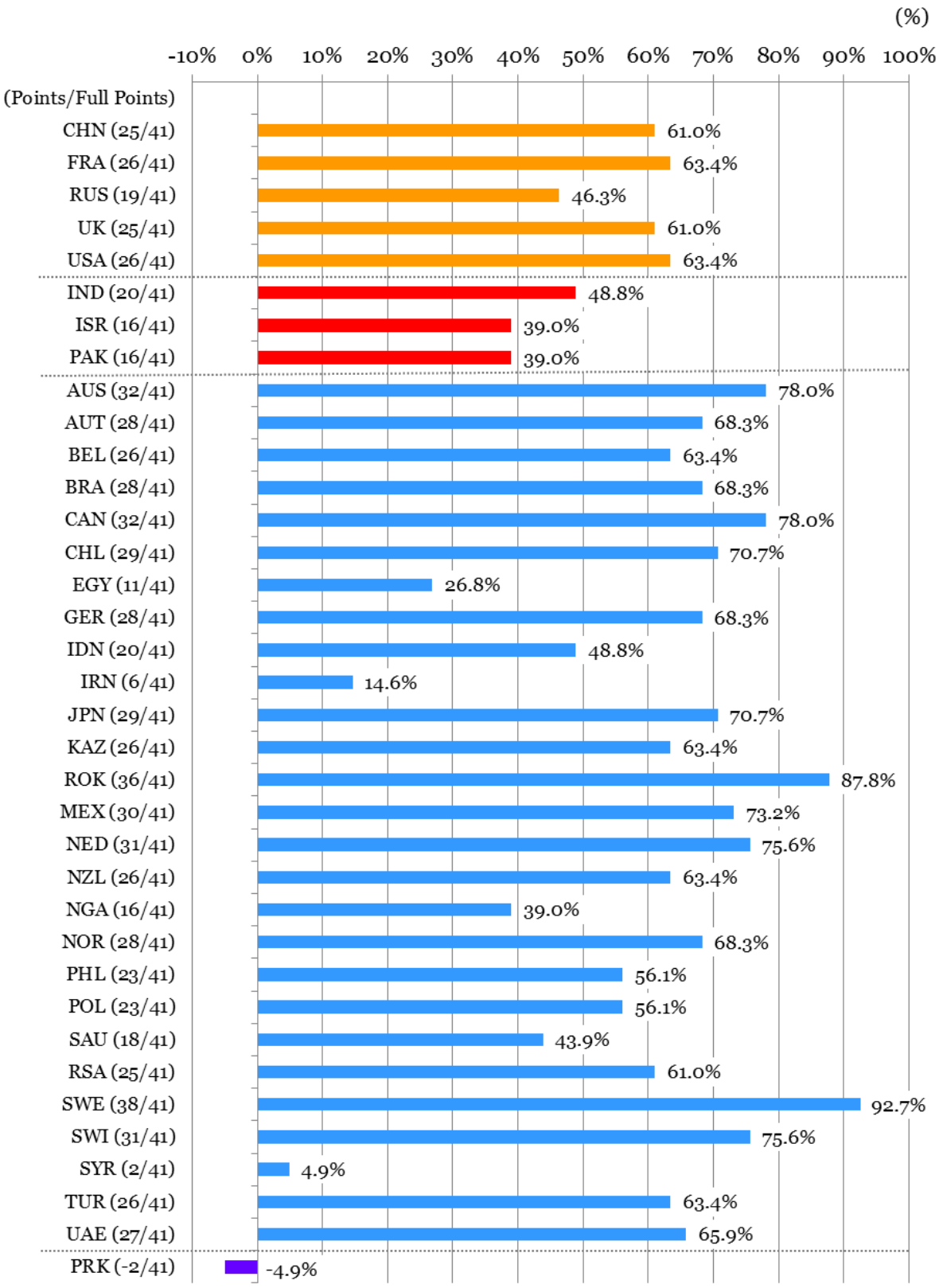




(2) Nuclear Non-Proliferation



(3) Nuclear Security



Chapter 2. Country-by-Country Summary

(1) Nuclear-Weapon States

1. China (Nuclear-Weapon States)

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), and added about 10 warheads per year. China announced in December 2015 that the People's Liberation Army (PLA) established the PLA Rocket Force, practically replacing its Second Artillery Force. 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. It has declared no first use of nuclear weapons and the unconditional negative security assurance. On the other hand, it 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. While arguing the importance of transparency in intention, China has maintained the least transparency about nuclear weapons capabilities among the NWS.	
Nuclear Non-Proliferation	***32/47 (68.1%)***
China acceded to the IAEA Additional Protocol, in which no provision for complementary access visits is stipulated. It has developed its export control systems, but questions remains as to whether China is conducting adequate and strict implementation. China has been criticized for exporting two nuclear power reactors to Pakistan, which may constitute a violation of the NSG guidelines.	
Nuclear Security	***25/41 (61.0%)***
China conducted conversion of Miniature Neutron Source Reactor (MNSR) from using HEU to LEU, and it is expected that the loading and commissioning of the LEU core will be completed by the end of 2015. China-US Center of Excellence (COE) on Nuclear Security was established in 2014. In recent years, China has promoted the efforts for nuclear forensics.	

2. France (Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***21/94 (22.3%)***
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 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. While declaring the 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 and promoting 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%)***
National efforts on domestic application of measures recommended in "Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities" (INFCIRC/225/Rev.5) have been made. France has declared to establish its own COE on nuclear security.	

3. Russia (Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***9.5/94 (10.1%)***
Russia has reduced its strategic nuclear forces under the New START. Still it is estimated to possess 7,500 nuclear warheads, and has modernized ICBMs and SLBMs. Furthermore, 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. In 2015 Russia did not introduce any additional measures for diminishing roles of nuclear weapons. Instead, it continued to repeat nuclear saber-rattling vis-à-vis the U.S. and the 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 2014, Russia made a statement that it would not attend the preparations for the 2016 Nuclear Security Summit in Washington. In 2015, Russia co-organized a workshop with the IAEA to support Convention on the Physical Protection of Nuclear Material (CPPNM) amendment and to promote its implementation. Russia has declared to establish its own COE on nuclear security.	

4. The United Kingdom (Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***24/94 (25.5%)***
The number of the U.K. nuclear arsenal has decreased incrementally. The United Kingdom 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. The U.K. government announced the decision for construction of a new class of four SSBN as replacements of the existing Vanguard-class SSBNs. It voted against most of the UNGA Resolutions regarding nuclear disarmament. 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 international safeguards. It has proactively engaged in nuclear non-proliferation, including implementation of export controls. The U.K. was against the adoption of a final document of the 2015 NPT Review Conference (RevCon), disagreeing with the proposal on a Conference on a Middle East Zone Free of WMD.	
Nuclear Security	***25/41 (61.0%)***
The U.K. has announced that accepting a future International Physical Protection Advisory Service (IPPAS) mission is under consideration. It has declared to establish its own COE on nuclear security.	

5. The United States (Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***19.5/94 (20.7%)***
The U.S., possessing 7,260 nuclear warheads, continues to implement the New START. 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)." On the other hand, the United States has not introduced new or significant measures for diminishing the role of its nuclear forces in 2015; rather, it sometimes dispatched strategic bombers aimed at reassuring its allies. 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. Few protocols to the nuclear-weapon-free zones have been ratified.	
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. The U.S. was against the adoption of a final document of the 2015 NPT Review Conference, disagreeing with the proposal on a Conference on a Middle East Zone Free of WMD.	
Nuclear Security	***26/41 (63.4%)***
With its ratification of CPPNM amendment in 2015, U.S. has ratified all major treaties on nuclear security and safety, except for the Nuclear Terrorism Convention. It has announced that U.S. will host the nuclear security summit in Washington D.C. from March to April 2016.	

(2) Non-Party to the NPT

6. India (Non-Party to the NPT)

Points / Full Points (%)

Nuclear Disarmament	***6/91 (6.6%)***
India is estimated to possess 90-110 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. 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	***20/41 (48.8%)***
India has ratified all major treaties on nuclear security and safety, except for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. India has declared to establish its own COE on nuclear security.	

7. Israel (Non-Party to the NPT)

Points / Full Points (%)

Nuclear Disarmament	***-1/91 (-1.1%)***
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.	
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	***16/41 (39.0%)***
In general, Israel's efforts toward nuclear security is still insufficient in some areas. In terms of ratification status of major treaties on nuclear security and safety, Israel has not ratified the Nuclear Terrorism Convention and Nuclear Safety Convention, and not signed the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. In recent years, Israel has embarked on strengthening of nuclear forensics capability.	

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 100-120 nuclear warheads. In addition to continuing to develop short- and medium-range ballistic missiles, it revealed a possession of low-yield, small nuclear weapons. Pakistan voted positively to some extent in the UNGA Resolutions regarding nuclear disarmament. While maintaining a moratorium on nuclear test explosions, it refuses to sign the CTBT. Pakistan, which refused to attend the Group of Governmental Experts (GGE) on an FMCT, 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	***16/41(39.0%)***
Among major treaties on nuclear security and safety, Pakistan has ratified the CPPNM, Nuclear Safety Convention, Convention on Early Notification of a Nuclear Accident and Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency. Pakistan has declared to establish its own COE on nuclear security.	

(3) Non-Nuclear-Weapon States

9. Australia (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***17.5/35 (50.0%)***
At the First Committee of the UNGA, Australia led the issuing of the "Joint Statement on the Humanitarian Consequences of Nuclear Weapons" as an alternative for those countries which concur on the principle regarding the humanitarian consequences of nuclear weapons, but could not support the related UNGA Resolutions due to their security policies. It was against or abstained in the vote on the UNGA Resolutions related to the humanitarian dimensions, as well as legal prohibition of nuclear weapons. 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 has acceded to the IAEA Additional Protocol, and has applied the integrated safeguards. It announced the completion of procedures of the Australia-India Nuclear Cooperation Agreement.	
Nuclear Security	***32/41 (78.0%)***
In 2015 General Conference of the IAEA, Australia has mentioned its appreciation for the proposal of an International Convention on Nuclear Security (ICNS), and expressed its view that this proposal could complement and support the existing instruments in the field of nuclear security. Australia has ratified all major treaties on nuclear security and safety. Australia has served as chair of the nuclear forensics working group in the Global Initiative to Combat Nuclear Terrorism (GICNT).	

10. Austria (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***27/35 (77.1%)***
After hosting the third International Conference on the Humanitarian Impact of Nuclear Weapons, and issuing the "Austrian Pledge" (renamed the "Humanitarian Pledge" later) in 2014, Austria has played the leading role in promoting the issue on the humanitarian dimensions of nuclear weapons. Austria has engaged in promoting the CTBT's entry into force, and developing its verification systems. It has also proactively engaged in cooperation with civil society.	
Nuclear Non-Proliferation	***52/61 (85.2%)***
Austria has also participated in and implemented the nuclear non-proliferation-related treaties and measures. It has acceded to the IAEA Additional Protocol, and has applied the integrated safeguards.	
Nuclear Security	***28/41 (68.3%)***
In 2015, Austria has hosted meetings for the ITDB web-based resources, and the preparatory meeting for the ITDB Points of Contact meeting was also held in Vienna.	

11. Belgium (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***14/35 (40.0%)***
Belgium is hosting U.S. non-strategic nuclear weapons as part of NATO's nuclear sharing policy. It was against or abstained in the vote on the UNGA Resolutions related to the humanitarian dimensions, as well as legal prohibition of nuclear weapons. It has engaged in promoting the CTBT's entry into force, and developing its verification systems.	
Nuclear Non-Proliferation	***54/61 (88.5%)***
Belgium has acceded to the IAEA Additional Protocol, and has applied the integrated safeguards. It has engaged in non-proliferation Proactively, including the establishment of solid export control systems.	
Nuclear Security	***26/41 (63.4%)***
Belgium has been promoting establishment of legal instruments and strengthening physical protection measures based on the INFCIRC/225/Rev.5.	

12. Brazil (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***23/35 (65.7%)***
Brazil has actively advocated promotion of nuclear disarmament at disarmament fora, including the NPT RevCon and the UN General Assembly. 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 has ratified all major treaties on nuclear security and safety, except for the CPPNM amendment. It has been promoting establishment of legal instruments and strengthening physical protection measures based on the INFCIRC/225/Rev.5. Brazil has declared to establish its own COE on nuclear security.	

13. Canada (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***18.5/35 (52.9%)***
Canada was against or abstained on the vote on the UNGA Resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons. Meanwhile, Canada has taken an initiative to establish a GGE on an FMCT in 2014-2015. It has undertaken remarkable activities in promoting an FMCT, such as advocating discussions on obligations and measures that should be included in the treaty. 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 has acceded to the IAEA Additional Protocol, and has applied the integrated safeguards. It was against the adoption of a final document of the 2015 NPT RevConf, disagreeing with the proposal on a Conference on a Middle East Zone Free of WMD. Canada exported uranium to India, as part of their civil nuclear cooperation.	
Nuclear Security	***32/41 (78.0%)***
On the occasion of the IAEA General Conference in 2015, Canada declared its support for the Nuclear Security Summit process of developing "Action Plans" that will transition Nuclear Security Summit commitments to the key international institutions engaged in promoting nuclear security, in particular activities led by the IAEA. Canada has been promoting establishment of legal instruments and strengthening physical protection measures based on the INFCIRC/225/Rev.5. Canada completed its reception of the IPPAS mission in 2015. It has declared to establish its own COE on nuclear security.	

14. Chile (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***22/35 (62.9%)***
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.	
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 applied the integrated safeguards. Meanwhile, more efforts are needed to strengthen its nuclear-related export controls system.	
Nuclear Security	***29/41 (70.7%)***
Chile has been promoting establishment of legal instruments and strengthening physical protection measures based on the INFCIRC/225/Rev.5.	

15. Egypt (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***17/35 (48.6%)***
Egypt 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. However, it has not actively engaged in promotion of nuclear disarmament. Nor has it ratified the CTBT.	
Nuclear Non-Proliferation	***36/61 (59.0%)***
Egypt has been active toward establishing a WMD-free zone in the Middle East, and argued to convene a Conference on a Middle East Zone Free of WMD. Meanwhile, it has yet to conclude the IAEA Additional Protocol. In addition, no reliable information could be found regarding its implementation of export controls. While signing, it has not yet ratified the Africa Nuclear-Weapon-Free Zone Treaty.	
Nuclear Security	***11/41 (26.8%)***
In Egypt, no noticeable progress has yet been observed regarding ratification of nuclear security/safety related treaties, minimization of HEU, or acceptance of measures recommended in the INFCIRC/225/Rev.5.	

16. Germany (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***14/35 (40.0%)***
While Germany has proactively engaged in nuclear disarmament, it was against or abstained in the vote on the UNGA Resolutions related to the humanitarian dimensions, as well as legal prohibition of nuclear weapons. 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 has acceded to the IAEA Additional Protocol, and has applied the integrated safeguards. It has engaged in non-proliferation proactively, including the establishment of the solid export control systems.	
Nuclear Security	***28/41 (68.3%)***
Germany has been promoting establishment of legal instruments and strengthening physical protection measures based on the INFCIRC/225/Rev.5.	

17. Indonesia (Non-Nuclear-Weapon States)

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 NPT RevCon. It voted for most of the UNGA Resolutions regarding nuclear disarmament.	
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 has 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	***20/41 (48.8%)***
Indonesia has been promoting establishment of legal instruments and strengthening physical protection measures based on the INFCIRC/225/Rev.5. Indonesia has declared to establish its own COE on nuclear security. Also, it has implemented capacity building and support activities to other countries.	

18. Iran (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***15/35 (42.9%)***
Iran voted for most of the UNGA Resolutions regarding nuclear disarmament. However, it has not actively engaged in promotion of nuclear disarmament. Nor has it ratified the CTBT.	
Nuclear Non-Proliferation	***29/61 (47.5%)***
Iran agreed to conclude the Joint Comprehensive Plan of Action (JCPOA) in July 2015, in which it is to accept restrictions on its nuclear related-activities (including uranium enrichment) and verifications. While Iran has not ratified the IAEA Additional Protocol, it declared its provisional application. The IAEA decided to terminate its activities for clarifying the "outstanding issues" of Iran's alleged nuclear weapons-related activities. It has been reported that Iran has engaged in illicit transfer of nuclear-related items. However, Iran agreed to cooperate and act in accordance with the procurement channel stipulated in the JCPOA regarding Iran's procurement and transference of items and technology needed for its nuclear-related activities.	
Nuclear Security	***6/41 (14.6%)***
In Iran, noticeable progress has not 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.	

19. Japan (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***23/35 (65.7%)***
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. It served as co-chair of the Ninth Conference on Facilitating the Entry into Force of the CTBT. It has been provided U.S. extended deterrence. Japan abstained on the vote on some of the UNGA Resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons.	
Nuclear Non-Proliferation	***54/61 (88.5%)***
Japan acceded to the IAEA Additional Protocol, and has applied the integrated safeguards. It has proactively engaged in nuclear non-proliferation, including the establishment of robust export control systems and conducting outreach activities. Japan and India basically concluded negotiations for their bilateral civil nuclear cooperation agreement.	
Nuclear Security	***29/41 (70.7%)***
Japan has been promoting establishment of legal instruments and strengthen physical protection measures based on the INFCIRC/225/Rev.5. In 2014, Japan co-organized with the IAEA a Regional Workshop on Nuclear Security Culture in Practice. For the sake of minimizing HEU, Japan has pledged to remove and dispose all HEU and separated plutonium from the Fast Critical Assembly (FCA) at the Japan Atomic Energy Agency (JAEA) in 2014. Japan completed its reception of the IPPAS mission in 2015. It declared to establish its own COE on nuclear security.	

20. Kazakhstan (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***22/35 (62.9%)***
Kazakhstan has actively advocated the importance of the CTBT. In particular, it has taken initiative in establishing the ATOM (Abolish Testing. Our Mission) project. It served as co-chair of the Ninth Conference on Facilitating the Entry into Force of the CTBT. It voted for most of the UNGA Resolutions regarding nuclear disarmament.	
Nuclear Non-Proliferation	***47/61 (77.0%)***
Kazakhstan is also a state party to the Central Asia Nuclear-Weapon-Free Zone Treaty. It acceded to the IAEA Additional Protocol, and has applied the integrated safeguards. Kazakhstan concluded the agreement on establishing the LEU fuel bank, which will start operation in 2017.	
Nuclear Security	***26/41 (63.4%)***
Kazakhstan has been promoting establishment of legal instruments and applying recommended measures to domestic operation systems based on the INFCIRC/225/Rev.5. Also, it establishes its own COE on nuclear security.	

21. South Korea (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***15.5/35 (44.3%)***
South Korea was against or abstained in the vote on the UNGA Resolutions related to the humanitarian dimensions, as well as legal prohibition of nuclear weapons. Nor did it participate in the Joint Statements on the Humanitarian Consequences of Nuclear Weapons. Meanwhile, 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 applied the integrated safeguards. It has proactively engaged in the issue of how to make a withdrawal from the NPT difficult.	
Nuclear Security	***36/41 (87.8%)***
South Korea has ratified all major treaties on nuclear security and safety, except for the CPPNM amendment. It has been promoting establishment of legal instruments and strengthening physical protection measures based on the INFCIRC/225/Rev.5. South Korea has engaged in a project to build a Radiation Source Location Tracking System (RADLOT) in cooperation with the IAEA and Vietnam. Also, South Korea has developed new high-density LEU fuel as part of an effort to phase out HEU fuel in reactors, and declared to establish its own COE on nuclear security.	

22. Mexico (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***24/35 (68.6%)***
Mexico has actively advocated promotion of legal prohibition of nuclear weapons, and voted for most of the UNGA Resolutions regarding nuclear disarmament. It led the adoption of the UNGA Resolution, calling for the establishment of an Open-Ended Working Group on nuclear disarmament. It has engaged in promoting the CTBT's entry into force, and developing its verification systems.	
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, though a broader conclusion has not been drawn.	
Nuclear Security	***30/41 (73.2%)***
Mexico has ratified all major treaties on nuclear security and safety, except for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. In terms of transport security, national efforts on domestic application of recommended measures in INFCIRC/225/Rev.5 have been made.	

23. The Netherlands (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***15/35 (42.9%)***
The Netherlands was against or abstained in the vote on the UNGA Resolutions related to the humanitarian dimensions, as well as legal prohibition of nuclear weapons. It is hosting U.S. non-strategic nuclear weapons as part of NATO's nuclear sharing policy. It has engaged in promoting the CTBT's entry into force, and developing its verification systems.	
Nuclear Non-Proliferation	***55/61 (90.2%)***
The Netherlands acceded to the IAEA Additional Protocol, and has applied the integrated safeguards. It has engaged in non-proliferation, including the establishment of a solid export control system.	
Nuclear Security	***31/41 (75.6%)***
The Netherlands has been promoting establishment of legal instruments and strengthening physical protection measures based on the INFCIRC/225/Rev.5. Under the framework of GICNT, an international conference and mock trial was hosted by the Netherlands in 2015. The Netherlands Forensic Institute 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. It also declared to establish its own COE on nuclear security.	

24. New Zealand (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***26/35 (74.3%)***
New Zealand has actively advocated promotion of nuclear disarmament at various fora, including the UN General Assembly. It voted for most of the UNGA Resolutions regarding nuclear disarmament, except a few resolutions. 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 acceded to the IAEA Additional Protocol, with a broader conclusion having been drawn. It also hosted a PSI interdiction exercise in 2015.	
Nuclear Security	***26/41 (63.4%)***
New Zealand ratified the CPPNM amendment in 2015. It has been promoting establishment of legal instruments and strengthening physical protection measures based on the INFCIRC/225/Rev.5. New Zealand completed its reception of the IPPAS mission in 2015.	

25. Nigeria (Non-Nuclear-Weapon States)

	Points / Full Points (%)
Nuclear Disarmament	***20.5/35 (58.6%)***
Nigeria voted for most of the UNGA Resolutions regarding nuclear disarmament.	
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, with a broader conclusion having been drawn. Its implementation of export controls and nuclear security-related measures are not necessarily adequate.	
Nuclear Security	***16/41 (39.0%)***
Nigeria has announced to finalize the institutional and technical framework for the establishment of a National Nuclear Security Centre (NNSC), and it co-organized a national workshop on establishing this NNSC with the IAEA in 2015. Also, Nigeria has implemented capacity building and support activities to other countries.	

26. Norway (Non-Nuclear-Weapon States)

	Points / Full Points (%)
Nuclear Disarmament	***17/35 (48.6%)***
Norway has proactively engaged in nuclear disarmament. As a NATO member, it is under nuclear extended deterrence. Norway had emphasized the issue of humanitarian consequences of nuclear weapons, and taken initiative for its promotion proactively with others actors. However, it was against or abstained in the vote on the 2015 UNGA Resolutions related to the humanitarian dimensions, as well as legal prohibition of nuclear weapons. Norway has engaged in promoting the CTBT's entry into force, and developing its verification systems.	
Nuclear Non-Proliferation	***54/61 (88.5%)***
Norway has acceded to the IAEA Additional Protocol, and has applied the integrated safeguards. It has engaged in non-proliferation, including the establishment of a solid export control system.	
Nuclear Security	***28/41 (68.3%)***
In Norway, national efforts on domestic application of recommended measures in INFCIRC/225/Rev.5 have been made.	

27. The Philippines (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***21/35 (60.0%)***
The Philippines voted for most of the UNGA Resolutions regarding nuclear disarmament.	
Nuclear Non-Proliferation	***48/61 (78.7%)***
The Philippines is a state party to the Southeast Asia Nuclear-Weapon-Free Zone Treaty. It has concluded the IAEA Additional Protocol, with a broader conclusion having been drawn. On export controls, however, it has yet to prepare a list of dual-use items and technologies, or to implement catch-all control.	
Nuclear Security	***23/41 (56.1%)***
Under the framework of GICNT, an international conference and mock trial was hosted by the Philippines in 2015. It has also declared to establish its own COE on nuclear security.	

28. Poland (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***12.5/35 (35.7%)***
Like other NATO countries, Poland maintains a cautious stance on legally banning nuclear weapons. It was against or abstained in the vote on the UNGA Resolutions related to the humanitarian dimensions as well as legal prohibition of nuclear weapons. It has engaged in promoting the CTBT's entry into force, and developing its verification systems.	
Nuclear Non-Proliferation	***52/61 (85.2%)***
Poland acceded to the IAEA Additional Protocol, and has applied the integrated safeguards. It has engaged in non-proliferation, including the establishment of a solid export control system.	
Nuclear Security	***23/41 (56.1%)***
From 2014 to 2015, a national IPPAS workshop was held in Poland.	

29. Saudi Arabia (Non-Nuclear-Weapon States)

	Points / Full Points (%)
Nuclear Disarmament	***12/35 (34.3%)***
Saudi Arabia voted for most of the UNGA Resolutions regarding nuclear disarmament. However, 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 comes short.	
Nuclear Security	***18/41 (43.9%)***
Saudi Arabia has been promoting establishment of legal instruments and strengthening 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 States)

	Points / Full Points (%)
Nuclear Disarmament	***22/35 (62.9%)***
South Africa has actively advocated promotion of legal prohibition of nuclear weapons, and voted for most of the UNGA Resolutions regarding nuclear disarmament.	
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, with a broader conclusion having been drawn. South Africa 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 the CPPNM amendment. It has been promoting establishment of legal instruments, strengthening 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 States)

	Points / Full Points (%)
Nuclear Disarmament	***25/35 (71.4%)***
Sweden has actively advocated promotion of nuclear disarmament. It voted for or abstained in the vote on most of the UNGA Resolutions regarding nuclear disarmament, except the resolution titled "Convention on the Prohibition of the Use of 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 applied the integrated safeguards. It has engaged in non-proliferation, including the establishment of a solid export control system.	
Nuclear Security	***38/41 (92.7%)***
In 2015, as part of a joint project with the IAEA, Sweden conducted an exercise focusing on safe transportation of spent nuclear fuel.	

32. Switzerland (Non-Nuclear-Weapon States)

	Points / Full Points (%)
Nuclear Disarmament	***23/35 (65.7%)***
Switzerland has actively advocated promotion of nuclear disarmament. It voted for or abstained in the vote on most of the UNGA Resolutions regarding nuclear disarmament, except a few resolutions, including one titled "Convention on the Prohibition of the Use of Nuclear Weapons." It has engaged in promoting the CTBT's entry into force, and developing its verification systems. It has also taken a proactive attitude regarding cooperation with civil society. It enacted national laws, which restrict financing for nuclear weapons production.	
Nuclear Non-Proliferation	***48/61 (78.7%)***
Switzerland acceded to the IAEA Additional Protocol, but a broader conclusion has not yet been drawn. It has engaged in non-proliferation, including the establishment of a solid export control system.	
Nuclear Security	***31/41 (75.6%)***
Switzerland has been promoting establishment of legal instruments and strengthening physical protection measures based on the INFCIRC/225/Rev.5. Switzerland announced that approximately 2.2 kg of HEU had been returned to the United States in 2015. The successful transport of this HEU made Switzerland the 27th country plus Taiwan to remove all of its HEU. It also declared to establish its own COE on nuclear security.	

33. Syria (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***10.5/35 (30.0%)***
Syria voted for most of the UNGA Resolutions regarding nuclear disarmament. However, it has not actively engaged in promotion of nuclear disarmament. Nor has it signed the CTBT.	
Nuclear Non-Proliferation	***21/61 (34.4%)***
The Syrian case of non-compliance with the IAEA Safeguards Agreement has not yet been resolved. It has not concluded the IAEA Additional Protocol. It has yet to take appropriate measures on export controls.	
Nuclear Security	***2/41 (4.9%)***
In Syria, noticeable progress has not yet been observed in the areas such as ratification of nuclear security- and 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 States)

Points / Full Points (%)

Nuclear Disarmament	***8.5/35 (24.3%)***
Turkey is not particularly active on nuclear disarmament compared to other non-nuclear-weapon states. It was against or abstained in the vote on the UNGA Resolutions related to the humanitarian dimensions, as well as legal prohibition of nuclear weapons. On the other hand, it has engaged in promoting the CTBT's entry into force, and developing its verification systems. Turkey is hosting U.S. non-strategic nuclear weapons as part of NATO's nuclear sharing policy.	
Nuclear Non-Proliferation	***50/61 (82.0%)***
Turkey acceded to the IAEA Additional Protocol, and has applied the integrated safeguards. It has engaged in non-proliferation, including the establishment of a solid export control system.	
Nuclear Security	***26/41 (63.4%)***
Turkey ratified the CPPNM amendment in 2015. On the occasion of IAEA General Conference in 2015, Turkey expressed that the need for an effective global nuclear security regime should not be ignored, while the responsibility for nuclear security lies with the states, and also pointed out that measures commensurate with the risk and consequences of nuclear terrorism can only be achieved through international cooperation.	

35. UAE (Non-Nuclear-Weapon States)

Points / Full Points (%)

Nuclear Disarmament	***19/35 (54.3%)***
UAE voted for most of the UNGA Resolutions regarding nuclear disarmament. However, it has not actively engaged in promotion of nuclear disarmament.	
Nuclear Non-Proliferation	***45/61 (73.8%)***
UAE acceded to the IAEA Additional Protocol, but a broader conclusion has not yet been drawn. On export controls, UAE established national legislation, which includes a catch-all control, but it is not clear how effectively it has implemented such measures.	
Nuclear Security	***27/41 (65.9%)***
The IAEA announced having received a request from the UAE for future IPPAS-related missions during 2015 to 2016.	

(4) Other

36. North Korea (Other)

Points / Full Points (%)

Nuclear Disarmament	***-5/91 (-5.5%)***
North Korea actively continues to develop nuclear weapons and ballistic missiles, and to produce fissile material for nuclear weapons. It has also initiated development of SLBMs. North Korea conducted the fourth nuclear explosion test in January 2016. It has emphasized bolstering its nuclear deterrent. It has yet to sign the CTBT. Meanwhile, North Korea voted for or abstained in the vote 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 be actively engaged in illicit transfers of nuclear and missile related items.	
Nuclear Security	***-2/41 (-4.9%)***
In North Korea, noticeable progress has not 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.	

Appendix

Chronology (January-December 2015)

Feb	The International Project on Decommissioning and Remediation of Damaged Nuclear Facilities The P5 (Nuclear-Weapon States) Conference in London Vienna Declaration on Nuclear Safety Speech on the nuclear policies by the French President
Mar	The inaugural meeting of the "International Partnership for Nuclear Disarmament Verification (IPNDV)" in Washington D.C.
Apr	The follow-up workshop on CTBT Integrated Field Exercise (IFE14) The 2015 NPT Review Conference in New York (27th-May 22nd)
May	Exercise on Security while Transporting Spent Nuclear Fuel in Sweden
Jun	The International Conference on Computer Security in a Nuclear World in Vienna The biennial CTBTO Science and Technology Conference
Jul	Conclusion of the Joint Comprehensive Plan of Action (JCPOA) regarding the Iranian nuclear issues Adoption of the UNSCR 2231
Aug	Hiroshima Peace Memorial Ceremony (6th) Nagasaki Peace Ceremony (9th) The CTBT's Group of Eminent Persons (GEM) meeting in Hiroshima Signed the agreement to establish an LEU fuel bank between Kazakhstan and the IAEA
Sep	The Ninth Conference on Facilitating the Entry into Force of the CTBT
Oct	The U.K. decision to construct four SSBNs Adoption Day of the JCPOA
Nov	The second meeting of the "International Partnership for Nuclear Disarmament Verification (IPNDV)" in Oslo The International Conference on Research Reactors: Safe Management and Effective Utilization in Vienna PSI Exercise "MARU 2015" in New Zealand

* North Korea conducted the fourth nuclear test in January 2016.

Abbreviation

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
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
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
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
ITWG	Nuclear Forensics International Technical Working Group
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
NSF	Nuclear Security Fund
NSG	Nuclear Suppliers Group
NSGEG	Nuclear Security Governance Experts Group
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
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
RevCon	Review Conference
RMWG	Response and Mitigation Working Group
SDSR	Strategic Defence and Security Review
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

	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 the UNGA resolutions on nuclear disarmament proposed by Japan, NAC and NAM	6	On each resolution: 0 (against); 1(abstention); 2 (in favor)	3	1	0	1	1	2	1	3	3	5	3	6	3	6	5	3	6	5	4	6	3	6	3	5	6	3	6	3	6	5	5	4	5	3	6	2
	B) Voting behavior on the UNGA resolutions calling for commencement of negotiations on a legap prohibition of nuclear weapons	2	On each resolution: 0 (against); 0.5（abstention); 1 (in favor)	2	0	0.5	0	0	2	0	2	0.5	1	0	2	0.5	2	2	0	2	2	1	2	1	2	0	1	2	0.5	2	0	2	2	1	1	2	0	2	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	3	On each resolution: 0 (against); 0.5（abstention); 1 (in favor). Add 0.5 (participating in the Joint Statements at the NPT RevCon, respectively). Maximum 3 points	1.5	0	0	0	0	2	0	1.5	1	3	1	3	1	3	3	1	3	3	3	3	0.5	3	1	3	3	1.5	3	0.5	3	3	3	3	3	0.5	3	2
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	3	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	3	3	3	2	3	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
4	**Diminishing the Role and Significance of Nuclear Weapons in the 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 the "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) The moratorium 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	0	0	2	2	2	1	2	1	1	1	1	0	2	2	2	2	2	2	0	2	1	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	3	1	3	1	3	3	2	3	2	2	1	3	3	3	0	1	1	0
	B) The moratorium 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	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	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 the 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**	**21**	**9.5**	**24**	**19.5**	**6**	**-1**	**2.5**	**17.5**	**27**	**14**	**23**	**18.5**	**22**	**17**	**14**	**20.5**	**15**	**23**	**22**	**15.5**	**24**	**15**	**26**	**20.5**	**17**	**21**	**12.5**	**12**	**22**	**25**	**23**	**10.5**	**8.5**	**19**	**-5**
	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**	**22.3**	**10.1**	**25.5**	**20.7**	**6.6**	**-1.1**	**2.7**	**50.0**	**77.1**	**40.0**	**65.7**	**52.9**	**62.9**	**48.6**	**40.0**	**58.6**	**42.9**	**65.7**	**62.9**	**44.3**	**68.6**	**42.9**	**74.3**	**58.6**	**48.6**	**60.0**	**35.7**	**34.3**	**62.9**	**71.4**	**65.7**	**30.0**	**24.3**	**54.3**	**-5.5**

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 the 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 1 and 2 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	5	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	0	0	2	0	0
	D) Compliance with the 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	2	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	1	5	1	0	5	5	5	5	5	5	1	5	1	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	0	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	2	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**	**36**	**56**	**48**	**29**	**54**	**47**	**51**	**50**	**55**	**55**	**45**	**54**	**48**	**52**	**36**	**51**	**53**	**48**	**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**	**59.0**	**91.8**	**78.7**	**47.5**	**88.5**	**77.0**	**83.6**	**82.0**	**90.2**	**90.2**	**73.8**	**88.5**	**78.7**	**85.2**	**59.0**	**83.6**	**86.9**	**78.7**	**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)	-9	-12	-16	-12	-12	-8	-5	-6	-4	0	-5	0	-5	0	0	-6	-4	-4	-8	-5	0	0	-5	0	-4	-4	0	-4	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	2	3	3	3	2	3	3	0	3	3	0	3	3	2	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	1	2	1	0	2	2	2	2	2	2	1	2	2	0	2	2	2	2	2	1	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	0	2	2	0	2	2	2	2	0	2	2	0	2	2	2	2	2	2	0	0	0	0	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	2	4	4	4	4	4	4	2	1	4	4	1	4	4	4	4	4	4	1	2	2	3	1	4	4	4	2	2	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	3	4	0	4	4	4	4	4	3	0	3	0	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	4	4	4	4	4	2	4	4	4	2	4	2	2	4	2	4	4	2	2	2	4	4	3	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	0	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)	1	2	2	2	2	0	1	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	1	1	0	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	1	1	1	2	0	2	0	0	2	0	1	2	0	2	0	2	2	0	2	0	0	0	0	2	0	0	1	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)	2	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			**25**	**26**	**19**	**25**	**26**	**20**	**16**	**16**	**32**	**28**	**26**	**28**	**32**	**29**	**11**	**28**	**20**	**6**	**29**	**26**	**36**	**30**	**31**	**26**	**16**	**28**	**23**	**23**	**18**	**25**	**38**	**31**	**2**	**26**	**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**
	(%)			**61.0**	**63.4**	**46.3**	**61.0**	**63.4**	**48.8**	**39.0**	**39.0**	**78.0**	**68.3**	**63.4**	**68.3**	**78.0**	**70.7**	**26.8**	**68.3**	**48.8**	**14.6**	**70.7**	**63.4**	**87.8**	**73.2**	**75.6**	**63.4**	**39.0**	**68.3**	**56.1**	**56.1**	**43.9**	**61.0**	**92.7**	**75.6**	**4.9**	**63.4**	**65.9**	**-4.9**

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