



Assessing Progress on Nuclear Nonproliferation and Disarmament

UPDATED REPORT CARD
2013-2016

July 2016

Elizabeth Philipp and Kelsey Davenport

An Arms Control Association Report

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Cover Photo

U.S. President Barack Obama (right) and Japanese Prime Minister Shinzo Abe turn around after laying wreaths during a visit to the Hiroshima Peace Memorial Park in Hiroshima on May 27, 2016. Photo credit: Jim Watson/AFP/GettyImages

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ACRONYMS

ACA	Arms Control Association
AEOI	Atomic Energy Organization of Iran
ASEAN	Association of Southeast Asian Nations
CD	Conference on Disarmament
CPPNM	Convention on the Physical Protection of Nuclear Material
CTBT	Comprehensive Test Ban Treaty
CTBTO	Comprehensive Test Ban Treaty Organization
DDPR	Defence and Deterrence Posture Review (NATO)
FMCT	Fissile Material Cutoff Treaty
G8	Group of Eight
GICNT	Global Initiative to Combat Nuclear Terrorism
GTRI	Global Threat Reduction Initiative
HEU	Highly Enriched Uranium
IAEA	International Atomic Energy Agency
ICBM	Intercontinental Ballistic Missile
INFCIRC	International Atomic Energy Agency Information Circular
ITDB	Incident and Trafficking Database
LEU	Low-enriched uranium
LWR	Light-water reactor
MTCR	Missile Technology Control Regime
NNSA	National Nuclear Security Administration (U.S.)
NPR	Nuclear Posture Review
NPT	Nuclear Nonproliferation Treaty
NSA	Negative Security Assurance
NSG	Nuclear Suppliers Group
NWFZ	Nuclear-Weapons-Free Zone
PNRA	Pakistan Nuclear Regulatory Authority
PSI	Proliferation Security Initiative
SLBM	Submarine Launched Ballistic Missile
START	Strategic Arms Reduction Treaty
UN	United Nations
WMD	Weapons of Mass Destruction

Preface

In the seven decades since the United States attacked Hiroshima and Nagasaki with atomic bombs, nuclear weapons have become less and less relevant to the security of possessor states and more harmful to international security and human survival.

In recognition of the risks posed by these weapons, the goal of eliminating nuclear arsenals was embraced by the international community in the first resolution of the United Nations General Assembly in January 1946. The resolution created a commission to generate proposals for the elimination of nuclear weapons from national arsenals.

In the subsequent years, arms control agreements and initiatives, particularly the 1968 nuclear Nonproliferation Treaty (NPT), have helped stem the spread and reduced the number of nuclear weapons globally. The NPT regime is now embraced by the vast majority of the world's nations and is a critical element of the international security architecture.

With the NPT serving as a cornerstone, a body of mutually reinforcing, internationally recognized standards, norms, and legal obligations for nuclear disarmament, nonproliferation, and nuclear material security have been developed. This body of self-imposed standards and commitments provides a useful baseline for measuring progress toward a world without nuclear weapons. It remains, however, incomplete, and progress toward a world free of nuclear weapons has slowed over the past several years.

While global nuclear stockpiles have fallen 85 percent since the height of the Cold War and key proliferation concerns have abated, recent actions by a number of countries to maintain and upgrade nuclear weapons delivery systems and expand nuclear arsenals, coupled with slow progress toward entry into force of the Comprehensive Test Ban Treaty and the ongoing failure to begin negotiations on a fissile material cutoff treaty, pose increasing challenges to the regime.

Such developments led former Secretary of Defense William Perry to warn earlier this year: "We are about to begin a new round in the nuclear arms race unless some brake is put on it right now."

New ideas, bolder leadership, and creative new initiatives are required to move forward toward

the goal of a world free of nuclear weapons and to prevent what Nagasaki Mayor Tomihisa Taue calls, "Third Use."

The Purpose of This "Report Card"

The Arms Control Association believes it is essential that states meet their nuclear nonproliferation and disarmament responsibilities and that the public has the information and tools necessary to help hold governments accountable.

The 2016 version of this report attempts to provide a straightforward, transparent measurement of the performance over the past three years of 11 key states in meeting 10 major, universally-recognized nuclear disarmament, nonproliferation, and nuclear security standards. These standards are the Arms Control Association's attempt to describe what constitutes mainstream responsibilities for nonproliferation and disarmament behaviors.

While all states share the responsibility of preventing the spread of nuclear weapons and supporting effective disarmament measures, the recognized states possessing nuclear weapons – China, France, Russia, the United Kingdom and the United States – states that obtained nuclear weapons outside of the treaty – India, Israel, and Pakistan – and states of proliferation concern North Korea, Iran, and Syria, are of particular importance. These 11 states are the focus of this report.

This report, the third of its kind, provides a better understanding of the areas where states have made progress, regressed, or taken no action. It utilizes open source material and covers the time period between March 2013-April 2016. Letter grades "A" through "F" are assigned for each criteria based on the performance of each country on each standard.

The report explains how the grades were assigned, with a clear rubric outlining the specific actions associated with each grade-level for each standard. Although in some cases we had to recognize that the

existing standards apply differently, or exclusively, to NPT nuclear-weapon or non-nuclear-weapon states, delineating the grading criteria clearly helped to ensure that the 11 states were being graded evenly, including those we chose to examine because they are, or were recently, in violation of their nonproliferation obligations.

Our assessment does not attempt to rank the 10 major standards and obligations in order of importance or effectiveness. Instead, we have chosen to present our assessment of states' performance in each category and to provide an average grade for each state as a rough measure of overall performance for the past three years.

It is also important to note that our report card is intended to provide a snapshot of the key states' performance within the past three years on these 10 well-recognized standards. It does not attempt to grade them on their historical nuclear disarmament, nonproliferation, and nuclear security records. The standards and obligations that constitute the regime have changed over time, and such an approach would involve imposing a current-day assessment on decades of history.

Moreover, the standard established by the international community with respect to nuclear stockpile numbers is, as Article VI of the NPT states, "effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament," and this report grades movement in

that direction, rather than overall numbers.

For the first time, this report will also examine the trends in each category over time. This measure is intended to provide a snapshot of overall progress, or lack thereof, on the 10 key standards.

We hope this report will help provide a common basis for discussion about what more needs to be achieved by these and other states—individually and collectively—to further reduce and eventually eliminate the threats posed by nuclear weapons. Over time, such periodic report cards might also serve to track longer-term progress and trends.

Finally, it is important to note that the standards in our report do not necessarily represent our ideal strategy for addressing the nuclear weapons threat. In our view, the existing obligations and commitments in certain categories are clearly insufficient, and key states' performances are inadequate to the task. It is imperative that states agree to meet more stringent standards and more ambitious goals and that the pace of progress be accelerated. While we recognize the need for bolder action, this report does not recommend steps that should be taken to accelerate progress.

Thus, we present this report card as a tool for helping to hold states accountable to their existing nuclear disarmament, nonproliferation, and nuclear security commitments and to help guide effective action to prevent the further spread or use of these most deadly and destructive weapons.

Daryl G. Kimball
Executive Director
Arms Control Association
June 2016

Executive Summary

This report assesses on a state-by-state basis the extent to which key states are fulfilling, abiding by, or promoting normative actions associated with 10 standards identified by the international community as critical elements of the nonproliferation and disarmament regime. Overall, states made significant progress on strengthening nonproliferation and nuclear security norms over the past three years. The positive trends in these areas, however, are not matched by action on the disarmament front. Progress on reducing nuclear arsenals has slowed, several states are taking troubling steps to expand their arsenals and develop new delivery systems, and no progress has been made on the negotiation of a treaty to end fissile material production for weapons. The report finds that:

- States possessing nuclear weapons demonstrated a unified effort on state-specific nonproliferation efforts, namely cooperating to achieve the nuclear agreement curtailing Iran’s nuclear activities in July 2015, and strengthening efforts to contain the North Korean nuclear program through the adoption and implementation of UN Security Council sanctions measures in 2013 and 2016.
- The recognized nuclear-weapons states have made very little progress on reducing the size of their nuclear arsenals. The United Kingdom and the United States took steps to slightly reduce the size of their deployed nuclear arsenals in number, whereas France announced no new reductions in the time covered by this report. China and Russia, however, both increased the number of deployed warheads since 2013. Russia also violated a key disarmament treaty, the 1987 Intermediate Range Nuclear Forces Treaty.
- Several states are taking actions to increase alert levels and store warheads mated with delivery systems for the first time. China is taking steps toward increasing the alert level of its nuclear weapons, including movement toward launch-on-warning. Both India and Pakistan are taking troubling steps toward mating nuclear warheads with new delivery systems. India will soon commission a ballistic missile submarine, the Arihant. Pakistan is believed to deploy the Nasr, a short-range battlefield nuclear weapon. Both developments require India and Pakistan to move away from traditional policies of keeping warheads de-mated from delivery systems.
- No positive progress has been made on ending fissile material production in the timeframe assessed by this report, or the two prior. The grades for all 11 states assessed have not changed since the first report was published in 2010. The five nuclear weapons states have maintained official or de-facto moratoriums on the production of fissile material. The states outside of the nuclear Nonproliferation Treaty (NPT) that possess nuclear weapons – India, Israel, and Pakistan – have retained failing grades on this criteria for continuing to produce fissile material for weapons. Negotiations on a cutoff treaty remain stalled in the Conference of Disarmament due to objections from Pakistan.
- There is a positive trend toward support of nuclear-weapon free zones. The grades of all nuclear weapons states have improved, due in part to ratification of the protocol to the Central Asian nuclear-weapon free zone agreement by all of



Joe Kaman/AFP/Getty Images

China’s Foreign Minister Wang Yi, French Foreign Minister Laurent Fabius, German Minister for Foreign Affairs Frank-Walter Steinmeier, High Representative of the European Union for Foreign Affairs and Security Policy Federica Mogherini, Iranian Foreign Minister Mohammad Javad Zarif, British Foreign Secretary Philip Hammond and U.S. Secretary of State John Kerry pose for a picture during the final press conference of the Iran nuclear talks in Vienna, Austria on July 14, 2015.

the recognized nuclear-weapon states except the United States. Washington also lags behind in completing ratifications to support zones in Africa and the South Pacific. Israel took supportive, albeit limited steps toward engaging in the process toward establishing a zone in the Middle East, although that process remains stalled after the mandate for holding a conference on the zone ended with the failure to come to a consensus at the 2015 NPT Review Conference.

- Nuclear-weapon states and the non-NPT nuclear-weapon states continue to maintain their moratoria on nuclear weapons testing. China and the United States, whose ratification is required for entry into force, have both demonstrated greater support for the Comprehensive Test Ban Treaty (CTBT) since 2013. Israel, too, has shown greater support for the CTBT by cooperating more closely with its Preparatory Organization.
- North Korea, by conducting a fourth nuclear test in January 2016, continues to violate the international norm against nuclear testing, as well as several UN Security Council resolutions demanding that it cease such testing. Pyongyang’s expanding arsenal, continued nuclear and ballistic missile tests, and aggressive rhetoric earned it the lowest grade of all assessed states.
- Export controls continue to remain a concern, as key states flout international obligations. China continues to sell nuclear reactors to Pakistan and lacks comprehensive lists for controlling the transfers of ballistic missile materials and

technologies. Iran, North Korea, and Syria also received failing grades for failing to implement adequate export control policies and transferring sensitive technologies to other countries or non-state actors.

- A major achievement of the international community for the timeframe covered by this report is the adoption of the 2015 Joint Comprehensive Plan of Action (JCPOA) to significantly restrict Iran’s nuclear program. Iran has been monitored as a state of concern in this report due to international suspicion that it was illicitly using its nuclear infrastructure for military purposes, and for its ongoing proliferation of ballistic missile technology. The nuclear deal with Iran verifiably limits the state’s nuclear activities and puts in place extensive monitoring and verification mechanisms. Iran’s improved grade reflects its renewed commitment to the nonproliferation regime, notably in its grade on the International Atomic Energy Agency safeguards standard. Iran’s grade radically improved from an “F” to an “A-” by its agreeing to implement the additional protocol to its safeguards agreement. This improvement marks the single greatest improvement on a nonproliferation standard for any state since 2010.
- The United Kingdom once again received the highest grade of all states assessed in this report, and is recognized for possessing the smallest nuclear arsenal of the nuclear-weapon states, as well as its efforts to establish additional agreements to halt nuclear proliferation and enhance nuclear security.

Introduction

Since 2010, the Arms Control Association has tracked the performance of 11 key states across 10 critical nonproliferation and disarmament standards. While the nuclear Nonproliferation Treaty (NPT) defined the initial obligations and goals in nonproliferation and disarmament, state responsibilities under the treaty were further fortified over the years by additional agreements, shared norms, and binding legal commitments. Together, these practices and agreements constitute and define the 10 standards used in this report and the two prior editions in 2010 and 2013.

The degree to which these standards are specifically defined varies, as does the degree to which they are instituted by states. Some standards, such as those regarding nuclear testing or International Atomic Energy Agency (IAEA) safeguards, are fairly specific. Others, such as reducing nuclear weapons alert levels, set expectations but do not outline specific actions. As demonstrated in the interval between the first, second, and third editions of this report, the passage of time continues to strengthen and define some of these criteria, particularly in areas such as export controls and multilateral security commitments. While the grading criteria remains unchanged, the description of what constitutes international expectations across the ten standards has been updated to reflect emerging norms, such as incorporating IAEA nuclear security fundamentals into domestic laws and regulations.

The responsibilities that states are expected to fulfill also differ based on their roles in the international community. Although all countries have responsibilities in working toward nuclear disarmament and stemming proliferation, the actions that certain countries take have a relatively greater impact on the health of the regime. In particular, states possessing nuclear weapons have an obligation to reduce their nuclear arsenals, while others must provide practical assurances that their nuclear energy programs do not contribute to the proliferation of weapons. States operating far outside the normative behavior associated with these standards also must be engaged with and reintegrated into the regime.

This report, like the two previous, divides states into three categories based on their current status: nuclear-weapon states, non-NPT states, and states of concern.

The first category consists of the five states—China, France, Russia, the United Kingdom, and the United States—that are recognized nuclear-weapon states under the NPT. The treaty limits this designation to states that tested nuclear weapons prior to 1967. As NPT member states that maintain nuclear arsenals, these states bear a particular responsibility under the treaty to “pursue negotiations in good faith” on disarmament.

The second group of states—India, Israel, and Pakistan—chose not to sign the NPT and developed nuclear weapons outside of the treaty for reasons related to regional security concerns and international prestige. Although these countries are not obligated by treaty to reduce their nuclear arsenals, they are arguably obligated to reduce the risk of accidental or intentional use of nuclear weapons through complete disarmament. Additionally, as UN member states, these three also bear the responsibility of preventing the proliferation of technology related to the development of weapons of mass destruction (WMD) to states or nonstate actors.

The remaining three states—Iran, North Korea, and Syria—are designated “states of concern” in this report because they have a history of noncompliance with their NPT treaty obligations and have been subject to investigation by the IAEA for actions related to the development of a nuclear weapons program.

Of these last three, North Korea has progressed the furthest, after formally declaring its withdrawal from

the NPT in 2003 in response to IAEA investigations and having tested a nuclear device four times, in 2006, 2009, 2013, and 2016. North Korea's actions have largely isolated it from the international community, and it is subject to sweeping sanctions designed to prevent it from developing its nuclear and ballistic missile programs, but Pyongyang has continued to make progress in these areas. North Korea's illicit networks for buying and selling technology applicable to WMD development also designate it as a primary proliferation concern.

Despite its withdrawal from the NPT, which is legally questionable, North Korea's UN obligations hold it responsible for preventing proliferation of nuclear weapons and working toward dismantling its nuclear capabilities.

The other two states of concern, Iran and Syria, remain members of the NPT, but past actions raise proliferation concerns. Syria is under investigation by the IAEA for suspicion that it was building a covert nuclear weapons program. Damascus has failed to answer questions about—and provide the IAEA with access to—facilities that likely housed undeclared nuclear activities. Cooperation between Syria and the IAEA has been stymied due to the ongoing armed conflict in the state.

Iran violated its safeguards obligations and only accounted for the evidence of weaponization

activities in late 2015. The IAEA assessed that Iran's past activities were indicative of a nuclear weapons program prior to 2003, but found no evidence that these activities continued past 2009. Despite the resolution of Iran's case at the IAEA, Iran is still tracked as part of this report because of its history of noncompliance and illicit nuclear activities. Tehran has an obligation to demonstrate to the international community that it is complying with the July 2015 nuclear agreement to alleviate mistrust about its nuclear activities.

Although these 11 countries are highlighted because of their particular relevance to the nonproliferation and disarmament regimes, it must be emphasized that all states bear responsibilities for upholding and strengthening the standards and obligations outlined in this report. Notable actions and positions of additional states are indicated at the end of this report. Furthermore, these conditions should not be considered sufficient to achieve complete nuclear disarmament. They are necessary, but a number of other factors also influence the decision of states to retain nuclear weapons or choose to give them up. Regional security and regime stability are demonstrably important factors. The standards described in this report, however, play an integral role in preventing the spread of nuclear weapons and achieving their ultimate elimination.



Dean Calina/IAEA

Tero Varjoranta, IAEA Deputy Director General and Head of the Department of Safeguards confers with Reza Najafi, Resident Representative of the Islamic Republic of Iran to the IAEA, before the start of a Board of Governors Meeting on June 6, 2016, in Vienna.

Nuclear Nonproliferation Standards

Methodology

This report updates the Arms Control Association’s 2010 and 2013 report cards, using the same basic methodology. The reports use letter grades to assess how the 11 states examined fared in abiding by the 10 nuclear nonproliferation and disarmament standards. The specific criteria outlined for each grade (A through F) serves as a baseline for allocating that grade. In general, the criteria for each standard will be consistent with the following actions:

Grade	Criteria
A	State is currently adhering to or exceeding the international standard.
B	State has taken significant steps to adhere to the international standard.
C	State has taken limited or declaratory steps to adhere to the international standard.
D	State has taken no action to adhere to the international standard.
F	State has taken steps inconsistent with or has rejected the international standard.

In some cases, additional positive actions in line with the standard may receive a plus (+) rating, for example, if actions were taken that may also be consistent with some of the criteria associated with a higher grade, but the state did not meet the baseline criteria to qualify for it. States may receive a minus (-) for taking actions contrary to the standard, even if a state meets the baseline criteria for the grade it has received. Although many of the standards examined are interrelated, a state’s grade in one standard does not generally affect its grade in another.

Overall grades for each state and each standard are then calculated on the basis of a standard grade-point average with the following numerical values corresponding to each grade:

However, in calculating the overall grade, states had to meet or exceed the numerical value associated with each grade. For example, to receive a “B” a state must have earned a 3.0 or higher. Values were not rounded up.

The assessments themselves are primarily informed by declared state policies, such as actions on treaties and agreements, participation in multilateral arrangements, or domestic laws it has enacted to address nuclear nonproliferation issues. This report also draws on assessments by international organizations such as the International Atomic Energy Agency (IAEA) and the committee established under UN Security Council Resolution 1540 (1540 Committee), unclassified intelligence judgments, and independent evaluations, as many of these standards

GRADE	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
VALUE	4.0	3.7	3.3	3.0	2.7	2.3	2.0	1.7	1.3	1.0	0.7	0.0

involve issues for which official state policies and practices are not a matter of public record.

The time frame covered in this report is March 2013 to April 2016. Because this report is measuring the status of the 10 standards for each of the 11 states, however, it is not limited to actions specifically taken during that time, but includes national positions still held or continuing efforts to implement disarmament and nonproliferation goals. In some cases, particularly with regard to suspicions or evidence of proliferation, the time frame expands into the past few years for two reasons: a pattern of proliferation is far more indicative of state intent or complicity than isolated examples in a given year, and evidence to substantiate such proliferation takes some time to become public.

Standards and Criteria

The Arms Control Association research staff identified 10 core standards that the international community has recognized as critical elements of the nuclear nonproliferation and disarmament regime. Each of these standards plays an important role in addressing the complex nature of the threat from nuclear weapons, but they are not necessarily equally vital in the path toward a world without nuclear weapons. Moreover, these standards are not static. As international conditions change and efforts to address nuclear proliferation adapt to new circumstances, the criteria by which these standards may be measured will necessarily change, and new standards agreed by the international community may become part of the body of established norms.

1. Banning Nuclear Testing

A ban on nuclear explosive testing initially was called for by Indian Prime Minister Jawaharlal Nehru in April 1954, and has since been among the world's top arms control priorities. Since 1963, nuclear tests have been prohibited in the atmosphere, underwater, in outer space, and in various nuclear-weapon-free zones (NWFZs). Yet, not until the Comprehensive Test Ban Treaty (CTBT) opened for signature in 1996 did the international community have an international legal instrument banning all nuclear test explosions.¹ The treaty, which has yet to enter into force despite being ratified by 164 countries, is intended to be a significant obstacle to additional states acquiring nuclear weapons and nuclear-armed states testing new nuclear warhead designs to add to their arsenals. There are 44 countries that negotiated the text of the treaty, known as Annex 2 countries, and ratification by all of these states is necessary for the treaty's entry into force. Eight Annex 2 states have yet to ratify the treaty.²

The 2000 NPT Review Conference recognized the CTBT's early entry into force as the first among

13 "practical steps" toward implementing Article VI of the nuclear Nonproliferation Treaty (NPT).³ The UN Security Council reinforced this priority in Resolution 1887, which called on all states to refrain from testing and to sign and ratify the CTBT. The 2010 NPT Review Conference specifically called on all nuclear-weapon states to ratify the CTBT "with all expediency," noting that those states "have the special responsibility to encourage Annex 2 countries...to sign and ratify."⁴ The UN General Assembly First Committee most recently overwhelmingly passed a resolution in support of the CTBT in 2015, with just North Korea voting in opposition. In addition, the UN Security Council issued a resolution in March 2016 deploring North Korea's January 6 nuclear test explosion, that country's fourth nuclear test and the world's 2,054th.

A country's commitment to banning nuclear testing is assessed by the extent to which it has adopted the CTBT. The assessment also takes into account whether countries that possess nuclear weapons act consistently with the treaty's aims by declaring a moratorium on nuclear testing.

Grade	Criteria: Banning Nuclear Testing	
A	State has signed and ratified the CTBT.	
B	<i>If in possession of nuclear weapons:</i> State has signed the CTBT, indicated its intent to ratify the treaty, and declared a testing moratorium.	<i>If not in possession of nuclear weapons:</i> State has signed the CTBT and signed and ratified the NPT.
C	<i>If in possession of nuclear weapons:</i> State has signed the CTBT and declared a testing moratorium, but has indicated that it does not currently intend to ratify the treaty.	<i>If not in possession of nuclear weapons:</i> State has signed and ratified the NPT.
D	State is not a member of the NPT and has not signed the CTBT.	
F	State has carried out a nuclear test in the time frame of this report or has declared its intent to carry out nuclear testing.	

2. Ending the Production of Fissile Material for Weapons

Proposals to control the production of fissile materials—highly-enriched uranium (HEU) and plutonium—for weapons purposes have been offered since the mid-1940s. In 1993 the UN General Assembly passed a resolution calling for a "non-discriminatory, multilateral and internationally and effectively verifiable treaty" prohibiting the

production of fissile material for nuclear weapons and other explosive devices.⁵ Such a ban would, at a minimum, cap the amount of material available to make nuclear weapons. The Geneva-based Conference on Disarmament (CD) reached consensus on a negotiating mandate for a fissile material cutoff treaty (FMCT) in 1995 (the so-called Shannon Mandate). However, procedural and substantive divisions within the 65-member body have prevented progress in negotiating such a treaty. UN Security Council Resolution 1887 calls on the CD to negotiate an FMCT and requests all states to “cooperate in guiding” the CD to an “early commencement of substantive work.”

At the 2010 NPT Review Conference, states-parties similarly issued a call to “immediately begin” such negotiations. Whether states have earnestly pursued negotiations on an FMCT or obstructed efforts to complete such an agreement is one measure of their commitment to this long-standing goal of the international community.

This report also considers whether a state has pursued such negotiations in line with the Shannon Mandate as agreed in 1995. Although all CD members will have a role to play in the negotiation of an FMCT, this standard is primarily relevant to those states that have produced fissile material for nuclear weapons and therefore will only apply to them.

Criteria: Ending Fissile Material Production for Weapons	
Grade	
A	State has supported negotiations on an FMCT consistent with the Shannon Mandate and has formally pledged not to produce fissile material for nuclear weapons.
B	State has supported negotiations on an FMCT consistent with the Shannon Mandate and is not currently known to be producing fissile material for nuclear weapons.
C	State has expressed general support for an FMCT, but has opposed aspects of the Shannon Mandate.
D	State has expressed opposition to negotiating an FMCT or blocked CD consensus to begin FMCT negotiations.
F	State continues to produce or is believed to be producing fissile material for nuclear weapons or has not ruled out such production.

3. Nuclear Weapons Alert Levels

States deploy their nuclear weapons in various stages of operational readiness. Some governments field warheads that are primed to launch in a matter of minutes, while other governments have put in place mechanisms to extend the time frame to launch to a period of days. Many observers worry that

weapons configured for rapid firing pose greater risks of accidental, miscalculated, or hasty use. In 2007 and 2008, an overwhelming majority of states called on nuclear-armed countries to remove their weapons from high alert and take steps to reduce their nuclear weapons readiness levels, meaning they should extend the amount of time needed to fire their systems.⁶ States-parties agreed at the 2000 NPT Review Conference to pursue “concrete agreed measures” toward that end and, in 2010, called on the nuclear-weapon states to “consider the legitimate interest of non-nuclear-weapon states in further reducing the operational status of nuclear weapons systems in ways that promote international stability and security.” Widespread calls for further de-alerting are complicated by a lack of agreement on specific steps toward that goal and a lack of transparency on the part of nuclear-armed states regarding the time frame needed to employ nuclear weapons.

To measure adherence to this standard, this report will consider the extent to which a state has physical and procedural measures in place to delay the time frame to launch nuclear weapons and ensure proper authorization for their use. This assessment will also take into account whether a country’s nuclear weapons are believed to be targeted against another state, a practice that the NPT nuclear-weapon states halted in the 1990s to prevent their accidental use against another country and which was welcomed by UN General Assembly resolutions.

Criteria: Reducing Nuclear Weapons Alert Levels	
Grade	
A	State is believed to maintain its weapons off alert, with its nuclear weapons de-mated from their delivery systems, and has measures in place to ensure proper authorization for their use.
B	State is believed to institute procedural measures to delay the time frame to employ nuclear weapons for an extended period and ensure proper authorization for their use.
C	State maintains nuclear weapons that are on high alert and has measures in place to ensure proper authorization for their use.
D	State is not known to have measures in place to ensure proper authorization for the use of nuclear weapons.
F	Nuclear warheads are believed to be targeted at another country.

4. Nuclear Force Reductions

As part of the NPT, nuclear-weapon-state members committed to make progress toward ending the nuclear arms race and engaging in efforts toward

nuclear disarmament. Non-nuclear-weapon states understood those commitments to be an essential part of their bargain to forswear nuclear arms and their decision to agree to extend the treaty indefinitely in 1995.⁷ At the 2000 NPT Review Conference, states-parties agreed that nuclear-weapon states should carry out further reductions of strategic and nonstrategic nuclear arms. The states-parties also agreed that the “principle of irreversibility” should apply to those reductions and that they be carried out in a transparent manner to enhance confidence and prevent cheating. Furthermore, in one of the action steps outlined in the 2010 NPT Review Conference Final Document, the nuclear-weapon states committed to “further efforts to reduce and ultimately eliminate all types of nuclear weapons, deployed and non-deployed, including through unilateral, bilateral, regional, and multilateral measures.”⁸

This assessment will take into account declared and reported steps taken by states to reduce their nuclear arsenals, including nonstrategic weapons where applicable. It will consider whether such reductions are carried out in a manner that is transparent and irreversible, including the existence of formal verification measures, and whether warheads removed from deployment are dismantled. This standard will measure only ongoing efforts to reduce nuclear arsenals, and it does not take into account the existing size of those arsenals. This is not intended to prejudice those that have undertaken reductions to lower levels but to encourage the continued pursuit of verifiable and irreversible reductions urged by the international community.

Grade	Criteria: Nuclear Force Reductions
A	State has taken steps in the time frame of this report to reduce the number of nuclear weapons in its possession. Nuclear weapons reductions were carried out under formal verification measures, and the warheads were verifiably dismantled.
B	State has taken steps in the time frame of this report to reduce the number of nuclear weapons in its possession. Nuclear weapons reductions were carried out under formal verification measures, but warheads were not verifiably dismantled.
C	State has taken steps in the time frame of this report to reduce the number of nuclear weapons in its possession. Nuclear weapons reductions were not carried out under formal verification measures.
D	State is not known to have taken steps in the time frame of this report reduce the number of nuclear weapons in its possession.
F	State has continued to increase the size of its nuclear arsenal.

5. Negative Security Assurances

A negative security assurance (NSA) is a pledge by nuclear-weapon states not to use or threaten to use nuclear weapons against non-nuclear-weapon states. It is intended to reinforce nonproliferation by reassuring states that have forsworn nuclear weapons that they are not at risk from a nuclear attack. The value of NSAs was recognized in Resolution 1887 (2009), which “affirms that such security assurances strengthen the nuclear nonproliferation regime.” In 1995 the UN Security Council adopted Resolution 984, recognizing unilateral NSAs by the five nuclear-weapon states. Although the five countries have reiterated these pledges, they are not legally binding. Moreover, some nuclear-weapon states have indicated that the use of nuclear weapons would be considered against non-nuclear-weapon states under certain circumstances. Still, the principle behind such assurances has been reaffirmed in NPT review conference decisions, including in 1995, 2000, and 2010. This report will assess whether nuclear-armed states have issued NSA pledges, the binding nature of those pledges, and whether they have reserved the right to use nuclear weapons in response to unconventional weapons threats from states that do not possess nuclear weapons. States that have adopted a no-first-use policy have indicated that they would only use nuclear weapons in response to a nuclear attack, which is considered to be a very strong commitment to this standard.

Grade	Criteria: Negative Security Assurances
A	State has issued legally binding NSAs.
B	State has issued non-legally binding NSAs.
C	State has issued non-legally binding NSAs, but leaves open the possibility of using nuclear weapons in response to non-nuclear attacks or threats from states that do not possess nuclear weapons.
D	State has not issued any NSAs.
F	State has openly threatened non-nuclear-weapon states with nuclear weapons use.

6. Nuclear-Weapon-Free Zones

The concept of creating zones free of nuclear weapons began in the 1950s and has since become recognized by the international community as an important nuclear nonproliferation mechanism.⁹ The potential for such regional efforts is recognized in Article VII of the NPT, which states that the treaty does not affect the right of states to conclude agreements “to assure the total absence of nuclear weapons in their respective territories.”

Countries in Latin America, Africa, Central Asia, Southeast Asia, and the South Pacific have negotiated nuclear-weapon-free zone treaties. NPT review conference documents since the treaty's entry into force have endorsed the adoption of such zones, including the 1995 Resolution on the Middle East calling for the creation of a zone free of nuclear weapons and other weapons of mass destruction in that region. That decision was integral to the indefinite extension of the treaty.

Despite the 1995 resolution, little progress has been made on the Middle East Zone. At the 2010 NPT Review Conference, states-parties decided that a conference on a Middle East WMD free zone should be convened by 2012. That conference, however, was postponed due to lack of agreement among participating states. Between October 2013 and June 2014, the conference facilitator Jaakko Laajava, with the support of the conveners, held five consultations with the countries in the region aimed at reaching consensus on an agenda for the conference. The last consultation was held in June 2014. There has been no real progress to move forward with an agenda for the zone since states failed to reach consensus at the 2015 NPT Review Conference.

Outside the NPT, the UN General Assembly has adopted annual resolutions promoting the establishment of specific zones and the creation of such zones in general. Moreover, the international community has recognized that such zones need not all be regional in character. UN General Assembly Resolution 3261 F, adopted in 1974, notes that such zones can also be formed by small groups of states and "even individual countries."

The creation of these zones is not limited to non-nuclear-weapon states. Each established zone includes protocols to be agreed upon by the five



Soe Than Win/AFP/Getty Images

Laos Foreign Minister Thongloun Sisoulith attends a meeting of the Southeast Asian Nuclear-Weapon-Free-Zone commission during the 47th ASEAN Foreign Ministers' Meeting in Naypyidaw, Myanmar on August 8, 2014.

nuclear-weapon states in which they pledge not to use, deploy, transfer, or test nuclear weapons anywhere in the region. Such a provision is intended to reinforce the principle that nuclear weapons would be entirely absent from such a zone and to serve as an incentive for states to create a zone in order to be protected from a nuclear attack.

In recognition of the divergent responsibilities for nuclear-weapon and non-nuclear-weapon states with regard to NWFZs, this standard will be measured by the extent to which non-nuclear-weapon states actively pursue such arrangements and nuclear-weapon-states agree to the relevant protocols. The nuclear-armed states that never signed the NPT are still considered non-nuclear-weapon states for the purpose of the treaty and this criteria.

Grade	Criteria: Nuclear-Weapon-Free Zones	
A	As an NPT nuclear-weapon state, the country has ratified the relevant protocols of all established NWFZs.	As an NPT non-nuclear-weapon state, the country has either signed and ratified an NWFZ in its region or has declared itself an NWFZ.
B	As an NPT nuclear-weapon state, the country has ratified the relevant protocols of at least three of the established NWFZs.	As an NPT non-nuclear-weapon state, the country has signed an established NWFZ in its region, taken steps to implement one, or proposed an NWFZ in its region to include multiple countries or as a single state.
C	As an NPT nuclear-weapon state, the country has ratified the relevant protocols of at least one of the established NWFZs.	As an NPT non-nuclear-weapon state, the country has supported the establishment of NWFZs in general, but has taken no steps to conclude or abide by NWFZ arrangements itself.
D	As an NPT nuclear-weapon-state, the country has ratified no relevant protocols to the established NWFZs.	As an NPT non-nuclear-weapon state, the country has taken no steps to support the establishment of NWFZs in any location.
F	The state has opposed formal proposals to establish an NWFZ in its region or elsewhere or violated an existing nuclear-weapon-free zone arrangement.	

7. IAEA Safeguards

The NPT calls for non-nuclear-weapon states to apply IAEA safeguards to all of the nuclear facilities and activities where source or special fissionable material exists. Known as full-scope safeguards because they apply to a state's entire peaceful nuclear complex, these measures have become a condition for trade in nuclear materials and technology.¹⁰ The IAEA General Conference has frequently adopted resolutions calling on all non-nuclear-weapon states to adopt full-scope safeguards, and the UN Security Council issued a similar call in Resolution 1887.¹¹

Since the early 1990s, however, the international community has recognized that full-scope safeguards are insufficient for providing assurance against undeclared nuclear activities in a state. The failure of traditional IAEA safeguards to detect illicit nuclear activities in Iraq, as well as problems in verifying North Korea's nuclear program, prompted the strengthening of agency safeguards and the development of the 1997 Model Additional Protocol. That protocol, which states adopt as an enhancement to their safeguards agreements, provides the agency with greater authority and tools to investigate all of a state's nuclear activities. The protocol is currently a voluntary measure, but the agency has maintained that, without it, "the IAEA cannot provide credible assurance about the absence of nuclear material or activity."¹² The final consensus document of the 2000 NPT Review Conference encouraged all states-parties to adopt additional protocols "as soon as possible," a call NPT members reiterated in 2010. UN Security Council Resolution 1887 calls on all states to implement the protocol, "which together with comprehensive safeguards agreements constitute essential elements of the IAEA safeguards system." This report will consider the extent to which non-nuclear-weapon states, whether or not a member of the NPT, have adopted safeguards. Several states not party to the NPT have concluded safeguards agreements with the IAEA. These agreements are based on INFCIRC/66, which is less comprehensive than the full-scope safeguards agreements that the IAEA concludes with NPT member states, known as INFCIRC/153.

Although all nuclear-weapon states have adopted voluntary safeguards on their civilian nuclear activities, they are not applicable to the assessment in this report because these confidence-building measures do not perform the same nonproliferation function as non-nuclear-weapon-state safeguards. However, that does not diminish their importance for promoting the universalization of IAEA safeguards and the Model Additional Protocol in particular.

Grade	Criteria: IAEA Safeguards
A	State has full-scope IAEA safeguards and an additional protocol in force.
B	State has full-scope IAEA safeguards in force.
C	State has an INFCIRC/66-type safeguards agreement in force.
D	State has not concluded any safeguards agreement with the IAEA.
F	State has been found in the time frame of this report to be in non-compliance with its safeguards agreement or to have otherwise failed to cooperate with IAEA inspections.

8. Nuclear Weapons-Related Export Controls

In recent years, there has been increasing international recognition of the important role that export controls play in preventing state and nonstate actors from acquiring and sharing goods and technology relevant to the development of nuclear weapons and delivery systems. Controls have traditionally been implemented on an informal basis by groups of like-minded states that supply such technologies, particularly the 46-member Nuclear Suppliers Group (NSG) and the 34-member Missile Technology Control Regime (MTCR).¹³ NSG member states voluntarily adhere to consensus guidelines, which regulate the export of nuclear materials and dual use technology. The MTCR guidelines recommend export controls on technologies relevant to nuclear-capable delivery systems. In 2004 the UN Security Council required states to adopt export controls on all nonconventional weapons-related goods and technologies and their means of delivery with the adoption of Resolution 1540. Further, the council has incorporated the NSG Trigger List and MTCR Guidelines in its sanctions resolutions on Iran and North Korea, giving further weight to the utility of those export control regimes. Most recently, the 2010 NPT Review Conference encouraged states-parties "to make use of multilaterally negotiated and agreed guidelines and understandings in developing their own national export controls."¹⁴

This standard will be measured by the extent to which states have committed to abide by international export control standards established by the NSG and MTCR or, short of that, their efforts to implement the nuclear and missile-related controls consistent with the requirements in Resolution 1540, including national reporting on implementation of Security Council nonproliferation resolutions. This report does not assess the strength of the national controls states have in place to meet their export

control commitments, although it will take into account patterns of export control violations by a state or its nationals.

Grade	Criteria: Nuclear Weapons-Related Export Controls
A	State is a member of the NSG and MTCR or an adherent to their guidelines.
B	State is a member of the NSG or MTCR or an adherent to their guidelines.
C	State has taken some steps to implement export controls on goods and technology relevant to nuclear weapons development and their means of delivery on a national basis or is an NSG or MTCR member that has failed to fully enforce its export control commitments.
D	State has taken no known steps to implement export controls on goods and technology relevant to nuclear weapons development and their means of delivery.
F	State is known or widely suspected to be engaged in ongoing efforts to export goods or technology in violation of NSG or MTCR guidelines, import or export materials in violation of UN Security Council nonproliferation resolutions, or breach the export control laws of other countries.

9. Nuclear Security Commitments

Over the past two decades, concerns have intensified over the prospect that unsecured nuclear materials might be stolen and smuggled to nonstate actors or states seeking nuclear weapons. Although nuclear security had long been seen primarily as a state's domestic responsibility, such risks have led to more extensive efforts to develop international nuclear security standards, to mandate that all states develop national nuclear security measures, and to assist countries in that process. On an international basis, much of that work has been carried out by the IAEA, which has developed action plans and standards for nuclear security and convened international conventions to seek legally binding commitments for that purpose.¹⁵ These standards include the IAEA Code of Conduct on the Safety and Security of Radioactive Sources (IAEA Code of Conduct), which includes voluntary security guidelines that many states have made political commitments to follow. It also includes the Convention on the Physical Protection of Nuclear Material (CPPNM), which establishes standards for how states should protect nuclear materials designated for peaceful purposes during international transit. CPPNM members adopted an amendment in 2005 that extended those standards to nuclear material in domestic storage and transit. The 2005 amendment

to the CPPNM entered into force in May 2016. The standard also includes requirements under UN Security Council Resolution 1540 (2005), which established an international mandate for all states to implement laws, regulations, and authorities to account for, protect, and secure nuclear material and facilities.

Some states have enhanced the physical protection of fissile materials through the nuclear security summit process. One such example is 35 states pledging at the 2014 summit to adhere to IAEA nuclear security fundamentals in a joint statement known as the Strengthening Nuclear Security Implementation Initiative. The statement became IAEA INF/CIRC/869 in 2014, opening up adherence to any IAEA member state.

NPT member states also endorsed specific actions related to nuclear security in the 2010 NPT Review Conference Final Document, urging parties to implement the IAEA Code of Conduct, encouraging members to adhere to the CPPNM and adopt its amendment as soon as possible, and calling on all CPPNM parties to ratify its amendment. Nuclear security actions were included in the 2015 final document, but consensus on it was blocked.

Recognizing that nuclear security is largely a task for states to undertake with internal efforts to protect such material from unauthorized access, measuring the strength of those actions is outside the scope of this report. Rather, this study will measure the commitments states have made to adhere to international standards to improve their own national nuclear security architecture and the extent to which they are cooperating with others to raise such standards globally. Therefore, as a baseline, this standard will be measured by whether a state has ratified the CPPNM and taken steps to put in place nuclear security regulations consistent with the requirements of Resolution 1540.



U.S. President Barack Obama addresses a press conference during the Nuclear Security Summit on April 1, 2016, in Washington, D.C.

Mandel Ngan/AFP/Getty Images

It will also measure whether a state has agreed to implement international nuclear security standards contained in the IAEA Code of Conduct or the CPPNM amendment and engaged in multilateral cooperation to provide or receive assistance related to securing nuclear material and facilities. The Global Partnership Against the Spread of Weapons and Materials of Mass Destruction (Global Partnership) is one of the international cooperation mechanisms measured for in this report. The Global Partnership is open by invitation to non-G7 members. State participation is noted in this report, but, given that membership is not open to all states, there is no penalty for not participating in this initiative.

Grade	Criteria: Nuclear Security Commitments
A	State has adopted domestic nuclear security measures consistent with international standards, ratified the CPPNM and its amendment, and has joined multilateral initiatives to strengthen nuclear security.
B	State has adopted domestic nuclear security measures consistent with international standards and ratified the CPPNM. State has ratified the CPPNM amendment or joined multilateral initiatives to strengthen nuclear security.
C	State has adopted domestic nuclear security measures consistent with international standards and ratified the CPPNM.
D	State has not adopted domestic nuclear security measures consistent with international standards and has not ratified the CPPNM.
F	State is known or widely believed to have illicitly transferred nuclear material to another state or nonstate actor in the time frame of this report.

10. Criminalization and Illicit Trafficking Commitments

Following the attacks of September 11, 2001, and the expressed interest of al Qaeda and other terrorist groups in acquiring nuclear weapons, the threat of nuclear terrorism became increasingly acute. Therefore, in addition to securing nuclear materials and facilities to prevent unauthorized access, the international community developed mechanisms to directly address the efforts of actors that may be engaged in nuclear terrorism-related activities. These mechanisms are intended to bolster efforts by law enforcement and other responsible authorities to counter nonstate actors seeking to acquire nuclear materials for illicit purposes by putting in place appropriate domestic penal measures, preventing proliferation financing, and facilitating the international sharing of information on nuclear smuggling.

A requirement to enact domestic legislation to criminalize unauthorized nuclear activities, establish appropriate penalties, and assign enforcement authorities was a central feature in Resolution 1540 and the International Convention for the Suppression of Acts of Nuclear Terrorism (the Nuclear Terrorism Convention), which was adopted in 2005 by the UN General Assembly and entered into force in 2007.¹⁶ The latter also calls for enhanced international cooperation to share information on nuclear terrorism-related activities. A critical tool for such information sharing is the IAEA Incident and Trafficking Database (ITDB), which was established in 1995 (at that time called the Illicit Trafficking Database) as a catalogue comprised of state-reported incidents of unauthorized activities and events involving nuclear and radiological material.

Security Council Resolution 1887 calls on all states “to improve their national capabilities to detect, deter, and disrupt illicit trafficking in nuclear materials,” a call echoed by the 2010 NPT Review Conference Final Document. The document also encouraged all members to become party to the Nuclear Terrorism Convention “as soon as possible.”

This report considers whether a state participates in the ITDB to share information on incidents related to the theft, loss, or trafficking of nuclear material. It also takes into account whether a state has joined the Nuclear Terrorism Convention and multilateral efforts to prevent nuclear terrorism, such as the Global Initiative to Combat Nuclear Terrorism (GICNT) and the Proliferation Security Initiative (PSI).

Grade	Criteria: Criminalization and Illicit Trafficking Commitments
A	State participates in the ITDB, has ratified the Nuclear Terrorism Convention, and participates in multilateral cooperative arrangements on preventing nuclear terrorism and illicit trafficking.
B	State participates in the ITDB and has ratified the Nuclear Terrorism Convention or participates in multilateral cooperative arrangements on preventing nuclear terrorism and illicit trafficking.
C	State participates in the ITDB.
D	State does not participate in the ITDB, has not ratified the Nuclear Terrorism Convention, and does not participate in multilateral cooperative arrangements on preventing nuclear terrorism and illicit trafficking.
F	State is known or widely believed to have illicitly provided nuclear or missile-related goods or technology to nonstate actors in the time frame of this report.

State-by-State Reports



NUCLEAR-WEAPONS STATES

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Israel	42
Pakistan	46

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Democratic People's Republic of Korea	50
Iran	54
Syria.....	58

State-By-State Grades

Standard	NUCLEAR-WEAPON STATES															
	China			France			Russia			UK			U.S.			
	2010	2013	2016	2010	2013	2016	2010	2013	2016	2010	2013	2016	2010	2013	2016	
Banning Nuclear Testing	B	B	B+	A	A	A	A	A	A	A	A	A	A	B	B	B+
Ending Fissile Material Production for Weapons	B	B	B	A	A	A	A	A	A	A	A	A	A	A	A	A
Reducing Nuclear Weapons Alert Levels	A	A	B-	B	B	B-	C	C-	C-	B	B	B	C	C	C	
Nuclear Force Reductions	F	D	F	C+	D+	D	B-	B+	B-*	D+	C+	C+	B-	B	B+	
Negative Security Assurances	B+	B+	B+	C	C	C	C	C	C-	C	C	C	B	C	C	
Nuclear-Weapon-Free Zones	B	B	B+	B	B	B+	C	B	B+	B	B	B+	C	C	C+	
IAEA Safeguards	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Nuclear Weapons-Related Export Controls	C-	F	F	A	A	A	C	C	A	A	A	A	A	A	A	
Multilateral Nuclear Security Commitments	B+	A	A-	B+	A	A	A-	A-	B-	A	A	A	B+	B+	A	
Criminalization and Illicit Trafficking Commitments	B+	A	A	B+	B+	A	A	A	A	A	A	A	B+	B+	A	
OVERALL GRADE	B-	B-	C+	B	B	B	B-	B	B	B	B+	B+	B	B-	B	

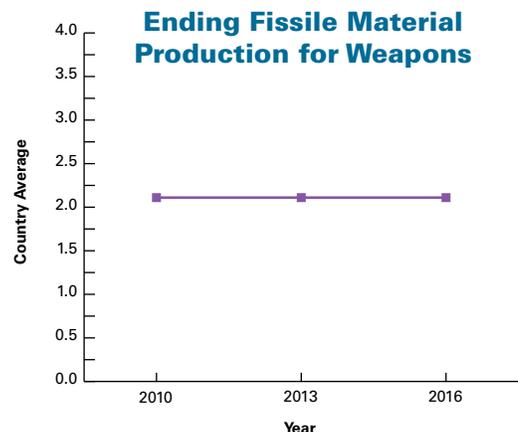
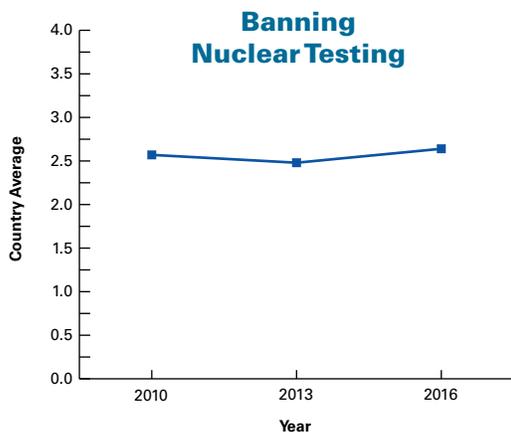
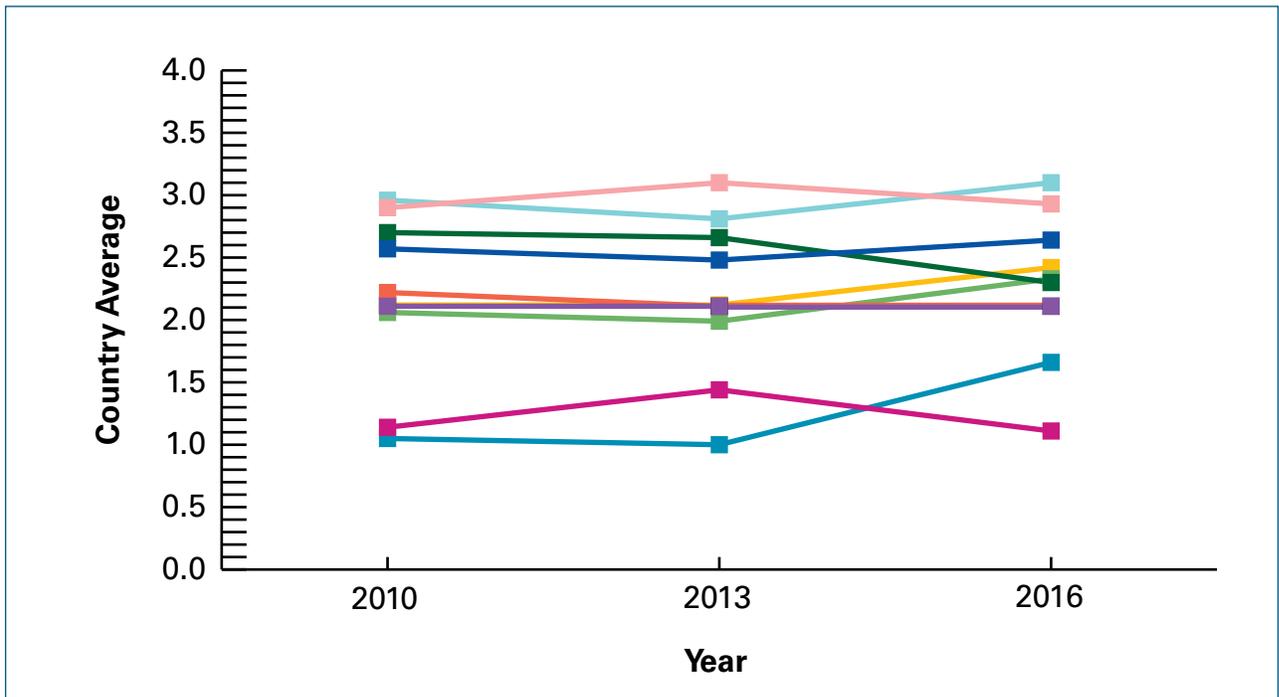
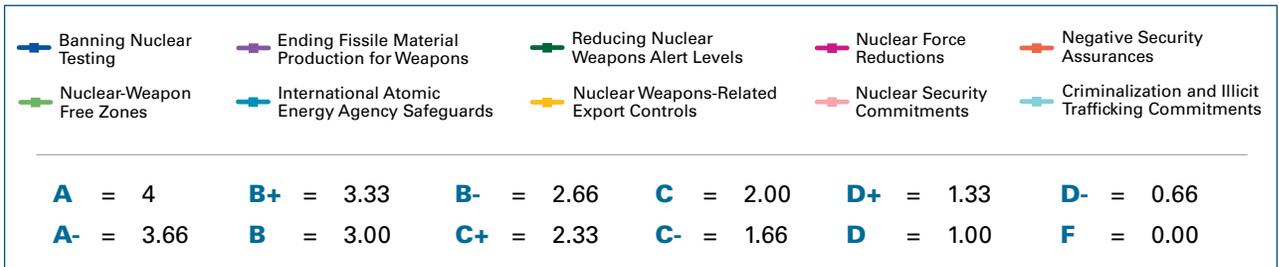
* When the methodology for assigning grades was developed in 2010, it did not account for violations of existing arms control treaties. According to the existing criteria, Russia would earn a "B-" in the category of Nuclear Force Reductions in the 2016 version of this report. If treaty adherence were considered in this category, Russia would earn an "F" for violating the Intermediate-Range Nuclear Forces Treaty.

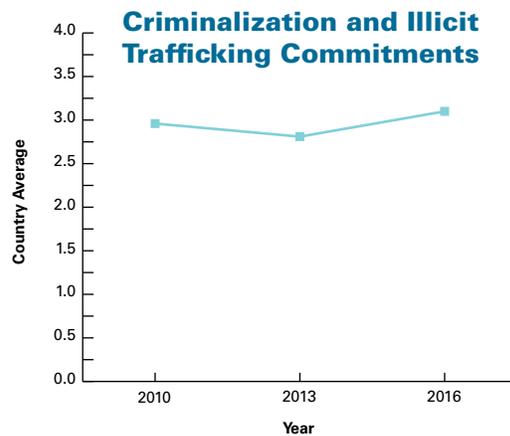
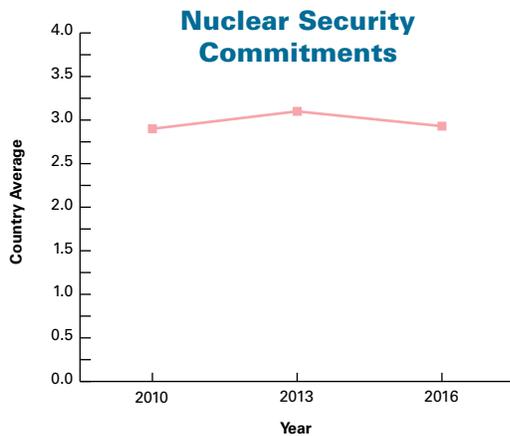
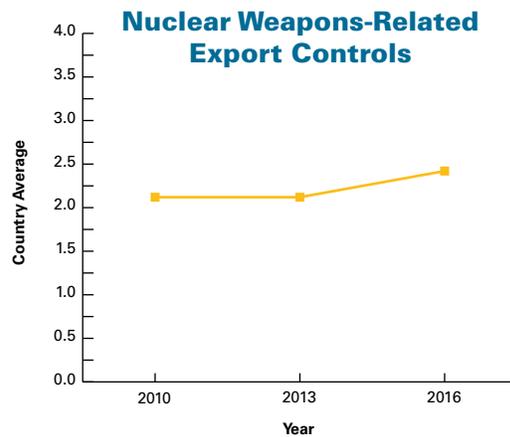
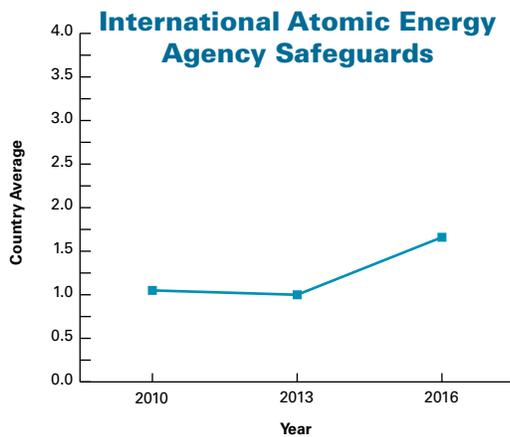
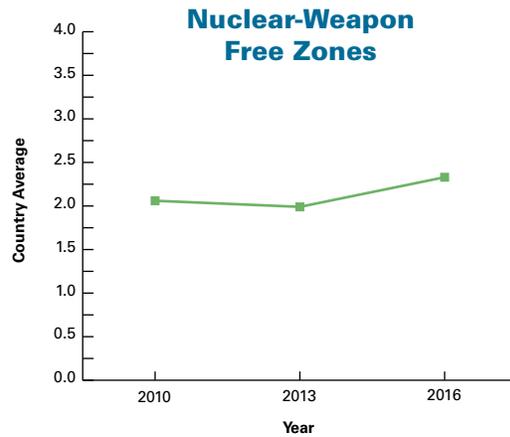
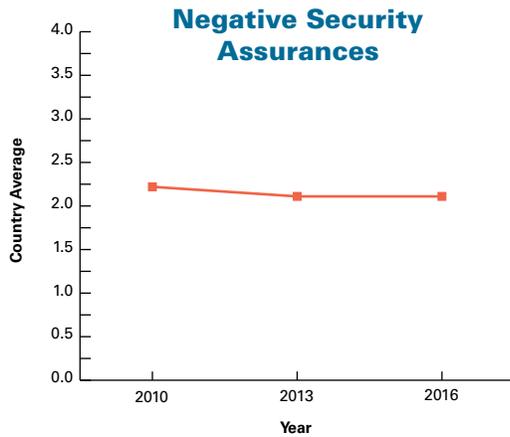
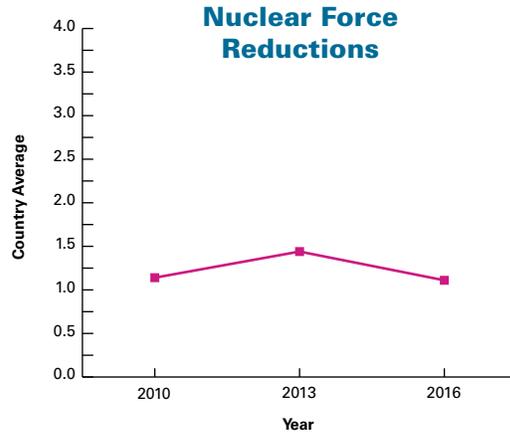
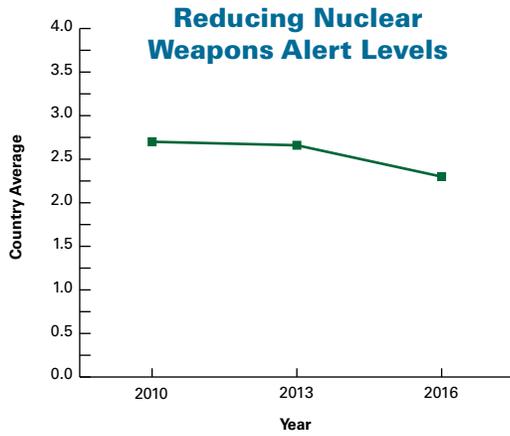
Standard	NON-NPT STATES									STATES OF CONCERN								
	India			Israel			Pakistan			DPRK			Iran			Syria		
	2010	2013	2016	2010	2013	2016	2010	2013	2016	2010	2013	2016	2010	2013	2016	2010	2013	2016
Banning Nuclear Testing	D+	D+	D+	C	C	C+	D+	D+	D+	F	F	F	B-	B-	B+	C	C	C
Ending Fissile Material Production for Weapons	F	F	F	F	F	F	F	F	F	F	F	F	N/A	N/A	N/A	N/A	N/A	N/A
Reducing Nuclear Weapons Alert Levels	A	A	A-	D+	D+	D	A	A	B	D	D	D-	N/A	N/A	N/A	N/A	N/A	N/A
Nuclear Force Reductions	F	F	F	D	D	D-	F	F	F	F	D	F	N/A	N/A	N/A	N/A	N/A	N/A
Negative Security Assurances	B+	B+	B+	D+	D+	D+	B	B	B	F	F	F	N/A	N/A	N/A	N/A	N/A	N/A
Nuclear-Weapon-Free Zones	C-	C-	C	C-	D-	C+	C-	C-	C	F	F	F	C-	C	C	C	C	C
IAEA Safeguards	C+	C	C+	C	C	C	C	C	C	F	F	F	F	F	A-	F	F	F
Nuclear Weapons-Related Export Controls	A-	A-	A	A	A	A	F	C-	B-	F	F	F	F	F	F	F	F	F
Multilateral Nuclear Security Commitments	A	A	A	B	A	A	B-**	B	B+	D	D	D	D+	D+	D	D+	D+	D+
Criminalization and Illicit Trafficking Commitments	A	A	A	B+	B+	B	B	B	B	D	F	D	C	C	C	D+	F	F
OVERALL GRADE	C+	C+	C+	C-	C-	C	C-	C-	C	F	F	F	D	D+	C	D	D-	D-

** Pakistan was incorrectly assigned a grade of "A" in the 2010 iteration of this report. Receiving that grade requires ratification of the 2005 amendment to the Convention on the Physical Protection of Nuclear Material, which Pakistan had yet to do. Its adjusted grade is shown here.

Trends

Since the first edition of this report card was issued by the Arms Control Association in 2010, states have taken more action to strengthen and reinforce certain nonproliferation and disarmament criteria while action in other areas remains stalled. These charts show the average grade for all 11 states across each criteria in the 2010, 2013, and 2016 editions of this report.





China

China remained outside of the global nonproliferation regime for several decades, until Beijing ratified the nuclear Nonproliferation Treaty (NPT) in 1992. Prior to its ratification of the treaty, Beijing is believed to have shared critical nuclear weapons technology, including warhead design information, with a number of states.¹⁷ In recent years, Beijing has shown an increasing willingness to engage in nonproliferation efforts, including the adoption of export controls and the imposition of sanctions on proliferators. China played a critical role in the negotiations with Iran to restrict Tehran's nuclear activities. Yet, Chinese entities are still believed to supply materials and technologies relevant to nuclear weapons and delivery systems to states of concern.¹⁸ Beijing is also taking troubling steps in regards to its own nuclear arsenal, including expansion of its warhead stockpile and qualitative improvements to its delivery systems. These developments, as well as movements toward increasing alert levels and considering the option of launch-on-warning, resulted in China's overall grade dropping from 2013. **Overall grade: C+**

1. Banning Nuclear Testing: B+

China has maintained a nuclear testing moratorium since July 1996. Beijing, an Annex 2 state, signed the Comprehensive Test Ban Treaty (CTBT) in September of that year and declared its intent to ratify the treaty. At the UN General Assembly First Committee Debate on Oct. 20, 2015, China said it was "steadily preparing" for national implementation of the treaty.¹⁹ China also voted in favor of the 2015 UN General Assembly Resolution supporting the CTBT and urging states that have yet to ratify the treaty to take steps to do so.

A plus (+) is added to China's grade because Beijing has enhanced its cooperation with the Comprehensive Test Ban Treaty Organization (CTBTO) since the last edition of this report. In August 2013, China announced that it would begin sending information from the stations in its country that are part of the CTBTO's International Monitoring System to the organization's data center in Vienna.²⁰ While Chinese stations are not yet fully certified, the

CTBTO said in January 2014 that the organization's data center was receiving information from China's stations. China also hosted a workshop in 2013 to assist with preparations for the CTBTO Integrated Field Exercise in Jordan, which took place in 2014.

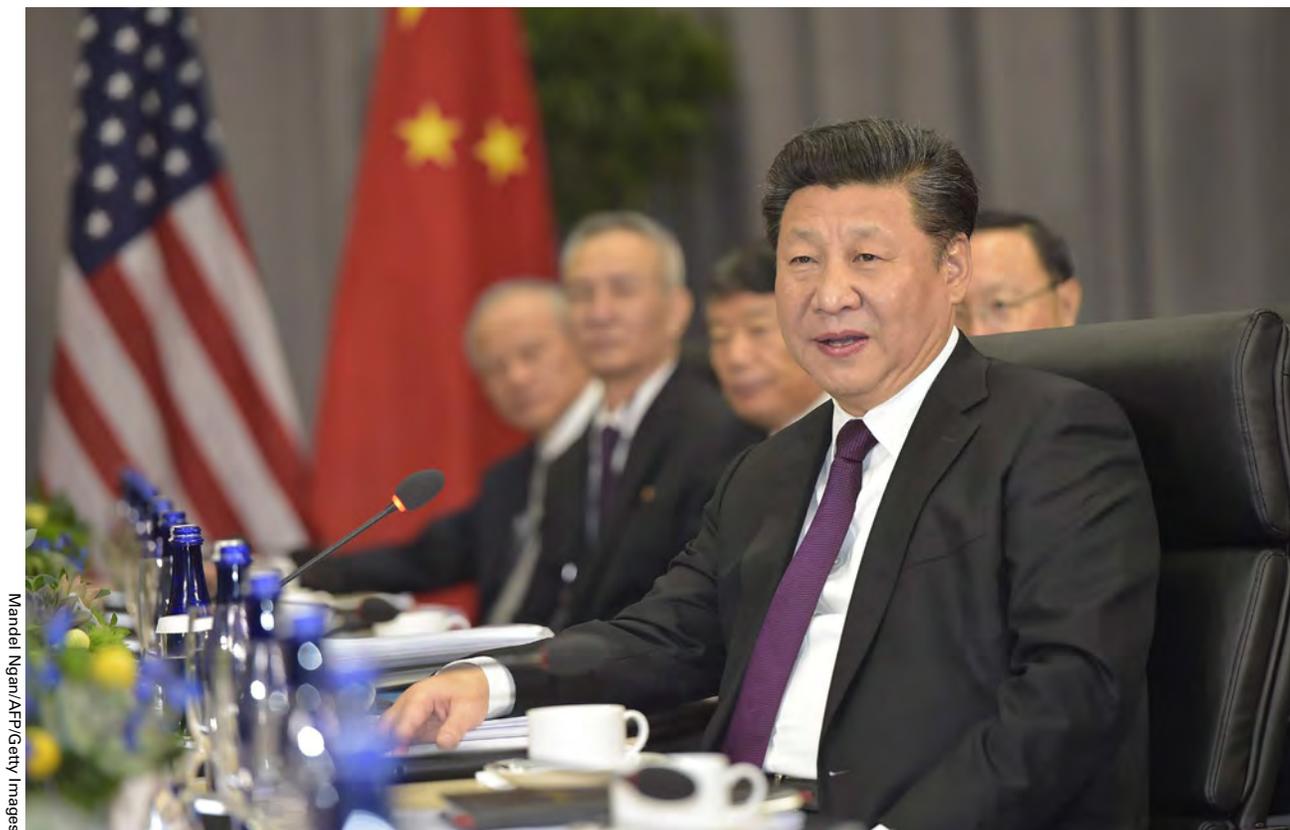
2013 grade: B

2010 grade: B

2. Ending Fissile Material Production for Weapons: B

Despite China's official statements in support of a Fissile Material Cutoff Treaty (FMCT), it has yet to officially declare a moratorium on fissile material production. Beijing reportedly ceased production of highly-enriched uranium (HEU) for weapons in 1987 and of weapons-grade plutonium in 1991.

Since joining the May 2009 consensus on the Conference on Disarmament (CD) program of work, China has supported action on the treaty in the CD based on the Shannon Mandate. China supports enlarging the CD, but maintaining the principle of



Mandel Ngan/AFP/Getty Images

China's President Xi Jinping and U.S. President Barack Obama (not shown) take part in a bilateral meeting on the sidelines of the Nuclear Security Summit at the Walter E. Washington Convention Center on March 31, 2016 in Washington, D.C.

consensus for any decision making.

China is estimated to have military stockpiles of about 18 metric tons of HEU and 1.8 metric tons of weapons-grade plutonium.²¹ China continues to enrich uranium for reactor fuel and is reportedly advancing preparations for construction of a reprocessing plant, also for civilian uses.

2013 grade: B

2010 grade: B

3. Reducing Nuclear Weapons Alert Levels: B-

Although China has provided very few details regarding its nuclear forces, independent analyses indicate that Chinese nuclear warheads are stored separately from their delivery systems during peacetime, maintaining a relatively “low alert” posture consistent with its no-first-use doctrine.²² However, recent developments call into question whether all of China’s nuclear warheads are demated from the delivery systems. China is currently replacing the Xia-class submarine, which experts assess never conducted a deterrent patrol, with its newer, more capable Jin-class submarines. The Jin-class submarines can be armed with JL-2 nuclear-capable submarine launch ballistic missiles (SLBMs).²³

Deployment of these submarines will provide

Beijing with an enhanced second-strike capability, but also will require the warheads to be mated with the missiles onboard the submarines. A May 2015 U.S. Defense Department report on China’s military stated that deterrent patrols with the Jin-class could begin in late 2015. As a result of these submarine developments, China’s grade in this category has dropped from the 2013 version of this report.

Beijing has declared that its weapons are de-targeted. A 2009 defense white paper on China’s nuclear forces states that, “[i]n peacetime the nuclear missile weapons of the Second Artillery Force are not aimed at any country.”²⁴ That phrase was not included in the 2015 defense white paper, which did, however, reiterate that China’s nuclear strategy is “self-defensive” in nature.

Beijing voted in favor of UN General Assembly resolutions calling for decreasing the operational readiness of nuclear weapons in 2010 and 2012. A similar resolution was offered in 2014, which China also supported. The resolution was not offered in 2015.

A minus (-) is added to China’s grade because there are indications that Beijing might be moving to increase its alert levels and considering the option of launch-on-warning. Officials in Beijing advocating for raising the alert level are concerned about the survivability of China’s nuclear arsenal in the event of a nuclear attack and the ability of Beijing to retaliate

following a first strike.²⁵

In December 2015, China announced that it was elevating and renaming its Second Artillery Force, charged with carrying out China's nuclear mission. The new Rocket Force will have equal standing with China's navy, army, and air force. Chinese President Xi Jinping said that the elevation of the force will not affect China's no-first-use policy and that China's nuclear weapons levels will remain at the lowest number necessary for China's national security.

2013 grade: A

2010 grade: A

4. Nuclear Force Reductions: F

Although China voices its support for an "incremental approach" to disarmament under Article XI of the NPT, Beijing is believed to be the only nuclear-weapon state that is quantitatively expanding its nuclear arsenal.

While China does not publicly release the size of its nuclear arsenal, independent estimates suggest China has 260 nuclear warheads, an increase from the 240 estimated in the 2013 version of this report.²⁶ About 180 warheads are considered non-deployed or in reserve. An estimated 50 to 60 warheads are believed to be for silo-based or road-mobile intercontinental ballistic missiles (ICBMs). One of China's ICBMs, the DF-5, is capable of carrying multiple independently-targeted re-entry vehicles and Beijing is developing a new road-mobile ICBM, the CSS-X-20, or DF-41, that may be capable of carrying multiple warheads.²⁷

China is also expanding its fleet of JIN-class submarines, which are capable of carrying the JL-2 SLBM. The JL-2 has a range of 7,400 km. China has four commissioned Jin-class submarines and another currently under construction.

China's prior submarine, the Xia-class, was widely believed to be a technology demonstrator that was not used for patrols with nuclear weapons on board.

China stated in October 2015 at the UN First Committee that all nuclear weapon states should join the multilateral disarmament process when countries with the largest nuclear arsenals have reduced their stockpiles and "conditions are ripe."²⁸

Beijing is in the process of developing technologies that will allow it to evade ballistic missile defense systems, such as multiple reentry vehicles, maneuverable reentry vehicles, decoys and thermal shielding. China also tested hypersonic glide vehicles in 2014 and 2015, although it is likely that China plans to use this technology, which can change trajectory and cover an extended range, for conventional military purposes.

2013 grade: D

2010 grade: F



Primary Seismic Station PS13 in Lanzhou, China is shown in the above photo from November 14, 2002.

CTBTO

5. Negative Security Assurances: B+

China is the only NPT nuclear-weapon state that has declared a no-first-use nuclear weapons policy.²⁹ China issued unilateral negative security assurance (NSA) pledges in 1978 and 1995. These pledges are non-binding. China consistently reiterates its no-first-use policy in its Defense White Papers. The most recent, in 2015, stated that "China will unconditionally not use or threaten to use nuclear weapons against non-nuclear-weapon states or in nuclear-weapon-free zones, and will never enter into a nuclear arms race with any other country."³⁰ Additionally, when China announced the formation of its Rocket Force, Beijing reiterated China's no-first-use policy.

China has also called for negotiation of an international legally binding instrument to prohibit first use of nuclear weapons and use or threat of use of nuclear weapons against non-nuclear weapon states and nuclear-weapon free zones.

China voted in favor of a 2015 UN General Assembly resolution calling for "early agreement on effective international arrangements to assure non-nuclear-weapon States against the use or threat of use of nuclear weapons."

2013 grade: B+

2010 grade: B+

6. Nuclear-Weapon-Free Zones: B+

China signed the Central Asian nuclear-weapon free zone (NWFZ) treaty protocol, along with all five of the nuclear-weapon states, in May 2014 and deposited its ratification in August 2015. China has a plus (+) added to its grade for completing ratification of the Central Asian NWFZ treaty protocol since the last report was published.

Beijing also announced in 2015 at the UN First Committee that it had resolved its outstanding concerns on the protocol for the Southeast Asian NWFZ treaty protocol and is ready to sign, but has yet to do so.³¹ China made a similar announcement in 2013 and expressed regular support for the establishment of a NWFZ and a WMD-free zone in the Middle East.

China signed and ratified NSA protocols to the Latin American (1974), South Pacific (1988), and African (1997) NWFZ treaties. Beijing also signed onto a joint declaration, in collaboration with the four other nuclear-weapon states, which recognized Mongolia's status as an NWFZ in 2012.

Beijing regularly reiterates at NPT fora and the UN First Committee that it “undertakes unconditionally not to use or threaten to use nuclear weapons” against NWFZs.

2013 grade: B

2010 grade: B

7. IAEA Safeguards: N/A

China concluded voluntary safeguards with the International Atomic Energy Agency (IAEA) in 1998 with the signing of an additional protocol.

2013 grade: N/A

2010 grade: N/A

8. Nuclear Weapons-Related Export Controls: F

China has taken significant steps over the past several years to strengthen its export controls. However, Beijing's decision to continue selling nuclear reactors to Pakistan in contravention of the Nuclear Suppliers Group (NSG) and its sales of missile technologies to countries of concern earns China a failing grade.

China joined the NSG in 2004, and its national export controls include provisions related to export licensing, control lists, end-user controls, and import controls.³² At the IAEA General Conference in 2015, China said it carries out “stringent reviews” on its export controls in and adjusts its trigger lists according to technical progress and in March 2016, Beijing said it started to implement the Nuclear Export Control List that was updated in January 2016.³³

Despite progress on its export controls China continues to supply Pakistan with nuclear power reactors, despite objections that the sale of the reactors did not receive a consensus exemption from the NSG. Pakistan, which is neither an NPT member nor under full-scope IAEA safeguards, is therefore ineligible to receive such assistance under NSG rules.

China has argued that the reactor transfer was based on a contract negotiated with Pakistan in 2003, one year before Beijing joined the NSG, and grandfathered in when China joined the regime.³⁴ However, the 2003 exemption was widely understood to apply solely to the two nuclear power reactors whose sale was completed before China's acceptance into the NSG in 2004. In February 2013, China is reported to have signed a formal agreement to build the Chashma-3 reactor. In January 2014, there were reports that China and Pakistan were discussing three new reactors.³⁵ At a February 2015 press conference in Beijing, a Chinese official confirmed that China “has assisted in building six nuclear reactors in Pakistan.”³⁶

The 2013 deal on the Chasma-3 also contradicts the consensus document of the 2010 NPT Review Conference, which “reaffirms that new supply arrangements” for the transfer of nuclear materials and technology should require that the recipient accept “IAEA full-scope safeguards and international legally-binding commitments not to acquire nuclear weapons.”³⁷

China applied to join the Missile Technology Control Regime (MTCR) in 2004, but the country's membership was blocked. Prior to the MTCR application, China committed in 2000 not to assist, “in any way, any country, in the development” of nuclear-capable ballistic missiles. Despite NSG membership and partial compliance with the MTCR, serious concerns remain over the Chinese government's ability to control the import and export of dual-use technologies, particularly for ballistic missile development.

Beijing voluntarily follows the MTCR's export control guidelines. However, China has not adopted the full annex, which includes a common list of controlled items. A 2016 State Department compliance report on arms control found that Chinese entities continue to supply missile technologies to countries of concern.³⁸

China has submitted all three of the reports on its implementation of nuclear weapons-related sanctions imposed on North Korea by the Security Council, including the most recent report in October 2013 on its implementation of Resolution 2094 (2013). China also supported the most recent UN Security Council Resolution, 2270, adopted in March 2016, on North Korea.

2013 grade: F

2010 grade: C-

9. Nuclear Security Commitments: A-

Beijing ratified the Convention on the Physical Protection of Nuclear Materials (CPPNM) in 1989 and its 2005 amendment in September 2009. China has a regulatory framework in place consistent with the IAEA Code of Conduct, which includes material accounting, material security, and licensing.³⁹ China also established a national radioactive source database.

China signed onto a joint statement at the 2016 Nuclear Security Summit which committed participating states to “meet the intent” of the IAEA’s nuclear security recommendations and “subscribe to the fundamental principles” of the nuclear security fundamentals.⁴⁰ In its progress report at the summit, China said it was also in the process of drafting nuclear security regulations.⁴¹

China established a nuclear security “Center of Excellence,” which formally opened in March 2016, and signed a memorandum of understanding with the United States in 2011 for cooperation on the center. China’s Center of Excellence participates in the Asian Regional Network of Nuclear Security Support Centers, which includes joint workshops with centers in South Korea and Japan.

China is also working with the IAEA and the United States on a project to convert the miniature source neutron reactors, which contain one kilogram

of HEU, that it sold to Ghana, Iran, Nigeria, Pakistan and Syria. China also operates two of the reactors domestically. In December 2015, China and the United States signed a contract to begin producing low-enriched uranium (LEU) fuel elements for converting the reactor in Ghana.⁴²

2013 grade: A

2010 grade: B+

10. Criminalization and Illicit Trafficking Commitments: A

China participates in the Incident and Trafficking Database (ITDB) and the Global Initiative to Combat Nuclear Terrorism (GICNT). China ratified the Nuclear Terrorism Convention in November 2010.

Beijing implements the Yangshan Port Pilot Program in Shanghai as a part of the larger Megaports Initiative in cooperation with the U.S. National Nuclear Security Administration (NNSA), which uses radiation inspection equipment to minimize incidences of illicit trafficking. China announced it is working toward radiation inspection of all inbound and outbound cargo from the Yangshan and Dongjiang Ports.⁴³ In October 2015, China and Russia held a joint exercise on preventing the illicit trafficking of nuclear and radiological materials across borders.

2013 grade: A

2010 grade: B+



An expert examines radionuclide station RN20 in Beijing, China on August 13, 2009.

France

France was the last of the five nuclear-weapon states to join the NPT, depositing its ratification in August 1992. France has declared that it possesses an arsenal of less than 300 nuclear weapons, and it has taken steps in recent years to shut down key nuclear weapons facilities. France, however, has been less proactive on nuclear disarmament, insisting that its nuclear deterrent must be maintained for future contingencies. Meanwhile, France is one of the world's foremost suppliers of nuclear technology, leaving Paris with a major responsibility in preventing the proliferation of technology applicable to developing nuclear weapons. Although France improved its score on illicit trafficking, Paris has not taken any steps to reduce its nuclear forces, resulting in a lower grade on that criteria since 2013. France's overall grade has not changed since the 2013 report. **Overall grade: B**

1. Banning Nuclear Testing: **A**

An Annex 2 state, France ratified the CTBT in 1998, two years after declaring a testing moratorium. France closed its nuclear test site, which was located in the French Polynesia. A 2008 white paper characterized the site as having been "dismantled."⁴⁴

2013 grade: A

2010 grade: A

2. Ending Fissile Material Production for Weapons: **A**

France has supported negotiations on an FMCT and has argued that such negotiations should not be linked to other issues.⁴⁵ France has consistently voted in favor of a resolution calling for an FMCT at the First Committee during the period covered by this report. France halted plutonium production in 1992 and HEU production in 1996, and has an estimated 26 metric tons of HEU remaining and six metric tons of plutonium in its military stockpiles.⁴⁶ Paris has moved beyond a cessation of fissile material production by irreversibly dismantling the country's fissile production facilities and allowing international observers to inspect the closed facilities at Pierrelatte and Marcoule in September 2008.⁴⁷ A 2013 white

paper characterized the dismantlement of these fissile material production sites as "irreversible."

2013 grade: A

2010 grade: A

3. Reducing Nuclear Weapons Alert Levels: **B-**

France announced the de-targeting of its nuclear forces in 1997. Paris declared that it took steps in 1992 and 1996 to extend the time it takes to launch nuclear weapons and has employed "considerable technical means in addition to strict, rigorous, and effective procedures" to prevent their use without presidential authorization.⁴⁸ With these steps in place, French nuclear weapons are believed to need "several days" of preparation to be launched.⁴⁹

A minus (-) is added to the grade because France has rejected calls for further reducing nuclear alert levels, most recently by voting against a UN General Assembly First Committee resolution on reducing nuclear alert levels. Explaining its 2014 vote, France said that the operational readiness of its nuclear weapons systems is "maintained at a level consonant with [its] national security requirements" and its "obligations to our allies, within the larger context of the current global strategic situation."⁵⁰ France



Ben Solomon/U.S. Department of State

French President François Hollande meets with other members of the P5+1 on the margins of the 2016 Nuclear Security Summit on April 1, 2016.

previously voted against the resolution in 2012 and similar resolutions on reducing nuclear alert levels at the UN General Assembly First Committee every year within the scope of this report.

2013 grade: B

2010 grade: B

4. Nuclear Force Reductions: D

In a 2013 white paper, the French defense ministry indicated it continues to maintain an arsenal of “fewer than 300” warheads, a level consistent with “strict sufficiency” for its defense. In March 2008, then President Nicolas Sarkozy delivered a speech in Cherbourg in which he discussed the future of France’s nuclear forces, announcing that it would be reducing its arsenal by one-third, to comprise fewer than 300 nuclear warheads.⁵¹ Independent estimates assess that these reductions were completed in late 2009 by eliminating one-third of the country’s nuclear bomber force and corresponding warheads.⁵²

Sarkozy indicated in his March 2008 speech in Cherbourg that France does not have any warheads beyond those in its operational stockpile, suggesting that it is dismantling those warheads in an irreversible fashion. No formal verification measures are in place to provide transparency for

these reductions.

France’s grade was lowered from the previous version of this report because no further reductions were completed from 2013 to 2016.

2013 grade: D+

2010 grade: C+

5. Negative Security Assurances: C

France maintains the option of using its nuclear deterrent to counter a non-nuclear attack. A 2013 French defense white paper states that “[b]eing strictly defensive, nuclear deterrence protects France from any state-led aggression against its vital interests, of whatever origin and in whatever form.” Similar language appeared in a 2008 white paper.

France has abstained from voting on a resolution calling for “early agreement on effective international arrangements to assure non-nuclear-weapon States against the use or threat of use of nuclear weapons” each year for the scope of this report.

France issued unilateral NSAs in 1978 and 1995. It has pledged not to use nuclear weapons against non-nuclear-weapon states that belong to the NPT unless it is facing an invasion or sustained attack against its territories, armed forces, or states with which it has a security agreement and the attack is in alliance with

a nuclear-weapon state.⁵³

The French nuclear strategy of “dissuasion” appears to be fairly expansive, allowing for the possibility of responding to threats of attacks of a non-nuclear nature.

2013 grade: C

2010 grade: C

6. Nuclear-Weapon-Free Zones: B+

France signed and deposited the protocol for the Central Asian NWFZ in 2014, earning it a plus (+) grade.

France has ratified protocols for NWFZs in Latin American (1991), Africa (1996), and the South Pacific (1996). France has not yet signed the protocol to the Southeast Asia NWFZ. The nuclear-weapon states announced in 2013 that they had reached an agreement with ASEAN on a revised protocol to the Southeast Asia NWFZ and that a signing of the protocol should take place soon.⁵⁴ In September 2012, Paris released a joint declaration, in collaboration with the four other nuclear-weapon states, which recognized Mongolia’s status as an NWFZ.⁵⁵

Paris has expressed support for a NWFZ in the Middle East through a 2014 statement at the UN First Committee. At the 2015 First Committee, France issued a statement that it “continues to support a regional approach to disarmament.”⁵⁶

2013 grade: B

2010 grade: B

7. IAEA Safeguards: N/A

France has had voluntary safeguards in force with the IAEA since 1981 and an additional protocol in force since 2004.⁵⁷

2013 grade: N/A

2010 grade: N/A

8. Nuclear Weapons-Related Export Controls: A

France is an NSG member and serves as the “point of contact” for the MTCR. Paris maintains an extensive national export control system consistent with the requirements of UN Security Council Resolution

1540, including licensing provisions; measures related to deemed exports, end-user, transshipment, and re-export controls, and a catchall clause.⁵⁸ France submitted its national implementation report of Resolution 1540 to the United Nations most recently in August 2015. It has submitted all three reports on implementation of nonproliferation resolutions against North Korea to the sanctions committee, most recently in January 2015.

2013 grade: A

2010 grade: A

9. Nuclear Security Commitments: A

France has a variety of national controls and regulations in place with regard to nuclear security including the establishment of a nuclear regulatory authority, material accounting measures, physical protection regulations, and licensing for materials, facilities, and entities.⁵⁹ Paris joined the CPPNM in 1991 and ratified the 2005 amendment in February 2013. France also participates in the Global Partnership Against the Spread of Weapons of Mass Destruction.⁶⁰

During the 2012 Seoul Nuclear Security Summit, France pledged to host an international seminar on the IAEA International Physical Protection Advisory Service (IPPAS), which it did in December 2013.⁶¹ In 2014, France signed on to the Strengthening Nuclear Security Implementation initiative introduced at the Nuclear Security Summit, which commits Paris to meet the intent of IAEA recommendations in the agency’s nuclear security series.

2013 grade: A

2010 grade: B+

10. Criminalization and Illicit Trafficking Commitments: A

France participates in the ITDB, Proliferation Security Initiative (PSI), and the GICNT. Paris signed the Nuclear Terrorism Convention in 2005 and ratified it in September 2013, which caused its grade to improve since the previous report.

Paris also organized an additional course on nuclear smuggling for the European Atomic Energy Community.

2013 grade: B+

2010 grade: B+

Russia

In the aftermath of the Cold War, Russia inherited a massive nuclear arms stockpile – about 40,000 nuclear warheads – from the Soviet Union. Beginning in the early 1990s, Moscow started to dramatically reduce its arsenal in accordance with arms control agreements between Russia and the United States. The two countries have worked together to secure nuclear material and facilities of the former Soviet Union and more recently have spearheaded multilateral initiatives to address the threat of nuclear terrorism. Moscow has had a long history of assisting other states with technologies applicable to nuclear weapons and missile programs. Over the last decade, however, it appears to have improved its efforts to prevent proliferation. Russia’s overall grade has not changed since the 2013 report. **Overall Grade: B**

1. Banning Nuclear Testing: **A**

Russia is an Annex 2 state, and its ratification of the CTBT is required for the treaty’s entry into force. Moscow ratified the treaty in 2000 and has issued numerous statements since then in support of the treaty, including in a joint ministerial statement in September 2014 with representatives from more than 90 countries.⁶² In April 2016, President Putin called upon the remaining Annex 2 states to “join the CTBT as soon as possible.”⁶³

2013 grade: A

2010 grade: A

2. Ending Fissile Material Production for Weapons: **A**

Moscow has supported negotiations on an FMCT based on the Shannon Mandate, and consistently votes in favor of resolutions supporting negotiation of a treaty in the UN First Committee.

Russia declared that it ceased production of fissile material for nuclear weapons in 1994. Moscow is currently estimated to have a military stockpile of about 670 tons of HEU and about 128 tons of weapons-grade plutonium. Russia’s HEU stockpile was reduced by 58 tons since 2013, whereas its plutonium stockpile has not changed.⁶⁴ Given Moscow’s lack of transparency about its stockpiles, there is a high

degree of uncertainty regarding these estimates.

In 1993, Russia and the United States agreed to down-blend 500 tons of HEU from Russian warheads to LEU for civilian use. The final shipment of HEU from Russia to the United States was completed in December 2013.⁶⁵

At the 2010 Washington Nuclear Security Summit, Russia signed a plutonium-disposition agreement protocol with the United States in which each country pledged to dispose of 34 tons of plutonium from their military stockpiles.⁶⁶ There is no indication that this plutonium disposition has begun as of the date of this report.⁶⁷ In April 2016, Russian President Vladimir Putin accused the United States of not living up to the plutonium disposition agreement and trying to change the disposition terms in a way that the material could be retrieved and converted into weapons-grade plutonium again.⁶⁸

2013 grade: A

2010 grade: A

3. Reducing Nuclear Weapons Alert Levels: **C-**

Russia is believed to maintain its nuclear weapons on a high-alert status. In early 2009, Col. Gen. Nikolai Solovtsov, the commander of Russia’s ICBM force, said that at least 96 percent of all Russian missile systems were “ready for deployment within several dozen



U.S. President Barack Obama (left) and Russian President Dmitry Medvedev sign the New Strategic Arms Reduction Treaty (START) in Prague on April 8, 2010, which committed their nations to major nuclear arms cuts and boosted Obama's drive for a world without atomic weapons.

seconds."⁶⁹ About 75 to 80 percent of Russian missiles are kept at this level of readiness, according to outside assessments.⁷⁰

Russia received a minus (-) because it voted against a resolution on reducing the readiness of nuclear forces in 2014, the only time it was offered during the period of this report. It also voted against the resolution in 2012 after abstaining in 2010. In 2012, Moscow stated that the provision used certain parts of the 13 practical steps from the 2000 NPT Review Conference selectively and did not look at the "specifics of national arsenals" when calling for reductions in alert levels.⁷¹

2013 grade: C-

2010 grade: C

4. Nuclear Force Reductions: B- / F

On April 8, 2010, the United States and Russia signed the New Strategic Arms Reduction Treaty (New START), which established a new ceiling of 1,550 operationally deployed strategic warheads for each country, and a limit of 700 deployed strategic delivery systems by the year 2018. The reductions are being carried out under new and more robust verification provisions. The treaty reductions do not cover reserve warhead stockpiles.

Despite tensions over other issues, Russia has complied with its obligations under the 2010 New START agreement. Moscow's deployed strategic warhead level was below the treaty's 1,550 warhead limit as of September 1, 2012, when Russia reported 1,499 deployed strategic warheads.⁷² That number, however, increased back to 1,735 as of April 1, 2016.⁷³

Moscow has also resisted calls to take steps to reduce its nonstrategic weapons, and there are indications that Russia has instead increased its reliance on these systems as part of its overall defense strategy.⁷⁴ In particular, Moscow has often linked the issue of nonstrategic weapons reduction to the U.S. deployment of nuclear weapons in Europe. Russia is believed to possess 2,000 nonstrategic warheads, not all of which are actively deployed, a number which has not changed since the last version of this report.⁷⁵

A minus (-) is added to Russia's grade because it has rejected a June 2013 proposal by the United States for further arms reductions, which would have eliminated an additional third of each state's deployed strategic nuclear arsenal, and to date, has not made a counterproposal.

Russia is currently in the process of replacing all of its Soviet-era ICBMs, a process which should be complete by 2024. Russia is developing a new ICBM, the Sarmat, which could reportedly be flight-tested

in 2016. In November 2015, designs for a new Russian nuclear-armed torpedo, which may be under development, were leaked.⁷⁶

In July 2014, the United States formally accused Russia of testing a ground-launched cruise missile in violation of the 1987 Intermediate-Range Nuclear Forces (INF) Treaty. The issue remains unresolved. The methodology for this criteria, developed in 2010, does not account for violations of existing arms control treaties. Given the severity of violating a treaty, this is an oversight in the methodology. If treaty adherence were a factor considered in the grading system, Russia's grade for this standard would be an "F".

2013 grade: B+

2010 grade: B-

5. Negative Security Assurances: C-

Russia issued unilateral pledges not to attack non-nuclear-weapon states with nuclear weapons in 1978 and 1995. Moscow has indicated that those pledges would not apply in cases in which it was attacked by a non-nuclear-weapon state in association with a state that possesses nuclear weapons.⁷⁷ In that same statement, Russian officials appear to have asserted that Moscow may use nuclear weapons against an ally of a nuclear-armed state even if it has not been attacked.

According to the December 2014 Russian Military Doctrine Paper, Russia may use nuclear weapons in response to an attack using any weapon of mass destruction, and in response to conventional attacks "when the very existence of the state is under threat."⁷⁸ This phrase demonstrates a willingness to use nuclear weapons against non-nuclear states in the event of an impending conventional military loss. Russia's February 2010 description of its military doctrine included similar language.

A minus (-) is added to Russia's grade in this category due to Russia's ongoing military intervention in Ukraine, which violates its 1994 Budapest Memorandum commitment to respect the territorial sovereignty of Ukraine after Kiev agreed to denuclearize in 1994 and join the NPT as a non-nuclear-weapon state.

2013 grade: C

2010 grade: C

6. Nuclear-Weapon-Free Zones: B+

Russia ratified the protocol for the Central Asian NWFZ in June 2015, earning it a plus (+) grade.

Russia ratified the relevant protocols for NWFZ in Latin America (1979), Africa (2011), and the South Pacific (1988).

The nuclear-weapon states announced in 2013 that they had reached an agreement with ASEAN on a

revised protocol to the Southeast Asia NWFZ and that a signing of the protocol should take place soon.⁷⁹ Despite this statement, Russia has not signed the protocol as of April 2016.

On September 17, 2012, Moscow released a joint declaration, in collaboration with the four other nuclear-weapon states, which recognized Mongolia's status as an NWFZ.⁸⁰

2013 grade: B

2010 grade: C

7. IAEA Safeguards: N/A

Moscow's voluntary safeguards agreement entered into force in June 1985, and its additional protocol did so in October 2007.⁸¹

2013 grade: N/A

2010 grade: N/A

8. Nuclear Weapons-Related Export Controls: A

Russia is a member of the NSG and MTCR. It has a number of national export control measures in place to prevent the spread of nuclear and missile technologies, including export control legislation, licensing provisions, deemed exports restrictions, end-user controls, a catch-all clause, and controls over re-export and transshipment.⁸²

Russia submitted a national report on implementation to the 1540 Committee most recently in 2014, stating the preparation of the report is "yet another step towards the full implementation of the resolution at the national and international levels."⁸³ Moscow last reported to the committee in 2007. Russia has submitted implementation reports for all three nonproliferation resolutions on North Korea, most recently in December 2013 on its implementation of Resolution 2094.

Unclassified U.S. intelligence reports assessed that Russia continued to provide dual-use materials and technologies that may have contributed to proliferation in the Middle East and South Asia through 2011.⁸⁴ It was unclear the extent to which such transfers are taking place with the knowledge or complicity of the Russian government or if these transfers have ceased.

2013 grade: C

2010 grade: C

9. Nuclear Security Commitments: B-

Domestically, Russia has implemented measures to account for and secure the production, use, storage, and transport of nuclear weapons and related materials.⁸⁵ Regulations for the physical protection of nuclear facilities and materials, licensing, and



Russian soldiers patrol outside the navy headquarters in the Crimean Peninsula city of Simferopol on March 19, 2014, the day after the Russian Federation annexed the Ukrainian territory of Crimea.

nuclear facility personnel are also in place. Russia has expressed its intention to adhere to the IAEA Code of Conduct. Moscow joined the CPPNM in 1983 and its 2005 amendment in 2008. Russia no longer participates in the Global Partnership since it was ousted from the G8 in March 2014.

Since 2010, Russia has announced the shutdown of several HEU reactors and agreed to a “joint study” with the United States on how to convert six HEU research reactors to LEU use.⁸⁶ Additionally, Russia has assisted in the conversion of Russian-supplied HEU reactors abroad.⁸⁷ In 2014, Russia relaxed its regulations on export of fissile material for fuel, including HEU which could now be exported in bulk form.⁸⁸

In 2014, Moscow announced it would not attend the 2016 Nuclear Security Summit in Washington, citing it doubts the value of the summit, then began actively attacking the summit as “illegitimate.”⁸⁹ Additionally, Russia halted most of its nuclear security cooperation with the United States in 2014. Independent assessments judge that Russia’s nuclear security would benefit from renewed cooperation with the United States.⁹⁰

Russia has not signed on to the Strengthening Nuclear Security Implementation initiative introduced at the 2014 Summit, which would have committed Moscow to implementation of the IAEA recommendations for nuclear security in the agency’s nuclear security series documents.

In May 2015, President Barack Obama terminated existing executive orders against Russia, which were

enacted because of the “risk of nuclear proliferation created by the accumulation of a large volume of weapons-usable fissile material resulting from the reduction of nuclear weapons” in Russia. Obama terminated the order because “the situation that gave rise to the declaration... has been significantly altered by the successful implementation of” HEU disposition agreements between the United States and Russia.⁹¹

Questions remain, however, on the security of Russian radiological materials after recent operations in countries including Moldova and Georgia uncovered attempts to sell radioactive sources believed to have originated in Russia on the black market.⁹²

2013 grade: A-

2010 grade: A-

10. Criminalization and Illicit Trafficking Commitments: A

Russia participates in the ITDB and ratified the Nuclear Terrorism Convention in 2006. It is a partner in the PSI. In August 2011, with assistance from the GTRI, Russia completed the installation of radiation detectors at all Russian border points.⁹³

Russia worked in collaboration with the United States to create the GICNT in July 2006. Russia continues to serve as co-chair of the GICNT with the United States through 2019.

2013 grade: A

2010 grade: A

United Kingdom

The United Kingdom was the third state to test a nuclear weapon and played a major role in the U.S. efforts to develop nuclear weapons as part of the Manhattan Project. In recent years, London has moved to the forefront of nuclear disarmament efforts by the nuclear-weapon states, unilaterally reducing its nuclear arsenal to the lowest level of those five states. The United Kingdom continues to engage in an internal debate over the salience of its nuclear deterrent, including whether or not to build new ballistic missile submarines, the sole delivery system for the United Kingdom’s deterrent, to replace its aging fleet. The United Kingdom again scored the highest grade of all eleven states evaluated in this report. **Overall Grade: B+**

1. Banning Nuclear Testing: A

The United Kingdom, an Annex 2 state, signed the CTBT in 1996. France and the United Kingdom were the first two nuclear-weapon states to ratify the treaty in 1998. The United Kingdom has consistently supported international efforts to bring the CTBT into force, including voting for the most recent UN General Assembly resolution supporting the treaty in 2015.

2013 grade: A

2010 grade: A

2. Ending Fissile Material Production for Weapons: A

The United Kingdom has consistently expressed support for negotiations on an FMCT based on the Shannon Mandate. London has consistently voted in support of resolutions in the UN General Assembly calling for negotiations of an FMCT. The United Kingdom declared that it stopped production of HEU for weapons in 1962 and ceased production of plutonium for nuclear arms in 1995. London is estimated to have a stockpile of 19.8 metric tons of HEU for military purposes (including naval fuel) and 3.2 metric tons of plutonium for weapons.⁹⁴

2013 grade: A

2010 grade: A

3. Reducing Nuclear Weapons Alert Levels: B

The United Kingdom downgraded the alert status of its nuclear forces during the 1990s and limited its nuclear delivery systems in the 1998 Strategic Defence Review report to the Trident submarine-launched ballistic missile (SLBM). The same report states that the submarine-based missiles “will not be targeted and it will normally be at several days ‘notice to fire.’”⁹⁵

The United Kingdom, however, voted against a 2014 UN resolution that called for nuclear weapons states to be “removed from high-alert status.” A similar resolution was not offered in 2015.

2013 grade: B

2010 grade: B

4. Nuclear Force Reductions: C+

In its 2015 Strategic Defence and Security Review document, the United Kingdom said it would retain 120 operational warheads, with an additional 60 in reserve, by the mid-2020s. The plan called for each of the four British submarines to carry 40 warheads, a reduction from 48, on no more than eight missiles.⁹⁶

By 2015, the United Kingdom said it reduced its deployed arsenal to 120, with an estimated 65 in reserve, a slight reduction from the 2013 estimate of 215 total warheads, with 160 deployed.⁹⁷ These



Royal Navy security personnel stand guard on HMS Vigilant at Her Majesty's Naval Base, Clyde on January 20, 2016, in Rhu, Scotland. HMS Vigilant is one of the United Kingdom's fleet of four Vanguard class nuclear-powered ballistic missile submarines carrying the Trident nuclear missiles.

reductions have left the United Kingdom with the smallest nuclear arsenal of the five NPT states. However, these reductions were not undertaken in a verifiable manner.

The United Kingdom is currently planning to replace all four of its ballistic missile submarines, which are set to retire in the 2030s. The plan to move forward on a successor program generated significant debate in London, particularly in light of the Scottish vote on independence in 2014. Scotland houses the United Kingdom's submarine base and the Scottish National Party opposes the nuclear deterrent.

In November 2015, the British parliament voted for the third time to support the government's plan to go ahead with the Vanguard-class successor program. While Labour Party leader Jeremy Corbyn opposes the submarine-replacement program, he said in January 2016 that he would consider supporting the plan for new submarines if they were not armed with nuclear warheads.⁹⁸

The United Kingdom has engaged in efforts to develop warhead dismantlement verification measures for long-term nuclear reductions, earning it a plus (+) grade. Since 2007, the United Kingdom has worked with Norway, as well as the independent Verification Research, Training and Information Centre, to develop procedures for verifying nuclear warhead disarmament in concert with a

non-nuclear-weapon state. The United Kingdom also participates in the U.S.-led IPNDV, which began in 2015. The International Partnership for Nuclear Disarmament Verification (IPDNV) is a group of nuclear weapon states and non-nuclear weapon states working on developing technologies and processes for verifiably dismantling nuclear warheads for future treaty obligations.

2013 grade: C+

2010 grade: D+

5. Negative Security Assurances: C

The United Kingdom issued a unilateral NSA in 1978 and again in 1995. In the April 1995 letter to the UN, the United Kingdom said it will not use, or threaten to use, nuclear weapons against non-nuclear-weapon states party to the NPT.⁹⁹ This assurance does not apply, however, to any state acting "in association or alliance with a nuclear-weapon state" that attacks the United Kingdom, its territories or allies, or any state in breach of its commitments under the NPT.

The United Kingdom appears to leave open the possibility that it would use nuclear weapons in response to attacks using chemical or biological weapons from non-nuclear-weapon states. In the 2015 Strategic Defense and Security Review document, the United Kingdom says that there currently is no direct

threat to the country from WMDs, such as chemical and biological weapons, but the government reserves the right to “review this assurance if the future threat, development or proliferation of these weapons make it necessary.”

The United Kingdom abstained from a 2015 UN General Assembly resolution calling for “early agreement on effective international arrangements to assure non-nuclear-weapon States against the use or threat of use of nuclear weapons.”

2013 grade: C

2010 grade: C

6. Nuclear-Weapon-Free Zones: B+

In January 2015 the United Kingdom ratified the protocol for the Central Asian NWFZ, becoming the second nuclear-weapon state to complete ratification after the five nuclear-weapon states all signed the protocol in May 2014. That step earned London a plus (+) grade.

The United Kingdom ratified the relevant protocols for the Latin American (1969), South Pacific (1997), and African (2001) NWFZs. The United Kingdom along with the other nuclear-weapon states recognized Mongolia’s status as a NWFZ in 2012.

The nuclear-weapon states announced in 2013 that they had reached an agreement with ASEAN on a revised protocol to the Southeast Asia NWFZ and that a signing of the protocol should take place soon. As of early 2016, however, the United Kingdom has taken



Jonathan Ernst/AF/Getty Images
Britain’s Foreign Secretary Philip Hammond (left) and U.S. Secretary of State John Kerry wave to schoolchildren as they visit the Peace Memorial Park, on the sidelines of the G7 Foreign Ministers’ Meeting in Hiroshima on April 11, 2016.

no action on the protocol for that zone.

The United Kingdom voices its support for a Middle East Weapons of Mass Destruction Free Zone (MEWMDFZ) and agreed at the 2010 NPT Review Conference to act as one of the three convening states (along with the United States and Russia) to host a conference for Middle Eastern countries on establishing a zone. However, London did not support consensus on the final document of the 2015 NPT Review Conference over the issue of establishing such a zone in the Middle East. The United Kingdom, along with the United States and Canada, objected to the setting of arbitrary deadlines and creating unrealistic conditions. London did not oppose a resolution led by Egypt on the establishment of a nuclear-weapon free zone in the Middle East at the 2015 UN First Committee.

2013 grade: B

2010 grade: B

7. IAEA Safeguards: N/A

The United Kingdom has had a voluntary safeguards agreement in place with the IAEA since December 1972 and an additional protocol since April 2004.

2013 grade: N/A

2010 grade: N/A

8. Nuclear Weapons-Related Export Controls: A

The United Kingdom has been a member of the NSG since its creation in 1975 and of the MTCR since 1987. The United Kingdom, along with other G7 members, has expressed the need for the NSG to adopt stricter guidelines involving the transfer of enrichment and reprocessing technology and, along with the G7, has agreed to abide by draft criteria-based guidelines for such transfers.¹⁰⁰

London has a number of national export control measures in place to prevent the spread of nuclear and missile technologies, including export control legislation, licensing provisions, deemed exports restrictions, end-user controls, and controls over re-export and transshipment. It has maintained bilateral and multilateral programs providing other states with assistance in implementing export controls.¹⁰¹ The United Kingdom updated the United Nations on its efforts to implement UN Security Council Resolution 1540 in December 2013.

The United Kingdom submitted all three of the reports on its implementation of nuclear weapons-related sanctions imposed on North Korea by the Security Council, including a report in January 2014 on its implementation of Resolution 2094 (2013).

2013 grade: A

2010 grade: A



Alex Wong/Getty Images

Prime Minister of the United Kingdom David Cameron (left) talks to President of Lithuania Dalia Grybauskaitė during a scenario-based policy discussion of the 2016 Nuclear Security Summit April 1, 2016, in Washington, D.C.

9. Nuclear Security Commitments: A

On a multilateral basis, the United Kingdom established its own Global Threat Reduction Program to fund nonproliferation and security projects in other countries, and participates in the Global Partnership.¹⁰²

The United Kingdom has taken a number of steps domestically to secure nuclear materials. In addition to ratifying the CPPNM in 1992 and its 2005 amendment in 2010, the United Kingdom has endorsed the IAEA Code of Conduct and signed onto a joint statement at the 2014 Nuclear Security Summit which committed participating states to “meet the intent” of the IAEA’s nuclear security recommendations and “subscribe to the fundamental principles” of the nuclear security fundamentals.

The United Kingdom has an extensive regulatory system for nuclear security, overseen by the Office for Nuclear Security, including accounting, physical protection, and licensing regulations.¹⁰³ London has also developed a Nuclear Security Vulnerability Assessment in order to support the country’s civilian nuclear industry by providing a qualitative assessment of each nuclear facility’s security measures. The vulnerability assessment evaluates security at nuclear sites, facilities, transports, ports, and other “Critical

National Infrastructure.”¹⁰⁴

The United Kingdom has maintained ongoing programs for the dismantlement of submarines, the remediation of onshore storage sites, the management of spent nuclear fuel, and plutonium disposition. Additionally, London also spearheaded an initiative in 2012 and again in 2014 and 2016 on enhancing information security at nuclear facilities as part of the Nuclear Security Summit process. The United Kingdom expanded these efforts to also include cybersecurity at the 2016 summit, and committed to conducting an exercise with the United States on preventing cyberattacks on nuclear plants.¹⁰⁵

2013 grade: A

2010 grade: A

10. Criminalization and Illicit Trafficking Commitments: A

The United Kingdom participates in the ITDB and ratified the Nuclear Terrorism Convention in 2009. London is a partner in the PSI, hosting a meeting of its Operational Experts Group in April 2016, and the GICNT.

2013 grade: A

2010 grade: A

United States

The United States was the first nation to test nuclear weapons and remains the only country to have used nuclear weapons in war, dropping two nuclear bombs on Japan in 1945. Along with Russia, the United States built up a significant nuclear stockpile during the Cold War, peaking at a total of 31,255 warheads in 1967.¹⁰⁶ Since the end of the Cold War, the United States has significantly reduced its nuclear arsenal unilaterally and through bilateral arms control treaties with Russia. The United States has been active in global efforts to control the arms race and stop the spread of nuclear weapons, spearheading efforts in the 1960s for the adoption of the NPT and in the 1990s for the CTBT, among other measures. Following the collapse of the Soviet Union, Washington led efforts to address the threat of nuclear trafficking and nuclear terrorism through cooperative threat reduction programs and broader nuclear security initiatives. The United States' overall grade improved since the last report for continuing with force reductions and ratifying treaties to bolster its nuclear security and criminalization of illicit trafficking commitments. **Overall Grade: B**

1. Banning Nuclear Testing: B+

The United States halted nuclear testing in 1992 after carrying out a total of 1,030 nuclear test explosions. Washington led global efforts to negotiate and conclude the CTBT at the CD in 1996 and was the first nation to sign the treaty. As an Annex 2 state, U.S. ratification is necessary for entry into force.

The U.S. Senate voted to reject CTBT ratification in 1999 after a rushed and partisan debate. President Barack Obama declared his support for Senate ratification of the treaty in 2009, 2011, 2013, and most recently in March 2016. However, the administration has not yet launched a major push for the treaty, let alone won Senate support for its advice and consent for ratification of the treaty.

A plus (+) is added to the grade because U.S. officials have engaged in an education campaign for the Senate to help build the necessary public support for the treaty's eventual ratification. Since October 2015, U.S. government officials have been speaking

around the country on the importance of the CTBT.

The United States has no plans to resume nuclear testing.¹⁰⁷

2013 grade: B

2010 grade: B

2. Ending Fissile Material Production for Weapons: A

The United States declared a halt to the production of fissile materials for nuclear weapons in 1992 and is estimated to have 253 tons of HEU and 87.6 tons of separated plutonium remaining in its military stockpile.¹⁰⁸

Obama pledged in 2009 to "lead a global effort to negotiate a verifiable treaty ending the production of fissile materials for weapons purposes."¹⁰⁹ Prior to 2009, Washington had sought a multilateral ban without verification. U.S. officials have worked with the other permanent members of the UN Security Council to try to advance progress toward



U.S. Ambassador to the Conference on Disarmament (CD) Robert Wood delivered his first remarks to the CD on August 19, 2014.

negotiating an FMCT at the CD and have engaged India and Pakistan in informal consultations on the issue. In June 2013, President Obama stated that the United States would use the 2016 nuclear security summit to call on nations to begin negotiations for the FMCT.¹¹⁰ Obama restated his support for beginning negotiations on an FMCT in a joint statement with India in January 2015.¹¹¹

In a statement to the CD in January 2016, U.S. Ambassador Robert Wood stated that an FMCT is the “next logical and achievable step” in working for multilateral disarmament progress.

The United States made an informal proposal for the initiation of negotiations at the CD on an agreement to halt fissile material production for weapons and to take into account existing stockpiles of fissile material for military purposes.

During the 2010 nuclear security summit, the United States signed a plutonium-disposition agreement protocol with Russia in which each country pledged to dispose of 34 tons of plutonium. The United States had planned a new plant to be used for plutonium disposition, but as of February 2016 sought to defund and terminate the project, proposing a “dilute and dispose” plan in its stead. It is unclear how the United States will continue with plutonium disposition and Russia has accused the United States of trying to change the terms of the agreement.

Since 2010, the United States has down-blended almost 15 metric tons of HEU and helped Russia

down-blend excess HEU.¹¹²

2013 grade: A

2010 grade: A

3. Reducing Nuclear Weapons Alert Levels: C

U.S. nuclear ballistic missile forces are reportedly ready to launch on short notice. Independent experts estimate that virtually all of the approximately 450 Minuteman III ICBMs and 96 Trident II SLBMs are on alert and ready for launch within 15 minutes.¹¹³ Washington de-targeted its nuclear forces in 1994.

The Obama administration’s April 2010 “Nuclear Posture Review [NPR] Report” concluded that “the current alert posture of U.S. strategic forces—with heavy bombers off full-time alert, nearly all ICBMs on alert, and a significant number of [ballistic missile submarines] at sea at any given time—should be maintained for the present.”¹¹⁴ The report also concluded, however, that efforts to prevent accidental or unauthorized launches and to “maximize the time available” to the president to consider whether to authorize the use of nuclear weapons should continue. It noted that such steps included further strengthening the command and control system and exploring ICBM basing arrangements that “enhance survivability and further reduce any incentives for prompt launch.”

In March 2011, National Security Advisor

Thomas Donilon said that Obama asked the Defense Department to review requirements for the nation's nuclear stockpile, possibly "including changes in targeting requirements and alert postures that are required for effective deterrence."¹¹⁵ The results of that review were announced by Obama in June 2013, including new guidance from the president to the Defense Department "to examine and reduce the role of launch under attack."¹¹⁶ However, since that time, the Obama administration has not announced whether or how it has taken steps to do so.

2013 grade: C

2010 grade: C

4. Nuclear Force Reductions: B+

On April 8, 2010, the United States and Russia signed New START, which instituted a new ceiling of 1,550 accountable deployed strategic warheads for each country and a limit of 700 deployed strategic delivery systems by 2018. New START was approved by the U.S. Senate in December 2010. The agreement put in place verification measures absent since the expiration of START in December 2009. As of April 1, 2016, the United States had 1,481 deployed nuclear warheads, a reduction from the 1,722 deployed nuclear warheads at the time of the last report.¹¹⁷

A plus (+) is added to the grade because the United States has determined and announced that it could further reduce its strategic nuclear arsenal and it has sought to engage Russia in negotiations on further reductions in nuclear stockpiles, including tactical nuclear weapons.¹¹⁸

In June 2013, Obama announced he had completed a review of nuclear weapons employment guidance and determined that the United States can reduce the number of strategic nuclear weapons it deploys by up to one-third—from 1,550 under the New START to between 1,000 and 1,100—and would seek reciprocal Russian reductions through negotiations. Russia rejected the proposal.

2013 grade: B

2010 grade: B-

5. Negative Security Assurances: C

The United States issued assurances not to use nuclear weapons against non-nuclear-weapon-state NPT members in 1978 and 1995 except in the case of an attack "in association or alliance with a nuclear-weapon state."¹¹⁹ In 1997 the United States issued a Presidential Decision Directive reaffirming these pledges.¹²⁰

In its most recent NPR Report of 2010, the United States revised its policy of reserving the right to use nuclear weapons to deter chemical and biological weapons threats, stating instead that "the United

States is now prepared to strengthen its long-standing 'negative security assurance' by declaring that the United States will not use or threaten to use nuclear weapons against non-nuclear weapons states that are party to the NPT and in compliance with their nuclear non-proliferation obligations."¹²¹ This declaration effectively removes the caveats to previous NSAs that may have left non-nuclear-weapon states believed to possess or to be seeking chemical weapons open to possible nuclear weapons use.

The April 2010 NPR Report indicates that Washington may revise its pledge in the face of biological weapons threats. The report states that "the United States reserves the right to make any adjustment in the assurance that may be warranted by the evolution and proliferation of the biological weapons threat and U.S. capacities to counter that threat."¹²²

2013 grade: C

2010 grade: B

6. Nuclear-Weapon-Free Zones: C+

The United States has ratified the relevant protocol to the Latin American NWFZ (1981), but has only signed the protocols for the treaties of the African (1996) and South Pacific (1996) zones. It signed the protocol for the Central Asian zone in 2014, but has not yet ratified it.

The United States announced at the 2010 NPT Review Conference that it would seek the ratification of the protocols to the African and South Pacific NWFZs.¹²³ On September 17, 2012, Washington released a joint declaration, in collaboration with the four other nuclear-weapon states, which recognizes Mongolia's status as an NWFZ.¹²⁴

Washington announced in 2013 that it had reached an agreement with ASEAN on a revised protocol to the Southeast Asia NWFZ and that a signing of the treaty should take place soon.¹²⁵ The United States has not signed the protocol as of April 2016.

2013 grade: C

2010 grade: C

7. IAEA Safeguards: N/A

The United States has had a voluntary safeguards agreement in place with the IAEA since December 1980 and an additional protocol since January 2009.¹²⁶

2013 grade: N/A

2010 grade: N/A

8. Nuclear Weapons-Related Export Controls: A

The United States was a founding member of the NSG

and MTCR. It has agreed to G8 commitments not to transfer reprocessing and enrichment technologies to non-NPT states.

The United States is implementing the president's Export Control Reform Initiative, which will clarify existing regulations and standardize criminal and civil penalties for violations of U.S. dual-use export laws.¹²⁷ By August 2015, the first two phases, reconciling existing regulations, were reported to be nearly complete. A third phase will "create a single control list, single licensing agency, unified information technology system, and enforcement coordination center."¹²⁸

The United States has an extensive export control assistance program aiding the development of nuclear weapons-related export controls in other states, including the Export Control and Related Border Security program, a Department of State-led interagency program aimed at export control assistance in about 60 countries.

A 2007 action plan submitted to the 1540 Committee focused on assistance efforts to help states implement the resolution, including nuclear-related export control measures.¹²⁹ A 2013 report to the Committee detailed the United States' "whole-of-government" approach to implementing the resolution. The United States has worked with the UN to develop a fund to assist states in implementing Resolution 1540 and has contributed monetarily to the fund in recent years. The United States has submitted its national implementation reports and updates to the 1540 Committee, most recently in September 2014.

The United States has submitted all three of its national implementation reports on nonproliferation measures imposed on North Korea to the UN sanctions committee, most recently in October 2013 for Resolution 2094.

2013 grade: A

2010 grade: A

9. Nuclear Security Commitments: **A**

Washington joined the CPPNM in 1982 and its 2005 amendment in July 2015, elevating the U.S. grade to an "A".

The United States implements extensive national nuclear security regulations overseen by the Nuclear

Regulatory Commission and the NNSA. Regulations cover accounting and security for the use, storage, and production of nuclear material, physical protection for facilities and material, and licensing for entities and facilities.¹³⁰ The United States has agreed to implement nuclear security procedures consistent with the IAEA Code of Conduct.

The United States is actively involved in global efforts to secure nuclear materials. In April 2010, it hosted a nuclear security summit in which 47 nations committed to securing nuclear material around the world in four years. In March and April 2016, the United States hosted the fourth and final nuclear security summit. The United States led efforts to draft the Strengthening Nuclear Security Implementation initiative, a joint statement introduced at the third summit in 2014, that commits subscribing countries to meet the intent of IAEA nuclear security recommendations in domestic laws or regulations.

In 2004, Washington launched the Global Threat Reduction Initiative (GTRI), aimed at preventing the illicit acquisition of nuclear and radiological material. Since 2009, the GTRI has shutdown or converted 88 HEU research reactors and isotope production facilities in 25 countries and removed nearly 5,140 kilograms of weapons-usable materials from over a dozen countries.¹³¹ The United States also participates in the Global Partnership.

2013 grade: B+

2010 grade: B+

10. Criminalization and Illicit Trafficking Commitments: **A**

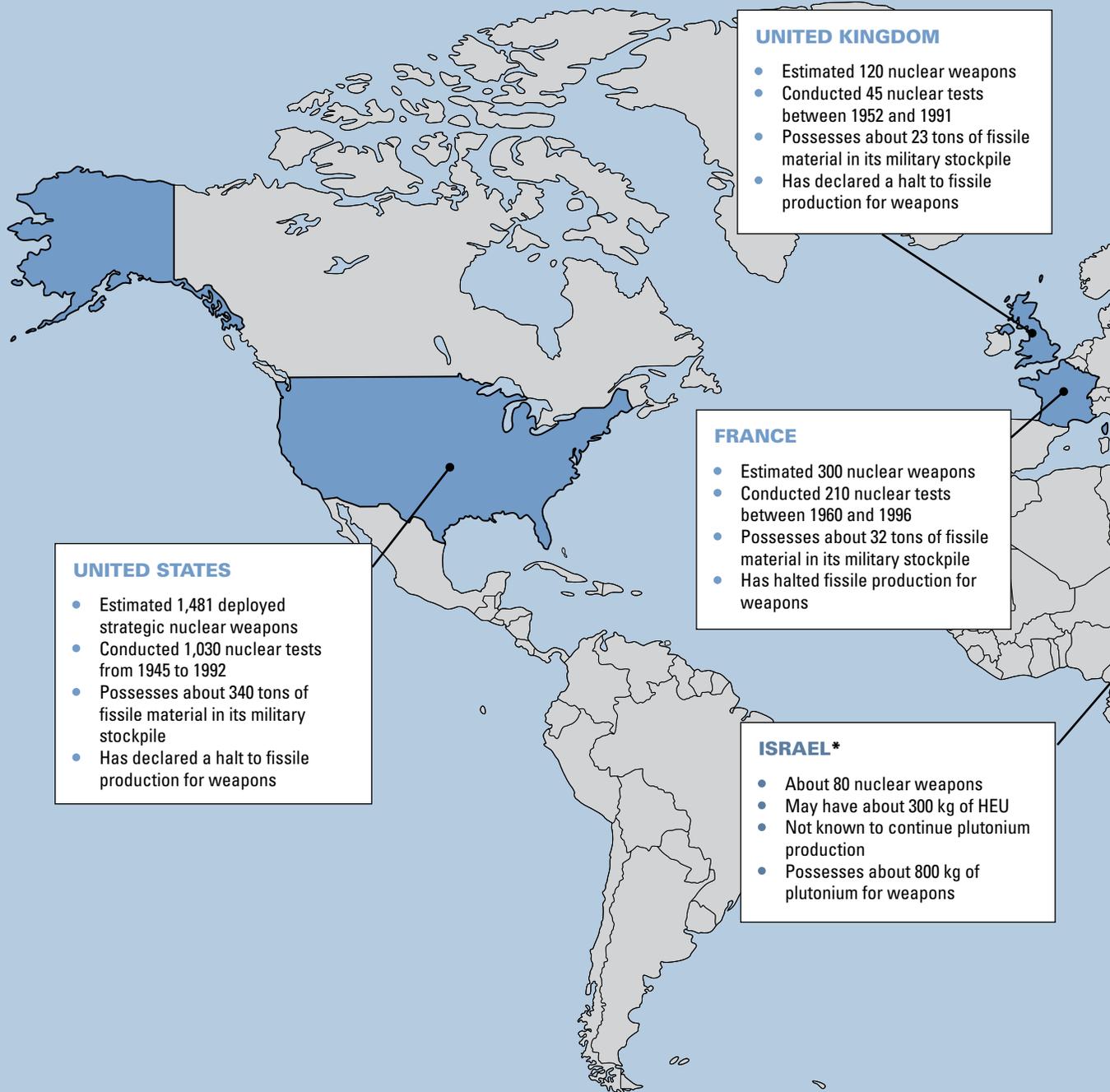
The United States signed the Nuclear Terrorism Convention in September 2005 and ratified it in September 2015.

The United States participates in the ITDB and has initiated or joined a number of multilateral efforts to prevent or counter illicit trafficking in nuclear materials, including the PSI and the GICNT. Washington also works with a number of countries to strengthen screening for radioactive materials at ports and border crossing through its Second Line of Defense and Megaports Initiatives.

2013 grade: B+

2010 grade: B+

Key Figures for 11 Select States



* Has not signed the NPT

† Announced withdrawal from NPT in 2003



SYRIA

- Under IAEA investigation since 2008
- No known fissile material production capabilities

RUSSIA

- Estimated 1,735 deployed strategic nuclear weapons
- Conducted 715 nuclear tests between 1949 and 1990
- Possesses about 800 tons of fissile material in its military stockpile
- Has declared a halt to fissile production for weapons

CHINA

- Estimated 260 nuclear weapons
- Conducted 45 nuclear tests between 1964 and 1996
- Possesses about 20 tons of fissile material in its military stockpile
- Is believed to have halted fissile production for weapons

DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA†

- Conducted four nuclear tests in 2006, 2009, 2013, and 2016
- Estimated plutonium stockpile for 6-8 nuclear weapons
- HEU production suspected

INDIA*

- Estimated 90-110 nuclear weapons
- Conducted 3 nuclear tests in 1974 and 1998
- Possesses about .4 tons of plutonium for weapons
- Continues to produce plutonium for weapons; is producing HEU

PAKISTAN*

- Estimated 110-130 nuclear weapons
- Conducted 2 nuclear tests in 1998
- Possesses 190 kg of plutonium; 3.1 tons of HEU for weapons
- Producing HEU and plutonium for weapons

IRAN

- Reached nuclear deal with six countries in July 2015
- Enrichment highly restricted for 15 years
- Reprocessing banned for 15 years
- IAEA assessed Iran conducted illicit nuclear weapons work before 2009

India

India developed a nuclear arsenal outside the NPT, carrying out its first nuclear test in 1974, which it described as a “peaceful nuclear explosion.” India formally declared itself a nuclear-weapon state after further tests were completed in May 1998. Despite long-standing calls from New Delhi for global nuclear disarmament, India rejects the current nonproliferation regime as inherently discriminatory and has been resistant to join multilateral disarmament efforts, arguing that nuclear weapons are “an integral part” of its national security “and will remain so pending the global elimination of all nuclear weapons.”¹³² In 2008 the NSG agreed to exempt India from rules restricting commercial nuclear cooperation to non-NPT members, allowing India to take advantage of a key NPT incentive despite remaining outside the treaty. India’s nuclear arsenal has expanded since the last report, and its overall grade has not improved. **Overall Grade: C+**

1. Banning Nuclear Testing: D+

India, an Annex 2 state, has not signed the CTBT, and sought to block adoption of the treaty in the CD in 1996.¹³³ India abstained from subsequent UN General Assembly votes calling for the CTBT’s early entry into force, including the most recent in December 2015.¹³⁴ In 1998, after the Indian and Pakistani nuclear test explosions, the UN Security Council demanded that each refrain from further tests in Resolution 1172.

A plus (+) is added to the grade because New Delhi declared a testing moratorium in September 1998, following its nuclear tests, and continues to abide by it. On September 5, 2008, Indian External Affairs Minister Pranab Mukherjee reiterated India’s commitment to “a voluntary unilateral moratorium on nuclear testing.” If India resumed testing, it would likely jeopardize nuclear cooperation with other countries. Following the 2008 NSG agreement to exempt India from restrictions on nuclear trade with non-NPT states, many countries issued statements indicating that such trade would halt if India were to conduct a nuclear test. U.S. law

requires that nuclear trade with India cease in the event of a test.¹³⁵

2013 grade: D+

2010 grade: D+

2. Ending Fissile Material Production for Weapons: F

New Delhi has expressed support for negotiating an FMCT that is verifiable and nondiscriminatory, but it has rejected a voluntary moratorium on fissile material production for weapons.¹³⁶ In May 2009, Indian Permanent Representative to the CD Nirupama Rao said that New Delhi would allow multilateral talks to begin but would “not accept obligations” that hinder India’s “strategic program” or research and development or those that “place an undue burden on our military non-proscribed activities.”¹³⁷ Under the terms of the U.S.-Indian nuclear cooperation agreement, India has agreed to “working with the United States for the conclusion of a multilateral” FMCT.¹³⁸ It is unclear what cooperation this pledge has yielded. In May 2012, Sujata Mehta, Indian permanent representative to the CD, reaffirmed that



Indian Navy personnel stand on an Indian Navy submarine during the International Fleet Review in Visakhapatnam on February 6, 2016.

New Delhi “remains committed to participating in the FMCT negotiations in the CD.”¹³⁹ In 2014 and 2015, India participated in meetings of a group of governmental experts established by the UNGA to discuss ways to move FMCT negotiations forward.¹⁴⁰

As of the end of 2014, India’s stockpile of weapons-grade plutonium was estimated at 5.5 metric tons, of which about 0.4 metric tons is the military stockpile.¹⁴¹ India is still producing weapons-grade plutonium, but at a slower rate after having shut down one of its two reactors in December 2010.¹⁴² Another reactor at Visakhapatnam is under construction and scheduled to begin operation during 2017 or 2018. India is known to produce HEU enriched to 30 to 45 percent for naval reactors, believed to be intended for fuel for its Arihant-class nuclear submarine reactors.¹⁴³ India’s stockpile is estimated at about 3.2 metric tons of uranium enriched to between 30-45 percent. India is currently constructing a second uranium enrichment plant at Chitradurga.¹⁴⁴

2013 grade: F

2010 grade: F

3. Reducing Nuclear Weapons Alert Levels: A-

India’s land-based missiles are not believed to be mated with their nuclear warheads, effectively reducing their readiness level and the risk of accidental or unauthorized use.¹⁴⁵ Currently, India’s land-based delivery systems are comprised of nuclear-capable missiles and nuclear-capable aircraft and New

Delhi’s Nuclear Command Authority, established in 2003, exercises command and control over its nuclear arsenal.

In 2014 India voted in favor of a First Committee resolution calling on states to reduce operational readiness of their nuclear weapons. New Delhi annually sponsors a UN General Assembly resolution that calls for de-altering and de-targeting nuclear weapons. It was a lead sponsor of the resolution for all years covered by this report, and issued statements each year highlighting the need for states to review their nuclear postures, saying in 2012 that India views “de-altering as an important step in the process of delegitimization of nuclear weapons.”¹⁴⁶

A minus (-) is added to the grade because India will soon commission its ballistic missile submarine, the *INS Arihant*, which will necessitate mating warheads with SLBMs for deterrent patrols. In 2012, India began sea trials of its prototype ballistic missile submarine, and declared that it had successfully developed an SLBM to pair with its *Arihant* submarines.¹⁴⁷ India has continued sea trials of the *Arihant* through 2016 and successfully tested an unarmed, nuclear capable ballistic missile for the submarine several times, including in December 2015. The submarine completed sea trials in February 2016. At the writing of this report in April 2016, it was ready to be commissioned. It is unclear how India will handle the mating of warheads with missiles on its sea-based deterrent, given that New Delhi still publicly supports the de-altering of nuclear weapons.

2013 grade: A

2010 grade: A

4. Nuclear Force Reductions: **F**

India continues to expand the size of its nuclear arsenal and enhance its nuclear delivery capabilities. In 2007, Defense Minister Shri A.K. Antony said that the size of India's nuclear arsenal would be "commensurate with the size and geostrategic position of India in the world."¹⁴⁸ As of 2015, India's arsenal is estimated at 90-110 nuclear weapons.¹⁴⁹

India currently possesses a dyad, composed of land-based ballistic missiles and air delivery capabilities. When the *Arihant* submarine is commissioned, India will possess a full triad.

India has continued to extend the range of its land-based missiles, including the long-range Agni-5 ballistic missile, which it successfully test-fired in April 2012, September 2013, and January 2015.¹⁵⁰ It is unclear if the Agni-5 will be equipped with multiple independently targeted re-entry vehicles, V.K. Saraswat, chief of India's Defence Research Development Organization (DRDO), said in May 2012 that India is "working in this area."¹⁵¹ The Agni-5 is a single-warhead design, according to the former head of India's defense research agency.¹⁵² The next Agni variant which has not yet been flight-tested, however, could be equipped with multiple independently targeted re-entry vehicles. The DRDO also announced it had approved serial production of the IRBM Agni-4 following a successful test in January 2014.¹⁵³

India is also investing in qualitative improvements that will allow it to operationalize and deploy shorter-range ballistic and cruise missiles.

In July 2012, India announced that it completed development of an SLBM, the K-15. It was tested from the *Arihant* ballistic missile submarine in November 2015.¹⁵⁴ In December 2015 it was reported that the missiles were under production.¹⁵⁵ Tests of the K-15 system date back to at least 2008.

India is developing an SLBM with a range of up to 3,000 kilometers known as the K-4, which India test-launched most recently in March 2016. A first test-launch took place in March 2014 from a submerged pontoon, and the missile was tested successfully from the *Arihant* for the first time in March 2016.¹⁵⁶

2013 grade: F

2010 grade: F

5. Negative Security Assurances: **B+**

India maintains a policy of the nonuse of nuclear weapons against non-nuclear-weapon states. India's ambassadors to the CD consistently state that New Delhi believes non-nuclear-weapon states "have a legitimate right to be assured against the use or threat of use of nuclear weapons."¹⁵⁷ India has consistently voted in favor of UN General Assembly resolutions,



Ravendran/AFPr/Getty Images

Indian scientist Vijay Kumar Saraswat, the director general of the Defence Research and Development Organisation, looks on during an Agni 5 missile press conference held in New Delhi on April 20, 2012.

including in December 2015, on concluding "effective international arrangements" to assure non-nuclear-weapon states against the use or threat of use of nuclear weapons,¹⁵⁸ but has not issued unilateral legally binding assurances.

A plus (+) is added to the grade because as stated in its 1999 nuclear doctrine, "India will not be the first to initiate a nuclear strike, but will respond with punitive retaliation should deterrence fail."¹⁵⁹ Although officially India has adopted this no-first-use policy, some Indian strategists have called the pledge's validity into question.¹⁶⁰ The credibility of this pledge was weakened in 2009 when Indian Army Chief Gen. Deepak Kapoor suggested that the government should review the pledge in light of the growing threat of Pakistan.¹⁶¹ During debate at the CD in 2012, however, Ambassador Sujata Mehta said that India reiterated its no-first-use policy and the policy on nonuse against non-nuclear-weapon states and said that India was "prepared to convert these undertakings into multilateral legal arrangements."¹⁶² The Indian representative to the 2015 CD reiterated these policies and stated willingness to convert these "into bilateral or multilateral legally binding arrangements."¹⁶³

2013 grade: B+

2010 grade: B+

6. Nuclear Weapon Free Zones: **C**

India has voted in support of UN General Assembly resolutions calling for the establishment of NWFZs in

other regions.

In the past India had voted against UN measures supporting an NWFZ in South Asia. Since 2012, however, India has abstained from vote against a zone in the southern hemisphere, earning it a slight grade improvement.¹⁶⁴

2013 grade: C-

2010 grade: C-

7. IAEA Safeguards: C+

India has a limited INFCIRC/66-type agreement in force with the IAEA covering some of its civilian nuclear facilities. In 2008 the IAEA Board of Governors approved an “India-specific” safeguards agreement. As of February 2015, India had placed 22 civilian facilities under IAEA safeguards, an additional three since the last version of this report.¹⁶⁵

The IAEA approved an additional protocol for India in March 2009, which New Delhi ratified in 2014, earning India a plus (+) grade. Although India’s additional protocol is based on the 1997 Model Additional Protocol, it does not include a number of reporting requirements otherwise contained in the model protocol, nor does it cover all nuclear facilities. India agreed to report only nuclear-related exports, excluding reporting on nuclear-related imports, uranium mining, and research and development related to the nuclear fuel cycle.¹⁶⁶ The IAEA also does not have complementary access to Indian facilities to inspect undeclared sites.

2013 grade: C

2010 grade: C+

8. Nuclear Weapons-Related Export Controls: A

India pledged in July 2005 to adhere to NSG and MTCR guidelines as part of a proposed U.S.-Indian nuclear cooperation agreement and has repeatedly attempted to join both bodies. New Delhi said it harmonized its national export controls with those regimes in 2008, according to an April 18, 2012 speech by Foreign Secretary Shri Ranjan Mathai.¹⁶⁷ In March 2013, Indian Foreign Secretary Ranjan Mathai announced updates to India’s regulations so that they would comply with the revisions to the MTCR and the NSG from the previous year.¹⁶⁸

India’s national export controls include provisions related to export licensing, import controls, dual-use controls, brokering controls, transshipment and transport controls, and end-user controls.¹⁶⁹

India’s bid to join the MTCR in 2015 was blocked after it failed to gain unanimous support from the regime members. India is expected to move forward with an effort to join the NSG at that group’s annual meeting in June 2016.

India submits national implementation reports for Resolution 1540, most recently in May 2013. India has submitted two of the three national implementation reports for nonproliferation measures against North Korea, but none during the period covered by this report.

India received a minus (-) in past versions of this report because independent assessments suggested that Indian nuclear procurement efforts for dual-use goods have violated the export control laws of other countries and have been contrary to the spirit of the NSG, but that the extent to which these import activities continued remains uncertain.¹⁷⁰ According to another independent assessment, the Indian government has “developed an impressive framework of export controls.”¹⁷¹

2013 grade: A-

2010 grade: A-

9. Nuclear Security Commitments: A

India acceded to the CPPNM in 2002 and the 2005 amendment in 2007. India is implementing the IAEA Code of Conduct.

India has also undertaken a number of national nuclear security measures consistent with the requirements of Resolution 1540. These steps include the establishment of an independent nuclear regulatory authority, accounting measures for nuclear material, and a licensing procedure for nuclear facilities and materials. In April 2016, India announced plans to join the Strengthening Nuclear Security Implementation initiative introduced at the 2014 Nuclear Security Summit, which commits New Delhi to adhere to the nuclear security recommendations laid out by IAEA in its nuclear security series.

During the 2010 nuclear security summit, India pledged to create a Nuclear Energy Center with a nuclear security component and construction began in January 2014. India continues to hold training courses on a range of topics related to physical protection that will be included in the Global Centre for Nuclear Energy Partnership curriculum.¹⁷² New Delhi is under consideration for participation in the Global Partnership.¹⁷³

2013 grade: A

2010 grade: A

10. Criminalization and Illicit Trafficking Commitments: A

India participates in the ITDB, joined the Nuclear Terrorism Convention in 2006, and is a partner nation in the GICNT.

2013 grade: A

2010 grade: A

Israel

Israel is widely believed to possess an undeclared nuclear arsenal of approximately 80 nuclear weapons, with enough nuclear material for approximately 200 warheads. One of three states never to sign the NPT, Israel has maintained a policy of nuclear ambiguity since the 1960s, declaring that it will not be “the first country to introduce nuclear weapons into the region.”¹⁷⁴ Israel’s position on a wide variety of disarmament measures is that regional security conditions must first improve before it can take certain concrete disarmament steps. As a result, Israel’s participation in a number of key international nonproliferation measures has been somewhat limited. Israel’s grade did marginally improve since the 2013 version of this report, primarily because of positive steps taken in support of a zone free of weapons of mass destruction in the Middle East and support of the CTBTO’s work. **Overall Grade: C**

1. Banning Nuclear Testing: C+

Israel signed the CTBT in 1996, but has not yet ratified the treaty. As an Annex 2 state, Israel’s ratification is necessary for the treaty’s entry into force. Although the country has expressed its support for the CTBT as an important aspect of the nuclear nonproliferation regime, calling it an “important confidence-building measure” in the region at a January 2016 conference on the treaty, Israel has linked its full membership in the past to the security environment in the region.

In a June 2015 speech, Israeli Ambassador Merav Zafary-Odiz said that Israel intends to ratify the treaty “when the time is right” and “certain conditions are met.”¹⁷⁵ The obstacles she listed included countries in the region failing to recognize Israel as a state.

However, Israel’s claim that it shall not be the first state to introduce nuclear weapons to the Middle East region is indicative of a de facto moratorium on nuclear testing. Absent another state in the region choosing to test or pursue nuclear weapons, Israel is unlikely to be the first to conduct a nuclear test.

Israel houses three stations for the CTBTO’s International Monitoring System. All three are

operational and certified. Israel participated in the CTBTO’s Integrated Field Exercise in Jordan in 2014, and hosted a workshop on the results in April 2015, which earned it a plus (+) grade in this category.

2013 grade: C

2010 grade: C

2. Ending Fissile Material Production for Weapons: F

Israel has expressed concern that an FMCT would not be an adequate safeguard against a potential Iranian development of nuclear weapons.¹⁷⁶ It is unclear whether or not Israel’s position has changed in light of the July 2015 nuclear deal with Iran that restricts Tehran’s enrichment activities and stockpiles of LEU and bans reprocessing through 2031.

Despite that concern, Israel has not blocked consensus in the CD to move forward on negotiating such an FMCT treaty. Israel also abstained from a 2015 UN General Assembly consensus resolution urging the CD to start FMCT negotiations.

Israel is believed to be operating its Dimona reactor at the Negev Nuclear Research Center. Under its policy of nuclear ambiguity, Israel has not declared



CTBTO

An inspection team conducts electrical field measurements on December 3, 2014, as part of the CTBTO's 2014 Integrated Field Exercise, in Amman, Jordan.

a cessation of such production for weapons purposes. Some experts assess that Dimona may currently primarily produce tritium for warheads.¹⁷⁷ As of 2014, it is estimated that Israel has about 800 kilograms of weapons-grade plutonium.¹⁷⁸ There is less certainty about Israel's HEU stockpile, which could be roughly 300 kilograms.¹⁷⁹

2013 grade: F
2010 grade: F

3. Reducing Nuclear Weapons Alert Levels: D

Israel does not acknowledge its possession of nuclear weapons and therefore has not provided transparency regarding the command and control structure of its nuclear forces or other assurances against unauthorized use. Israel has abstained in UN General Assembly votes on resolutions calling for decreasing the readiness of nuclear forces, including the most recent resolution on the topic in 2014.

Israeli delivery vehicles include land- and sea-based, nuclear-capable ballistic and cruise missiles as well as air-delivered gravity bombs.¹⁸⁰

Israel is believed to maintain its nuclear weapons de-mated from their delivery systems and may store them in a disassembled state.¹⁸¹ However, many experts allege that Israel fitted its five Dolphin-class submarines, purchased from Germany, with nuclear-tipped submarine-launched cruise missiles.¹⁸² A

submarine-based leg of Israel's nuclear forces would call into question the assertion that Israel's warheads are de-mated.¹⁸³ A sixth submarine is on order from Germany.

2013 grade: D+
2010 grade: D+

4. Nuclear Force Reductions: D-

Israel is suspected to have an arsenal of about 80 nuclear warheads, plus additional separated plutonium available for up to 200 total weapons. There is no indication that Israel has made any force reductions, or has taken any steps to expand its nuclear arsenal, during the timeframe of this report.

Israel may be pursuing qualitative improvements to its delivery vehicles. In November 2013, Israel is believed to have successfully tested its nuclear-capable Jericho-3 multistage intermediate-range ballistic missile for the third time.¹⁸⁴ Israel also deploys the Jericho-2, a medium-range ballistic missile and has the ability to deliver nuclear gravity bombs with several types of aircraft. Experts also assess that Israel's Dolphin-class submarines are fitted for carrying nuclear-tipped cruise missiles. Israel's fifth submarine arrived from Germany in January 2016.¹⁸⁵

Israel voted against 2015 UN General Assembly resolutions concerning nuclear disarmament, such as those introduced by Japan, the New Agenda Coalition, and the Non-Aligned Movement. This

represents a change from past behavior when Israel has abstained from voting on similar resolutions, earning it a minus (-) grade.¹⁸⁶

2013 grade: D

2010 grade: D

5. Negative Security Assurances: D+

Given that Israel has not acknowledged possession of nuclear weapons, it has not made any statements regarding its willingness to use nuclear weapons against non-nuclear-weapon states.

Israel, however, generally abstains from voting on an annual UN General Assembly resolution that would establish international arrangements to assure non-nuclear-weapon states that the use or threat of use of nuclear weapons would not be used against them, including the most recent resolution in 2015.¹⁸⁷

A plus (+) is added to the grade because Israel's position that it will not be the first state to introduce nuclear weapons in the region can be interpreted as a de facto pledge not to use them against non-nuclear-weapon states.

2013 grade: D+

2010 grade: D+

6. Nuclear-Weapon-Free Zones: C+

Israel supports the creation of a WMD-free zone in the Middle East, but prefers movement toward a zone take place as part of larger regional discussions on security issues.¹⁸⁸



Israel's Ambassador to the IAEA, Merav Zafari Odiz, looks on as she attends the Board of Governors meeting at the UN atomic agency headquarters in Vienna on November 29, 2013.

Alexander Klein/AFP/Getty Images

Israel's grade improved significantly since the last report because Israeli diplomats participated in five rounds of consultations from 2013-2014 with the aim of moving toward an agenda for a conference on establishing a WMD-free zone, as called for in the 1995 Resolution on the Middle East and the 2010 NPT action plan.

Israel's decision to participate in the consultative process came after it was the only country not to have publicly said that it would participate in the conference originally planned for December 2012, but postponed by the convenors.

Israel voiced a willingness to continue with the consultative process led by Finnish diplomat Jaako Laajava, but his mandate for overseeing the process ended when the NPT Review Conference closed in 2015 without consensus.

Israel has supported nuclear-free zones in other regions of the world.

2013 grade: D-

2010 grade: C-

7. IAEA Safeguards: C

Select Israeli nuclear facilities are governed under a limited INFCIRC/66-type agreement, rather than a full-scope IAEA safeguards arrangement. The IAEA's annual safeguards implementation report, issued in May 2015, found that there was no diversion of nuclear materials from the facilities covered by Israel's limited-scope agreement. However, the Dimona nuclear complex, thought to be the location of Israel's nuclear material production for its weapons program, is not included in this agreement.

In September 2009, the IAEA General Conference adopted a resolution expressing concern over the lack of safeguards at Israeli nuclear facilities, while calling on the country to join the NPT and adhere to comprehensive safeguards. The resolution was adopted with 49 votes in favor, 45 against, and 16 abstentions.¹⁸⁹ A similar resolution failed in 2013, 2014, and 2015.

2013 grade: C

2010 grade: C

8. Nuclear Weapons-Related Export Controls: A

Israel has agreed to adhere to NSG guidelines with respect to nuclear transfers and says it updates its control lists on a regular basis.¹⁹⁰ Israel pledged in October 1992 to abide by the MTCR Guidelines.

Israel has submitted two of the reports on its implementation of nuclear weapons-related sanctions imposed on North Korea by the Security Council, but it has not yet provided a report pursuant to Resolution 2094 (2013).



Evan Schneider/UN

The General Assembly’s Ad Hoc Committee on International Terrorism adopted the text of a draft of the Nuclear Terrorism Convention on April 1, 2005. Israel has signed, but not ratified, the Nuclear Terrorism Convention.

In its 2012 update to the 1540 Committee, Israel noted a number of national measures to control the spread of nuclear weapons-related and delivery vehicle technologies, including export control legislation, licensing provisions, import controls, and a catchall clause.¹⁹¹

2013 grade: A
2010 grade: A

9. Nuclear Security Commitments: A

Israel joined the CPPNM in January 2002 and the 2005 CPPNM amendment in March 2012. Israel has endorsed the IAEA Code of Conduct for the security of radioactive sources. The Israeli Atomic Energy Commission has some independent nuclear regulatory responsibilities.¹⁹²

Israel also signed onto a joint statement at the 2014 Nuclear Security Summit which committed participating states to “meet the intent” of the IAEA’s nuclear security recommendations and “subscribe to the fundamental principles” of the agency’s nuclear security fundamentals.

Israel also sits on the IAEA Nuclear Security Guidelines Committee and in 2013 hosted a U.S. delegation to conduct a physical protection assessment at a research reactor and research center.¹⁹³

2013 grade: A
2010 grade: B

10. Criminalization and Illicit Trafficking Commitments: B

Israel participates in the ITDB, as well as the GICNT and the PSI. Israel, in cooperation with the United States, is implementing a Megaports Initiative Agreement to provide radiation monitoring at its major ports. That agreement was expanded in 2013.

Israel has signed, but not ratified the Nuclear Terrorism Convention. Israel has maintained that it is “in the process of ratifying” the treaty for several years, but not taken any noticeable action. As a result, its grade dropped from 2013.

2013 grade: B+
2010 grade: B+

Pakistan

Pakistan chose not to join the NPT and began a concerted drive to develop nuclear weapons in the early 1970s. As nuclear suppliers began to oppose transfers of sensitive nuclear technologies to the country, Islamabad relied heavily on smuggled uranium-enrichment technology acquired by nuclear official Abdul Qadeer Khan. By the 1980s, when Pakistan had acquired sufficient expertise in uranium enrichment, Khan and his smuggling network shared that technology with a number of other countries, including Iran, Libya, and North Korea, likely with some involvement by the Pakistani government or military. More recently, Pakistan's development of tactical nuclear weapons have raised concerns about the security of Pakistan's nuclear warheads and on the issue of crisis escalation on its border with India.¹⁹⁴ Pakistan's grade improved slightly since the 2013 report, due in part to progress on strengthening export controls and ratifying a key nuclear security treaty. **Overall Grade: C**

1. Banning Nuclear Testing: D+

Pakistan, an Annex 2 state, has not signed the CTBT, but continues to maintain that Islamabad will not be the first country in the region to resume testing. In June 2015, Foreign Secretary Aizaz Ahmad Chaudhry reaffirmed Pakistan's stance that it "will not be the first in its region to resume nuclear testing."¹⁹⁵

In 2009 Pakistani Foreign Ministry spokesman Abdul Basit told reporters that "Pakistan has no plan to sign the CTBT," adding that circumstances have changed since Islamabad pledged in 1998 to sign the agreement if nuclear rival India did the same.¹⁹⁶

Yet there are indications that Pakistan may be moving away from its decision not to sign the CTBT and reverting back to its 1998 position. In a November 2011 interview, Pakistan's ambassador to the CD Zamir Akram said Pakistan would be willing to sign and ratify the CTBT if India does.¹⁹⁷

A plus (+) is added to the grade because Islamabad declared a test moratorium following its 1998 nuclear tests, which were condemned in UN Security Council Resolution 1172. Pakistan has consistently voted in

favor of a resolution supporting the CTBT in the UN First Committee.

2013 grade: D+

2010 grade: D+

2. Ending Fissile Material Production for Weapons: F

Pakistan continues to produce fissile material for nuclear weapons and has expressed concern that limitations on its production would essentially freeze the asymmetry between its fissile material stores and that of India, leaving Pakistan at a permanent disadvantage.¹⁹⁸ Pakistan has argued that the 2008 NSG exemption for nuclear cooperation with India will increase that disadvantage. This position has led Pakistan to block consensus on negotiations at the CD for an FMCT if the treaty does not take into account stockpile size.

Pakistan continues to hinder efforts by the CD to break its long-standing deadlock and commence negotiations on an FMCT. Although Islamabad initially joined the consensus on a program of work



Pakistani army soldiers salute as they travel on a vehicle carrying Shaheen III ballistic missiles during the Pakistan Day military parade in Islamabad on March 23, 2016.

in May 2009, it broke the consensus that August by refusing to agree to the program's corresponding implementation framework. Pakistan cited a number of procedural concerns and argued that "balanced progress" must be made on the CD's other three core issues: complete disarmament, legally binding NSAs, and preventing an arms race in outer space.¹⁹⁹ Islamabad argues that the CD must determine the scope of the treaty, which should include limits on existing stockpiles, before negotiations on an FMCT begin.²⁰⁰ In a 2015 statement by the Pakistani permanent representative to the CD, Islamabad argued that partial nonproliferation measures such as an FMCT delay nuclear disarmament, and that an FMCT that does not address existing stockpiles of fissile material does not advance disarmament.²⁰¹ Pakistan continues to block consensus on approving an agenda at the CD.

In an October 2011 interview, Pakistani Ambassador Zamir Akram suggested that Pakistan might be willing to negotiate an FMCT under the Shannon Mandate if the NSG were to give Pakistan a waiver, similar to the 2008 waiver granted to India.²⁰²

Pakistan voted against a CD resolution calling for the establishment of a group of governmental experts to advance FMCT negotiations, and declined to participate in the group's subsequent meetings in 2014 and 2015.²⁰³

A 2015 report estimated that Pakistan has a stockpile of approximately 190 kilograms of separated plutonium, an increase of 65 kilograms from the last version of this report.²⁰⁴ Pakistan has two operating heavy-water reactors at Kushab. A third reactor is believed to have been operating since 2013 and satellite imagery suggests that construction on a fourth reactor began operating as of early 2015.²⁰⁵ Pakistan may also have completed major work on an additional reprocessing facility at Chashma as of December 2013.²⁰⁶ The operational status of this site is unclear, but imagery suggests it could be ready for operation or operational.²⁰⁷

Pakistan also produces HEU for its nuclear-weapons program and its stockpile was estimated at 3.1 tons as of the end of 2014.²⁰⁸ It has a confirmed centrifuge plant for this purpose at Kahuta, and a possible second facility at Gadwal.²⁰⁹

2013 grade: F

2010 grade: F

3. Reducing Nuclear Weapons Alert Levels: B

Pakistan's nuclear warheads are believed to be stored in a disassembled state, with the fissile core kept separate from the warhead package.²¹⁰ Pakistani officials maintain that its nuclear weapons are

equipped with permissive action links and require at least two people to authorize their use.²¹¹

Pakistan has a three-tiered command and control structure overseeing its nuclear weapons establishment, which was formalized by the “National Command Authority Ordinance, 2007” by then-President General Pervez Musharraf.²¹² Islamabad’s National Command Authority has the primary responsibility for nuclear weapons development and deployment, including operational planning and control. Authority to launch a nuclear strike requires consensus within the National Command Authority. In 2014, a senior Pakistani government official stated that control of the nuclear forces will remain under the National Command Authority, and not the military, even in the time of crisis.²¹³ Then U.S. Undersecretary of Defense Michele Flournoy described Pakistan’s command and control system as “very solid” during an April 29, 2010, hearing.²¹⁴

Pakistan’s grade has been lowered because in October 2015, Pakistani foreign minister Aizaz Chaudhry publicly stated that Pakistan has developed low-yield, tactical nuclear weapons. Pakistan is believed to have deployed these weapons on the battlefield.²¹⁵ Pakistan announced its first successful test of the Nasr missile in 2011, and has since tested it twice more in February and November 2013.

2013 grade: A

2010 grade: A

4. Nuclear Force Reductions: F

The increasing scale of Pakistan’s fissile material production capacity enhances its means to expand the size of its nuclear arsenal at a faster rate than any other state possessing nuclear weapons. Pakistan has not established a ceiling for the size of its arsenal, which has increased to an estimated 110-130 warheads from the 90-110 estimated in 2013.²¹⁶ Pakistan has maintained its nuclear doctrine as “credible minimum deterrence,” and reiterated this in a 2016 joint statement with the United States.²¹⁷ The deterrence requirement, however, remains ambiguous because Islamabad has not quantified what stockpile size would constitute this minimum level.²¹⁸

Additionally, Pakistan is continuing to develop its nuclear weapons infrastructure, expand its nuclear-weapon stockpiles, which are based primarily on HEU, and seek more advanced nuclear warheads and delivery systems.²¹⁹ In particular, Pakistan has continued to develop and test ballistic and cruise missile capabilities.

Of particular concern is Pakistan’s development of short-range ballistic missiles designed to deliver low-yield tactical nuclear weapons. In April 2011, Pakistan first test-fired the Nasr (or Haft-8), a short-range nuclear-capable ballistic missile that experts assessed

to indicate Islamabad’s intention to deploy low-yield tactical nuclear weapons. In October 2015, Pakistani foreign minister Aizaz Chaudhry publicly confirmed that Pakistan has developed low-yield, tactical nuclear weapons.

2013 grade: F

2010 grade: F

5. Negative Security Assurances: B

Pakistan has made a no-first-use pledge to non-nuclear-weapon states and votes in favor of an annual UN General Assembly resolution on NSAs. Pakistan’s position on first use against states that possess nuclear weapons is less clear, particularly with regard to India. In July 2015, Pakistani defense minister Khawaja Asif suggested Islamabad would use nuclear weapons for defensive purposes in armed conflict with India.²²⁰ Pakistani officials have indicated that the circumstances surrounding its no-first-use policy must remain deliberately imprecise, as demarcating clear redlines could allow provocations by the Indian military just below any established threshold for use.²²¹ In a 2015 statement, Foreign Secretary Aizaz Ahmad Chaudhry said that Pakistan’s nuclear arsenal is one-dimensional, that is it “not for starting a war.”²²²

2013 grade: B

2010 grade: B

6. Nuclear-Weapon-Free Zones: C

Islamabad has generally supported the establishment of NWFZs, having voted in favor of resolutions supporting their creation in various regions.

Pakistan has voted against or abstained from UN General Assembly resolutions supporting the creation of such a zone in South Asia, most recently in December 2010.²²³ Since 2010, specific language calling for a zone in South Asia has not been included in resolutions supporting a nuclear-weapons-free southern hemisphere. Pakistan’s grade improved because it has voted in favor of these resolutions since 2012.

2013 grade: C-

2010 grade: C-

7. IAEA Safeguards: C

Currently, only select Pakistani nuclear facilities, including the nuclear power plants at Karachi and Chashma, two research reactors and a reprocessing plant, are governed under a limited-scope INFCIRC/66 IAEA safeguards arrangement. In 2015, Pakistan claimed that all of its existing civilian nuclear power plants were under IAEA safeguards.²²⁴

2013 grade: C

2010 grade: C

8. Nuclear Weapons-Related Export Controls: B-

Pakistan is suspected of maintaining an illicit procurement network for goods and technologies related to its nuclear and missile programs, although the extent to which the state participates directly in these activities is debatable.²²⁵

Although Pakistan has continued to procure goods in violation of export controls in other states, it has taken steps to establish its own national export control system in recent years.²²⁶ These steps include export control legislation developed in 2004 covering export, re-exports, and transshipment; national controls lists consistent with those of the NSG and MTCR, and a licensing body responsible for control list implementation and export control law enforcement.

Islamabad has taken many steps since 2010 to adhere to Resolution 1540 following revelations regarding the nuclear smuggling network run by Khan.²²⁷ On March 18, 2011, U.S. Secretary of State Hillary Rodham Clinton issued a certification that Pakistan is “continuing to cooperate with the United States in efforts to dismantle supplier networks relating to the acquisition of nuclear weapons-related materials.”²²⁸ In a March 2012 report to Congress, the State Department described the Khan network as “defunct.”²²⁹

In July 2011, Pakistan updated its national control lists after an interagency review, stating that the revised lists incorporate “the relevant amendments and modifications made by the NSG, MTCR, and Australia Group. The major changes related to the categories of missiles and nuclear dual use items.”²³⁰ A 2013 report by the U.S. State Department concluded the 2011 revisions still had proliferation gaps. Pakistan updated its national control lists again in 2015, stating that the lists “encompass lists and scope of export controls maintained by the Nuclear Suppliers Group (NSG), the Australia Group (AG), and the Missile Technology Control Regime (MTCR).”²³¹ Pakistan has not submitted a national implementation report for Resolution 1540 since 2008. It has submitted all three implementation reports for nonproliferation measures against North Korea, most recently in June 2013.

A minus (-) is added because there are still questions of dual-use items slipping past Pakistan’s export control system.²³²

2013 grade: C-
2010 grade: F

9. Nuclear Security Commitments: B+

Pakistan acceded to the CPPNM in 2000, and the 2005 amendment in March 2016, adding a plus (+) to its grade.²³³ In addition, Pakistan has undertaken a number of measures in recent years to secure nuclear materials. In its 2004 report to the 1540 Committee, Pakistan indicates that the “Pakistan Nuclear Regulatory Authority (PNRA) has established a Nuclear Security Action Plan, which includes the safety and security of nuclear and radioactive materials and installations during use, storage and transport, based on IAEA guidelines.” The PNRA also addresses the licensing of nuclear facilities and entities. Islamabad has agreed to follow the guidelines of the IAEA Code of Conduct.

In response to these concerns, physical security has improved in the recent years, due in significant part to U.S. assistance across a spectrum of activities. This assistance includes the development of nuclear material accountability and tracking programs, advanced training by U.S. national laboratories, and the development of personnel reliability and accounting measures.²³⁴ Cooperation has been limited by speculation over U.S. contingency plans designed to secure Pakistani nuclear weapons in a crisis.²³⁵

Pakistan also has relied extensively on a strategy of secrecy to protect its nuclear arsenal from unauthorized access, an approach that has come under some criticism because of the increased risk of insider collusion.²³⁶

The United States has reasserted its confidence in the security of Pakistan’s nuclear weapons. In December 2015, the U.S. Special Representative for Afghanistan and Pakistan stated in a hearing that “Washington has confidence in the capabilities of ... the Pakistani security forces to control and secure their nuclear weapons.”²³⁷ Pakistan has not signed on to the Strengthening Nuclear Security Implementation initiative introduced at the 2014 Nuclear Security Summit.

2013 grade: B
2010 grade: B-*

10. Criminalization and Illicit Trafficking Commitments: B

Pakistan participates in the ITDB and the GICNT. It has not signed or ratified the Nuclear Terrorism Convention.

2013 grade: B
2010 grade: B

* Pakistan was incorrectly assigned a grade of “A” in the 2010 iteration of this report. Receiving that grade requires ratification of the 2005 amendment to the Convention on the Physical Protection of Nuclear Material, which Pakistan had yet to do. Its adjusted grade is shown here.

Democratic People's Republic of Korea

The Democratic People's Republic of Korea (North Korea) has been a focal point for nuclear nonproliferation efforts for more than 20 years, a focus that intensified after IAEA inspectors found North Korea to be cheating on its nonproliferation obligations in the 1990s. In response, the United States entered into the so-called Agreed Framework of 1994 that froze much of the North's nuclear activities but was unsuccessful in turning back the program. Following the collapse of that agreement in 2002, North Korea developed an overt nuclear weapons capability and declared its withdrawal from the NPT in 2003. A multilateral process, known as the six-party talks, began in 2003 to address the nuclear issue, and that process has been replete with periods of crisis, stalemate, and tentative progress toward denuclearization, until North Korea declared it would no longer take part in the talks in 2009. The UN Security Council also has sought to place pressure on North Korea regarding its proliferation activities, adopting sanctions in response to its 2006, 2009, 2013, and 2016 nuclear tests.²³⁸ North Korea is also taking steps to develop its ballistic missile systems, and currently deploys short and medium range ballistic missiles that experts and some officials in Seoul and Washington think could be capable of delivering nuclear warheads. In December 2012 and again in February 2016, North Korea successfully launched a satellite into space using an Unha-3 space launch vehicle. Pyongyang is prohibited from space launches by UN Security Council resolutions because the technology can be used to inform ballistic missile development. Given the many technical differences between the two types of systems, experts assess that North Korea remains years away from development of an ICBM, but could begin flight tests in as little as a year.²³⁹ In addition to its own nuclear weapons efforts, North Korea has been a key supplier of nuclear and missile technologies to other states, increasing proliferation threats in South and Southeast Asia and the Middle East. North Korea has maintained the lowest possible grade for this report. The situation in North Korea has only worsened since the last version of this report, evidenced by Pyongyang's continued missile development, nuclear weapons testing, and production of fissile material. **Overall Grade: F**



On March 2, 2016, the UN Security Council unanimously adopted resolution 2270, imposing additional sanctions on the Democratic People's Republic of Korea (DPRK) in response to that country's continued pursuit of a nuclear weapons and ballistic missile programme.

1. Banning Nuclear Testing: F

Pyongyang, an Annex 2 state, has not signed the CTBT and is the only country to have tested a nuclear weapon in the 21st century, conducting tests in June 2006, May 2009, February 2013, and January 2016. Pyongyang has left open the possibility that it will test additional nuclear devices in an effort to build on both the quantity and quality of its arsenal.²⁴⁰

North Korea has voted against an annual UN General Assembly resolution supporting the CTBT's entry into force for the past several years, including the most recent resolution in 2015.

In January 2015, North Korea proposed to temporarily halt nuclear testing in exchange for a pause in U.S.-South Korea joint naval exercises. It is unclear if North Korea's proposal was a serious effort to restart talks, but the United States rejected the offer, stating the nuclear issue and naval exercises were separate issues.

2013 grade: F

2010 grade: F

2. Ending Fissile Material Production for Weapons: F

Although North Korea voted to move forward with a CD agenda, including discussions on an FMCT, Pyongyang declared that it would restart plutonium production in response to UN condemnation of its

missile tests in April 2009.²⁴¹ In November of that year, North Korea announced that it was in the final stages of reprocessing 8,000 rods of plutonium it unloaded from its nuclear reactor in Yongbyon, enough for one or two additional nuclear weapons.²⁴²

In 2013, North Korea completed construction on a light-water reactor (LWR) that experts assess could be configured to produce weapons-grade plutonium.²⁴³ Satellite imagery indicates the reactor is operating intermittently, or doing so only at a very low level, as of April 2016.²⁴⁴

Additionally, North Korea is pursuing a uranium-enrichment program, but its status is unclear. In November 2010, North Korea gave permission for three U.S. scientists to visit its Yongbyon nuclear complex. Siegfried Hecker reported that there were 2,000 advanced centrifuges in two cascade halls in the complex, which appeared to be operational.²⁴⁵ Estimates on the amount of material produced and the uranium-enrichment level vary widely, and some experts believe the purpose of North Korea's third nuclear test in February 2013 may have been to test a uranium device, but a lack of evidence from the test makes it impossible to verify or disprove.²⁴⁶ Satellite imagery from January 2016 indicates that the enrichment plant is likely operating.²⁴⁷

North Korea is believed to be constructing an isotope separation facility since 2015 at Yongbyon. Hydrogen isotopes separated at such a facility could be used in hydrogen bombs, as North Korea claims

to have tested in 2016, or in boosted fission devices, which Pyongyang is more likely to have tested.

2013 grade: F

2010 grade: F

3. Reducing Nuclear Weapons Alert Levels: D-

North Korea claims that it has weaponized all of its plutonium and experts assess that North Korea can likely fit a warhead on a short or medium-range ballistic missile. The U.S. Defense Intelligence Agency and Department of Defense assess that North Korea may be capable of mating a nuclear warhead with a ballistic missile.²⁴⁸ It remains unclear in what status Pyongyang's nuclear devices are maintained or what procedures are in place to prevent unauthorized use.

A minus (-) is added to the grade because in March 2016, Pyongyang's leader Kim Jong Un called for the state's nuclear warheads to be "always on standby so as to be fired any moment."²⁴⁹ Rhetoric in Pyongyang's news media and propaganda have described the arsenal as capable of delivering a pre-emptive attack, specifically on the United States.

2013 grade: D

2010 grade: D

4. Nuclear Force Reduction: F

North Korea has repeatedly declared that it would continue to enhance its nuclear weapons capabilities.

In March 2015, Pyongyang's Foreign Minister stated to the CD that North Korea needed to "bolster its nuclear deterrent capability." After the January 2016 nuclear test, Pyongyang declared its intent to improve its arsenal in both quantity and quality.

The unveiling of a uranium-enrichment facility and the continued construction of the LWR at Yongbyon indicate that North Korea is likely pursuing options to produce more fissile material to expand its nuclear arsenal. In April 2013, Pyongyang announced it would restart its plutonium production reactor at Yongbyon. In September 2014, the IAEA issued a statement saying activity at the site observed through satellite imagery was consistent with the reactor being in operation. A February 2016 report indicates North Korea may be able to recover plutonium from the reactor in early 2016.²⁵⁰

Currently, experts estimate that Pyongyang has enough weapons-grade plutonium for an estimated 6-8 warheads and could have HEU for an additional 4-8 warheads. South Korean and U.S. intelligence officials, as well as experts, believe North Korea could deliver its nuclear warheads via the Nodong missile. Some experts assess that in a crisis situation, North Korea might be able to mount a warhead on

the longer-range Musudan or Taepodong-2 missiles, but without having tested a reentry vehicle or successfully tested either system, performance would be unreliable.²⁵¹ North Korea has not yet tested an ICBM. The two nuclear tests and satellite launches since then, however, likely increased Pyongyang's knowledge and technical capacity for nuclear and ballistic missile development. In 2012, Pyongyang displayed an ICBM mockup for the first time during a military parade. It displayed the missile, known as the KN-08, again in 2013 and most recently in October 2015. In April 2015, a U.S. defense official stated that the United States assessed Pyongyang as being able to launch a KN-08 armed with a miniaturized nuclear device, but acknowledged that North Korea has not yet tested the missile. However, there is ongoing debate in the expert community on the KN-08 and miniaturization progress.²⁵²

Pyongyang is pursuing an SLBM capability. It conducted two ejection tests and one test launch of a sub-based missile known as the KN-11 in 2015.²⁵³ Another test was conducted in 2016, where the missile ejected from the submarine and traveled 30 kilometers.

2013 grade: D

2010 grade: F

5. Negative Security Assurances: F

Although North Korea generally refers to its nuclear weapons capabilities as a deterrent, in the past it has threatened to use nuclear weapons against perceived threats, including against the United States and South Korea, a non-nuclear-weapon state.²⁵⁴ These threats were often made in response to annual U.S.-South Korean joint military exercises.

In January 2016, after its fourth nuclear test, Pyongyang declared its policy of no-first-use under the condition that hostile forces do not encroach on its sovereignty.²⁵⁵

2013 grade: F

2010 grade: F

6. Nuclear-Weapon-Free Zones: F

In 1992, Pyongyang and Seoul issued the Joint Declaration on the Denuclearization of the Korean Peninsula, declaring that neither state would test, manufacture, possess, or use nuclear weapons, establishing in essence an NWFZ on the peninsula.²⁵⁶ The declaration also stated that both countries would use nuclear power solely for peaceful purposes and would not possess nuclear reprocessing and uranium-enrichment facilities. Pyongyang has since maintained or developed reprocessing and enrichment capabilities and nuclear weapons and remains in violation of that agreement. In January

2013, Pyongyang formally announced that it was nullifying the Joint Declaration, and later that year modified its constitution to reflect North Korea's status as a nuclear-armed state.²⁵⁷ The 2013 North Korean Constitution defines Pyongyang as a nuclear state. North Korea has occasionally supported UN General Assembly resolutions on various NWFZs in other regions.²⁵⁸

2013 grade: F

2010 grade: F

7. IAEA Safeguards: F

North Korea has not had comprehensive IAEA safeguards in place since 1994, when it withdrew from agency membership after failing to cooperate with a special inspection.²⁵⁹ The IAEA maintains that North Korea is still bound by its safeguards agreement despite North Korea's insistence that it withdrew from the NPT and is no longer required to have a safeguards agreement in place. Agency inspectors were briefly allowed to monitor the shutdown of North Korea's key nuclear facilities during two separate denuclearization agreements, but were ejected when negotiations collapsed.²⁶⁰ The IAEA has not had inspectors on the ground in North Korea since 2009, but the agency continues to monitor developments in North Korea's nuclear program and submits reports to the agency's Board of Governors.

2013 grade: F

2010 grade: F

8. Nuclear Weapons-Related Export Controls: F

North Korea is not a member of the NSG or MTCR and is considered one of the most active proliferators of nuclear and missile technology. The U.S. intelligence community assesses that North Korea has provided extensive nuclear assistance to Syria and continues to export ballistic missiles and associated materials to several countries, including Iran and Pakistan.²⁶¹ The UN committee that monitors the implementation of sanctions on North Korea issues annual reports detailing incidents of noncompliance with UN sanctions. The 2012 report noted that North Korea maintains extensive networks that allow it to procure illicit materials for its nuclear and ballistic missile programs.²⁶² The reports issued in 2013 through 2015 highlighted shortcomings in implementation of UNSC resolutions and recommended additional sanctions on individuals and entities. In 2015 the Panel reported "widespread evidence of resilience and adaptation" in North Korea's continued proliferation activities and circumvention of UN sanctions.²⁶³

North Korea has not submitted a report to the 1540 Committee and is currently facing sanctions resulting from its nuclear tests. In 2013 the UN Security Council unanimously adopted Resolution 2087 on January 22, 2013, in response to the December satellite launch and Resolution 2094 on March 7, 2013 in response to the third nuclear test conducted by North Korea the previous month. These resolutions strengthened existing sanctions, which includes an arms embargo, inspections of cargo ships for banned materials, and a ban on the import of dual-use technologies and materials.²⁶⁴ They also instituted financial sanctions, including limits on bulk cash transfers, and increased the authority of states to stop vessels containing North Korean cargo believed to contain illicit materials.²⁶⁵

On March 2, 2016, the Security Council adopted Resolution 2270 in response to the January 2016 nuclear test and the February 2016 satellite launch using ballistic missile technology. Amongst other measures, the resolution further restricts North Korean banking activities abroad and requires all member states to inspect cargo traveling to or from North Korea.

2013 grade: F

2010 grade: F

9. Nuclear Security Commitments: D

North Korea is not known to have adopted any nuclear material security measures consistent with Resolution 1540 or the CPPNM and its 2005 amendment. It is not a participant in any international nuclear security initiatives.

2013 grade: D

2010 grade: D

10. Criminalization and Illicit Trafficking Commitments: D

North Korea is a key nuclear trafficking concern and is not known to have enacted any measures to address the issue.

North Korea continues to provide missile equipment and assistance to Syria, and may continue to provide certain materials to Iran for its short range ballistic missile production.²⁶⁶ North Korea assisted Syria in constructing a nuclear reactor, which was ultimately destroyed by an Israeli airstrike in 2007.

In July 2013, a North Korean ship interdicted in Panama was found to be carrying undeclared small arms and light weapons as well as two Soviet-designed fighter jets. The import or export of these weapons by North Korea is banned under Security Council resolutions.

2013 grade: F

2010 grade: D

Iran

Iran's nuclear program was a critical nonproliferation concern, given that Tehran took steps to illicitly pursue uranium enrichment capabilities outside of its declaration to the IAEA, continued to expand its nuclear activities, and conducted work relevant to designing a nuclear weapon. Much of the concern about Tehran's nuclear activities in the near-term abated when Iran and six countries reached a nuclear deal in July 2015 known as the Joint Comprehensive Plan of Action. Under the nuclear deal, which was implemented in January 2016, Iran's uranium enrichment capacity is restricted to reactor grade levels and its stockpile is capped. Tehran also cannot reprocess any plutonium for at least 15 years. The country's entire nuclear infrastructure is subject to intrusive monitoring and verification, including real-time monitoring on centrifuge enrichment levels and continuous surveillance at key sites. As part of the deal, Iran is implementing its additional protocol and its import and export of dual-use materials is monitored. Iran also complied with the IAEA's request for access and information to resolve the outstanding concerns about Tehran's past weaponization activities and committed to forgo certain types of experiments relevant to designing nuclear explosives. In return, Iran received relief from nuclear-related UN, EU, and U.S. sanctions. While the deal dramatically restricts Iran's nuclear program, skepticism about Iran's intentions to comply with the deal remain. As a result of the deal, Iran's grade on safeguards dramatically improved. That contributed to Iran improving the most overall since the 2013 report. **Overall Grade: C**

1. Banning Nuclear Testing: B+

As an Annex 2 state, Iran's ratification is required for the CTBT's entry into force. Tehran signed the treaty in 1996, but has yet to ratify it. Iran voted for a UN Resolution in 2015 that supported the CTBT and called for states that have yet to ratify the treaty to do so. In a February 2016 interview with PressTV, head of the Atomic Energy Organization of Iran, Ali Akbar

Salehi, said it is up to the Iranian parliament to take action toward ratification, and it remains unclear if the parliament will make CTBT ratification a priority.

Prior to the July 2015 nuclear deal, Iran's commitment to the CTBT had been called into question due to evidence of Iranian activities related to illicit nuclear weapons development, including testing explosive components that could be used for



U.S. Secretary of State John Kerry (second from right) talks to US Secretary of Energy Ernest Moniz (right) as Iranian Foreign Minister Mohammad Javad Zarif (background, second from left) sits next to European Union High Representative for Foreign Affairs and Security Policy Federica Mogherini (background, left) at the United Nations building in Vienna, Austria on July 14, 2015.

nuclear warhead design. While these activities do not violate the CTBT, it is reasonable to assume that if Iran pursued nuclear weapons, it would test at least one device. Under the July 2015 nuclear deal, Tehran is prohibited from testing or developing explosives relevant to nuclear weapons design.

Iran's recent statements on the treaty do not reflect Tehran's initial criticism of the CTBT. After signing in 1996, Iran issued a number of declarations criticizing certain aspects of it, in particular Israel's inclusion in the Middle East and South Asian (MESA) regional grouping.²⁶⁷ Tehran said that this inclusion "will impede" treaty implementation, "as the confrontation of the States in this regional group would make it tremendously difficult for the Executive Council to form."²⁶⁸

Although Iran has generally participated in the CTBT's biennial entry-into-force conferences and expressed support for the treaty, its statements to the conference have not indicated any steps taken by Tehran to ratify it. Rather, Iran has stated that the nuclear-weapon states bear "the main responsibility" for the treaty's entry into force and insisted that Annex 2 states that are non-NPT parties must accede to that treaty in order to make progress on the CTBT.²⁶⁹

2013 grade: B-
2010 grade: B-

2. Ending Fissile Material Production for Weapons: N/A

Under the 2015 nuclear deal, Iran can only enrich uranium to reactor grades (3.67 percent uranium-235) for 15 years and can only store up to 300 kilograms of uranium gas enriched to that level. Iran is also converting its heavy water reactor at Arak. The initial design was well-suited for the production of approximately two bombs worth of weapons-grade plutonium per year. The redesigned reactor will produce a fraction of what is necessary for one bomb and the spent fuel will be shipped out. Iran committed not to reprocess any plutonium for 15 years and stated its intention to never do so.

2013 grade: N/A

2010 grade: N/A

3. Reducing Nuclear Weapons Alert Levels: N/A

2013 grade: N/A

2010 grade: N/A

4. Nuclear Force Reductions: N/A

2013 grade: N/A

2010 grade: N/A

5. Negative Security Assurances: N/A

2013 grade: N/A

2010 grade: N/A

6. Nuclear-Weapon-Free Zones: C

Iran, under the shah, was the first country to propose the creation of an NWFZ in the Middle East. Since that initial proposal in 1974, a Middle East zone has been a key international nonproliferation goal.²⁷⁰ Tehran has continued to call for the establishment of such a zone and has supported the adoption of the relevant resolutions in the UN General Assembly. Most recently, in 2015, it supported the resolutions for both a NWFZ and a MEWMDFZ. It has also supported resolutions pertaining to NWFZs in other regions.

Iran has expressed support for the process laid out in the 2010 NPT Review Conference Final Document calling for a conference to work toward establishing a WMD-free zone. Iran committed to attend the first conference in December 2012, before it was canceled over disagreements between the participants on the agenda. Some analysts question whether Iran seriously intended to attend the conference.²⁷¹

Iran also participated in the first consultation convened by Finnish diplomat Jaakko Laajava in late 2013. Iran did not participate in the subsequent four consultation meetings in Glion, Switzerland, due to its intensive negotiations with six countries on its nuclear program. Laajava briefed Tehran on the proceedings after each meeting. Resolution of the IAEA's investigation into the past possible military dimensions of Iran's nuclear program also paves the way for greater Iranian participation in the zone process.

2013 grade: C

2010 grade: C-

7. IAEA Safeguards: A-

In December 2015, the IAEA issued a report assessing Iran's past work related to nuclear weapons development, the so-called possible military dimensions of Iran's nuclear program and declared that the agency had no more outstanding concerns. The report came after an intensive five-month process to conclude the IAEA's investigation after Tehran and the agency agreed on a set of activities in July 2015.

The December 2015 report brought to a close over a decade of unresolved issues between Iran and the IAEA. The IAEA Board of Governors first adopted a resolution in September 2005 that found that Iran's undeclared nuclear activities prior to 2003 constituted noncompliance with its safeguards obligations.²⁷² In November 2011, the IAEA laid out these suspicions in

an annex to its quarterly report to the IAEA Board of Governors. They included evidence and intelligence that pointed to nuclear weapons development, such as high-explosives testing and computer simulations of re-entry vehicles for warheads.

In addition to resolving IAEA's outstanding concerns about Iran's nuclear program, Tehran took steps in January 2016 to provisionally apply its additional protocol and modified Code 3.1 to its safeguards agreement. Iran voluntarily implemented an additional protocol in December 2003, but halted this cooperation in February 2006 after the IAEA referred Iran to the UN Security Council for failure to comply with the agency's requests for information and access. Iran unilaterally decided to stop implementing Code 3.1 in 2006.

Since Iran's additional protocol is still being implemented on a voluntary basis as part of the nuclear deal and not a permanent ratified document, Iran is given a minus (-) grade. Iran will seek ratification of the additional protocol within eight years, and has also undertaken monitoring and verification mechanisms beyond what is required under its comprehensive safeguards agreement and its additional protocol.

2013 grade: F

2010 grade: F

8. Nuclear Weapons-Related Export Controls: F

Prior to reaching the July 2015 nuclear deal, Iran was one of the key targets for controls over the transfer of nuclear and missile-related materials and technology due to widespread concerns over its nuclear and ballistic missile programs. Iran was subject to strict UN, EU, and U.S. sanctions designed to stem the advancement of its nuclear and ballistic missile programs.

Despite these sanctions, Iran continued to expand its nuclear and missile activities, relying on illicit procurement for some dual-use materials, shipping missiles and missile-related technologies to state and non-state actors in the region. In February 2015, Iranian military commanders publically commented that missile technologies were transferred to Hamas and Hezbollah. In January 2016, the U.S. Department of Treasury noted that Iranian technicians had traveled to North Korea "within the past several years" to work on a North Korean rocket booster.²⁷³

A 2016 report by the U.S. Director of National Intelligence concluded that Iran still depended on foreign suppliers for key missile-related components. Director of National Intelligence James Clapper testified on Feb. 9, 2016, that recently there has "not been a great deal of interchange," on ballistic missile technologies between Iran and North Korea.



IAEA Director General Yukiya Amano meets Seyyed Abbas Araghchi, Deputy Minister for Legal and International Affairs of the Ministry of Foreign Affairs of Iran at the IAEA Headquarters in Vienna on November 24, 2015.

The UN Security Council established international controls in resolutions between 2006-2010 by adopting a series of resolutions requiring that all states prohibit the transfer of nearly all items on the NSG Trigger List and Dual Use List, as well as items contained in the MTCR Guidelines, to and from Iran.²⁷⁴ While these resolutions were replaced, missile technology controls remain in place under Resolution 2231 (July 2015).

Under the July 2015 nuclear deal, Iran's procurement of dual-use technologies on the trigger lists are subject to approval by a working group that is part of the body overseeing the deal. That procurement channel, which began in January 2016, will stay in place for 10 years. In addition to approving the purchase of any dual-use materials, the procurement working group can also conduct end-user checks to ensure that the items and technologies remain with the approved purchaser.

Despite this procurement channel, given the evidence that Tehran likely still depends on foreign suppliers for materials for its ballistic missile program and has transferred ballistic missile technology to Syria, Iran still fails this criteria.

Iran has not submitted any reports on its implementation of nuclear-weapons related sanctions on North Korea, pursuant to three UN Security Council Resolutions.

2013 grade: F

2010 grade: F

9. Nuclear Security Commitments: D

According to a 2006 report to the 1540 Committee, the Atomic Energy Organization of Iran (AEOI) established draft regulations based on the CPPNM regarding the physical protection of installations

and materials, but its status is unclear.²⁷⁵ Iran has not updated its national reporting to the 1540 Committee since 2006, nor has it taken action to ratify the CPPNM or its 2005 amendment.

Iran's AEOI acts as a nuclear regulatory authority that addresses physical protection and the licensing of facilities and entities.²⁷⁶ Tehran has not notified the agency of its intent to implement the Code of Conduct.

Part of the nuclear deal between Iran and the P5+1 calls for cooperation to enhance the safety and security of Iran's nuclear facilities. This includes opening a Nuclear Safety Centre, taking steps to prevent sabotage, and conducting workshops and trainings for personnel on nuclear safety and security issues. While some countries have indicated an interest in working with Iran on these areas, at the time of writing, these projects are not yet underway.

2013 grade: D+

2010 grade: D+

10. Criminalization and Illicit Trafficking Commitments: C

Iran participates in the ITDB. It does not participate in multilateral initiatives, including PSI, GICNT, or the Global Partnership. It has neither signed, nor ratified, the Nuclear Terrorism Convention.

Prior to reaching the nuclear deal restricting its activities in July 2015, Iran circumvented international sanctions and engaged in illicit trafficking to obtain materials and technologies for its nuclear and missile programs. Its procurement of these materials will be monitored by a commission beginning in January 2016.

2013 grade: C

2010 grade: C

Syria

Concerns about Syrian nuclear aspirations became particularly acute in 2007 when Israel destroyed a facility widely suspected of housing a nuclear reactor constructed with North Korean assistance. Although countries with knowledge of the facility refused to disclose any details for eight months following the attack, in April 2008, U.S. intelligence agencies publicly shared their assessment that the suspected reactor was part of a Syrian nuclear weapons program. The IAEA has pursued an investigation into the possible reactor site, as well as potential related nuclear activities since that time, but Damascus has refused to fully cooperate with the investigation. The violent conflict that erupted in Syria in March 2011 has further prevented any resolution or complete investigation of Syria's illicit nuclear activities, so the extent of any nuclear weapons program is still unknown. While the Assad regime does not control all of Syria's territory, the assessment in this report is based on the policies of the Assad government. Due in part to governing paralysis stemming from the the protracted conflict, Syria's grade has not changed since the 2013 version of this report. **Overall Grade: D-**

1. Banning Nuclear Testing: **C**

Syria has yet to sign or ratify the CTBT. Its ratification is not required for the treaty's entry into force.

Syria abstained from a UN Resolution in 2015 that supported the CTBT and called for states that have yet to ratify the treaty to do so.

2013 grade: C

2010 grade: C

2. Ending Fissile Material Production for Weapons: **N/A**

Syria is suspected of having worked on a nuclear reactor, with assistance from North Korea, that intelligence services and experts believe was intended to produce plutonium for nuclear warheads. However,

the site was bombed by Israel in September 2007 prior to the reactor's completion. There is no indication that construction resumed at the site.

2013 grade: N/A

2010 grade: N/A

3. Reducing Nuclear Weapons Alert Levels: **N/A**

2013 grade: N/A

2010 grade: N/A

4. Nuclear Force Reductions: **N/A**

2013 grade: N/A

2010 grade: N/A



Danish ship Ark Futura arrives in the port of Gioia Tauro, southern Italy, on July 2, 2014, for the transfer of chemical weapons from Syria to be destroyed.

5. Negative Security Assurances: **N/A**

2013 grade: N/A

2010 grade: N/A

6. Nuclear-Weapon-Free Zones: **C**

Syria has declared its support for the establishment of an WMD-free zone in the Middle East and consistently supports UN resolutions and NPT actions on establishing a zone dating back to 1995. However, given the suspicion that Syria considered a covert nuclear weapons program and used chemical weapons on multiple occasions over the past several years, even after formally giving up its stockpile in 2014, its commitment is questionable.

Syria, as part of the Arab League, participated in consultations led by Finnish diplomat Jaako Laajava on establishing an agenda for the WMD-free zone in the Middle East in 2013-2014. Syria has supported UN General Assembly resolutions, most recently in 2015, supporting the establishment of NWFZs in the Middle East, Africa and Southeast Asia. Syria has also supported past resolutions endorsing zones in Central Asia.

2013 grade: C

2010 grade: C

7. IAEA Safeguards: **F**

Syria concluded a comprehensive nuclear safeguards agreement with the IAEA in 1992, but was found in noncompliance with its safeguards obligations by the IAEA Board of Governors in June 2011.²⁷⁷ Since June 2008, Syria has failed to cooperate with an ongoing IAEA probe into suspected undeclared nuclear activities. This included the construction of a reactor at Dair al Zour, a site which was bombed in September 2007 by Israel.

In the IAEA's May 2011 report on Syria to the agency's Board of Governors, the IAEA concluded that it was very likely that the Dair al Zour site was a nuclear reactor that should have been declared to the IAEA, but was unable to confirm the nature of three additional sites of concern. Information made available to the IAEA indicated that North Korea was involved in the reactor's construction. The U.S. intelligence community assessed that the reactor "would have been capable of producing plutonium for nuclear weapons."²⁷⁸ Syria maintains that Dair al Zour was a non-nuclear installation at a military site.

In October 2011 meetings with the IAEA, Syria put forward a proposal for access to Dair al Zour, which the agency rejected as unacceptable, in part because it did not deal with the three additional sites

of concern. In February 2012, Syria said it would respond to the IAEA request to visit all facilities, but as of the August 2014 IAEA report, no response from Syria has been noted.²⁷⁹

In February and May 2014, the Syrian regime invited the IAEA to perform a physical inventory verification at its miniature source neutron reactor in Damascus. The reactor contains less than one kilogram of HEU. The IAEA, however, maintains that it is not in a position to send inspectors into Syria, given the security situation. The IAEA noted in its 2014 report that it continues to monitor locations of safeguards relevance using satellite imagery.

2013 grade: F

2010 grade: F

8. Nuclear Weapons-Related Export Controls: F

Damascus is believed to import materials and technology for its ballistic missile program from Iran and North Korea in violation of UN sanctions.²⁸⁰ In a 2012 unclassified report to Congress, the U.S. intelligence community stated that Syria has “growing domestic capabilities” to produce ballistic missiles but “remains dependent on foreign suppliers such as North Korea and Iran for some key ballistic missile technology.”²⁸¹

Defense Intelligence Agency Director Michael Flynn testified on April 18, 2013, that Syria’s ballistic missile program “depends on essential foreign equipment and assistance, primarily from North Korean entities.”²⁸² Syria has not submitted any reports on its implementation of nuclear-weapons related sanctions on North Korea, pursuant to three UN Security Council Resolutions.

2013 grade: F

2010 grade: F

9. Nuclear Security Commitments: D+

Syria has not signed the CPPNM or its 2005 Amendment. Syria requested in 2015 that the IAEA assist in converting its research reactor to run on LEU fuel and remove the HEU (less than one kilogram) from the reactor. The reactor, located in Damascus, is a miniature source neutron reactor supplied by China. The IAEA deemed that it is too dangerous at this time to look into the possibility of conversion. China is also working on developing the technical means to convert reactor types like the one in Damascus.



Alexander Klein/AFP/Getty Images

Syria’s Ambassador to the International Atomic Energy Agency (IAEA) Bassam al-Sabbagh speaks to the media as he attends the Board of Governors’ meeting at the UN atomic agency headquarters in Vienna on September 10, 2013.

Syria has taken some limited steps to implement nuclear security measures domestically, including agreeing to implement the IAEA Code of Conduct.²⁸³

2013 grade: D+

2010 grade: D+

10. Criminalization and Illicit Trafficking Commitments: F

Syria does not participate in any arrangements on preventing nuclear terrorism and illicit trafficking. Experts widely believe that the Syrian regime has transferred Scud missiles and other armaments across the border with Lebanon to Hezbollah and has received WMD-related materials and technologies in contravention of international law.²⁸⁴

Syria signed the Nuclear Terrorism Convention in September 2005, but has yet to ratify the treaty. It does not participate in any multilateral regimes, such as PSI, the GICNT, or the Global Partnership.

2013 grade: F

2010 grade: D+

Additional States

Beyond the 11 states specifically addressed in this report, a number of other states or groups of states have taken actions or positions of significance to the 10 standards. This section highlights some of the areas where such states have made a significant impact on the standards examined in this report or are poised to do so.

Banning Nuclear Testing

Eight of the 44 Annex 2 states, whose ratification is required for the entry into force of the CTBT, have yet to ratify the treaty. All of the eight Annex 2 states except Egypt are assessed in this report. Egypt has signed but not ratified the treaty. Egypt has taken no discernable steps on the treaty since the 2013 version of this report.

Since the 2013 report, additional states have ratified the CTBT, including Guinea Bissau and Iraq in 2013, Niue and the Congo Republic in 2014, and Angola in 2015.

Fissile Material Removals

While little progress has been made on banning the production of fissile material, a number of nations have eliminated stockpiles of weapons-usable materials since the last version of this report was published in 2013. That includes Czech Republic, Vietnam, and Hungary in 2013, Uzbekistan and Jamaica in 2015, and Switzerland and Argentina in 2016.²⁸⁵

Indonesia and Poland are also on schedule to eliminate their remaining stockpiles of weapons-usable nuclear materials in 2016.²⁸⁶

Japan

Japan is the only state that does not possess nuclear weapons that reprocesses plutonium. Tokyo's stockpile of reprocessed plutonium has grown since the last version of this report and serious questions have arisen regarding Japan's reprocessing activities. In 2013, Japan had 44 metric tons of separated plutonium, the majority of which was stored overseas. In 2015, the stockpile grew to nearly 48 metric tons.²⁸⁷

Japan intends to restart its commercial reprocessing plant, Rokkasho, in 2018. At that point, Japan will produce another eight metric tons of separated plutonium on a yearly basis.

Japan has taken some steps to reduce its stores of fissile materials. In March 2016, Japan shipped over 300 kilograms of plutonium and several hundred kilograms of HEU to the United States for disposition. At the fourth Nuclear Security Summit, in April 2016, Japan and the United States announced a joint plan for the United States to assist in disposing of all fissile material, including HEU and plutonium, from one site in Japan, the Fast Critical Assembly.²⁸⁸

Kazakhstan

In August 2015, the IAEA and Kazakhstan signed an agreement to establish an IAEA-run LEU fuel bank in Oskemen. The purpose of the fuel bank is to discourage member states from indigenously producing fissile material by "provid[ing] Member States with additional confidence in their ability to obtain nuclear fuel in an assured and predictable manner."²⁸⁹ The LEU at the facility will be subject to IAEA safeguards.

Nuclear Force Reductions

P5 Process

The 2010 NPT Review Conference Final Document called for the five recognized nuclear-weapon states to meet on an annual basis. At the London meeting in 2015, the states reaffirmed their commitment to a step-by-step approach to nuclear disarmament. The meetings that include ongoing expert working group discussions are producing initial results, including

greater transparency and better mutual understanding of how each member thinks about nuclear weapons. One of the products has included a glossary of terms, which provides common definitions for key terms. While the P5 process has made some progress, the nuclear weapon states have been criticized for not offering more concrete actions and a vision for the disarmament.²⁹⁰

Humanitarian Impact Conferences

In March 2013, over 100 countries met in Oslo, Norway for the first Conference on the Humanitarian Impact of Nuclear Weapons. The first in a series of three, the conferences focused on the humanitarian risks associated with the use of nuclear weapons. The countries met again in Nayarit, Mexico in February 2014 and for a third time in Vienna, Austria in December 2014.

The Vienna meeting expanded the agenda to include the risk of nuclear weapons use, the application of international law to the consequences of nuclear weapons explosions, and the shortfalls in international capacity to address a humanitarian emergency caused by the use of nuclear weapons. The United States and the United Kingdom were the only recognized nuclear weapons states to attend any of the conferences. Both governments attended the Vienna conference.

In Vienna, Austria called on all NPT members “to identify and pursue effective measures to fill the legal gap for the prohibition and elimination of nuclear weapons” and promised “to cooperate with all stakeholders to achieve this goal.”²⁹¹

Unlike the conference in Mexico, the Austria conference did not call for the negotiation of a treaty banning nuclear weapons, which some participating states favor. It is unclear if there will be a fourth conference and, if so, whether participating states will push for the negotiation of a ban treaty.

Open-Ended Working Group

UN member states voted in November 2015 to create a working group to advance nuclear disarmament. A similar proposal was part of the 2015 NPT Review Conference Final Document, which was not adopted. The UN resolution, offered by Mexico, called for creating a forum in which all UN members can participate, to “substantively address concrete effective legal measures, legal provisions and norms” necessary to “attain and maintain a world without nuclear weapons.”²⁹² The five recognized nuclear weapon states all opposed the creation of the working group.

The working group also would “substantively address recommendations on other measures that could contribute to taking forward multilateral nuclear disarmament negotiations.”²⁹³ Specifically, the



Samuel Kubani/AFP/Getty Images

The UN High Representative for Disarmament Affairs Angela Kane speaks at the international conference on the humanitarian impact of nuclear weapons, on December 8, 2014, in Vienna.

resolution cited transparency and threat reduction measures related to the risks associated with existing arsenals and additional measures to increase awareness about the humanitarian and societal consequences of nuclear weapons use. The latter issue has been the focus of an effort known as the humanitarian initiative.

The resolution says the group should convene in Geneva in 2016 for up to 15 days and present a report on its work to the General Assembly at its session next year.

Nuclear-Weapon-Free Zones

Central Asian NWFZ

Of the five NWFZs that have entered into force (Africa, Central Asia, Latin America and the Caribbean, Southeast Asia, and South Pacific), the Latin America and the Caribbean zone protocol remains the only one that has been ratified by all five recognized nuclear-weapon states.

During the timeframe of this report, four of the five nuclear-weapon states have signed and ratified the protocol to the Central Asian NWFZ, which

entered into force in 2009 with five states-parties: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. The United States signed the protocol in May 2014, but has yet to complete ratification.

In April 2012, ASEAN announced that the five nuclear-weapon states would sign the protocol for the Southeast Asian NWFZ during a July 2012 ASEAN meeting after having concluded negotiations to address the concerns of the five nuclear-weapon states. The signing, however, did not take place due to ASEAN's concerns over the five countries attaching declarations to the protocols. None of the five nuclear-weapons states have signed the protocols for the Southeast Asian NWFZ treaty as of April 2016.

South Pacific Nuclear Weapons Free Zone

In November 2015, Prime Ministers Narendra Modi of India and Malcolm Turnbull of Australia announced the completion of attunements to implement the India Australia Civil Nuclear Agreement which will allow Australian uranium to be exported for use in Indian power reactors.²⁹⁴ The deal was signed in 2014. Australian Prime Minister Julia Gillard proposed and narrowly won Australian Labor Party support to overturn its longstanding policy not to sell uranium ore to India in 2011. The arrangement appears to be at odds with Australia's past political and treaty commitments.

Under the South Pacific NWFZ treaty, Australia committed not to provide any "source or special fissionable material or equipment" to any non-nuclear-weapon state unless subject to the safeguards required by Article III.1 of the NPT. India is considered a non-nuclear-weapon state under the NPT. In 1996, Australian Foreign Minister Alexander Downer told the Australian parliament that the South Pacific NWFZ treaty bans Australian uranium exports to non-NPT states like India that do not allow full-scope safeguards.²⁹⁵

Middle East Weapons of Mass Destruction-Free Zone

Proposals for an NWFZ in the Middle East have been issued since the 1970s, and since that time, the UN General Assembly has adopted annual resolutions by consensus in support of that goal. As part of the package of decisions to extend the NPT indefinitely in 1995, the states-parties agreed on the Resolution on the Middle East, which calls for the establishment of a WMD-free zone in the region. During the 2010 NPT Review Conference, states-parties agreed on a consensus final document that included several practical steps toward implementing the 1995 resolution. Key among those steps is a call to convene a regional conference to discuss the matter in 2012. That conference was originally postponed, but a series of five consultations were held between October 2013 and June 2014.²⁹⁶ Israel, the Arab League and Iran

all attended the first consultation and all but Iran continued to attend the meetings.

The 2015 NPT review conference failed to produce a final document after the United States, the United Kingdom, and Canada blocked consensus. The failure to produce a consensus ended the mandate of the Finnish facilitator for the zone process, Jaako Laajava. There have been no steps toward a zone as part of the NPT process since the 2015 Review Conference.

IAEA Safeguards

Article III of the NPT requires states to adopt comprehensive safeguards with the IAEA irrespective of the presence of nuclear material and facilities. As of April 2016, the following 10 states have not fulfilled this basic requirement of the treaty:

Signed but Not Ratified a Safeguards Agreement	Has Not Signed a Safeguards Agreement
Benin, Cape Verde, Federated States of Micronesia, Guinea, Timor-Leste	Equatorial Guinea, Eritrea, Liberia, Sao Tome and Principe, Somalia

An additional protocol entered into force for six states during the time period of this report, bringing the total number of states with an additional protocol in force to 126. These six states were Antigua and Barbuda, Bosnia and Herzegovina, Cambodia, Djibouti, Liechtenstein, and St. Kitts and Nevis. An additional protocol is not required by the NPT.

Nuclear Security Commitments

Nuclear Security Summit

The United States convened the first nuclear security summit in April 2010 to agree on steps to secure fissile materials over the course of four years and prevent nuclear terrorism. The summit was chaired by President Barack Obama and attended by 47 national delegations and representatives of major international organizations.²⁹⁷ A second summit was held in Seoul, South Korea in 2012 with 53 participating countries, a third in 2014 in The Hague, Netherlands, and a final summit in 2016 in Washington, D.C. Russia chose not to attend the final summit.

In total, the summit process resulted in over 260 specific-state actions to strengthen nuclear security, minimize and eliminate materials, and enhance cooperation on nuclear smuggling. Over the course of the summit process, more than one dozen countries eliminated their stockpiles of materials. Some of the recent eliminations are discussed above.

Countries also collaborated on more than two



Eskinder Debebe/UN

World leaders gather on April 1, 2016, for the opening session of the 2016 Nuclear Security Summit hosted by the United States in Washington, D.C.

dozen multilateral commitments, known as joint statement or “gift baskets.” These covered a variety of key topics, including collaboration on alternative LEU fuels for research reactors, enhancing security for materials in transport, and cooperating on nuclear forensics.

A key accomplishment of the nuclear security summits was a joint statement offered at the 2014 summit, the Strengthening Nuclear Security Implementation initiative. This joint statement aims to promote nuclear security by requiring subscribing states to meet the intent of the recommendations in the IAEA nuclear security series publications as well as the code of conduct in domestic laws or regulations. There were 35 original subscribing states when the initiative was formalized and published by the IAEA as INFCIRC/869 in October 2014.²⁹⁸

The summits also spurred progress on a critical nuclear security treaty, the amended CPPNM, which entered into force since the last version of this report was published in 2013. The CPPNM 2005 Amendment extends the Treaty’s original obligations to secure materials in international transport to include physical protection requirements for domestic use, storage, and transit. All of the

summits reaffirmed the importance of this treaty and encouraged states to take action to complete ratification of the 2005 amendment.

After missing a 2014 goal for entry into force that was set at the 2012 Nuclear Security Summit, the 2005 amendment to the CPPNM received the requisite ratifications from two-thirds (102 states) of the original state parties on April 8, 2016. A significant number of ratifications were achieved in the lead up to the fourth Nuclear Security Summit, which was held in Washington, D.C. March 31-April 1, 2016. As of April 8, 2016, 102 countries had ratified the amendment. The CPPNM 2005 Amendment entered into force on May 8, 2016.

Criminalization and Illicit Trafficking

Three states have joined the Proliferation Security Initiative since the last version of this report, bringing the total to 105 states. Malaysia and Vietnam endorsed the PSI in April and May 2014, respectively. In July 2015, Trinidad and Tobago announced that it has endorsed PSI.

The GICNT has grown from 85 participating states in 2013 to 86 in 2016.

NOTES

1. The 1963 Partial Test-Ban Treaty, which forbids testing in the atmosphere, underwater, and in outer space, established the norm of underground nuclear testing. Even countries not party to the treaty that have tested nuclear weapons (China, France, and North Korea) reverted at some point to doing so only underground.
2. China, Egypt, Iran, Israel, and the United States have signed, but not ratified, the treaty. India, North Korea, and Pakistan have not signed the treaty.
3. 2000 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, "Final Document," NPT/CONF.2000/28 (Parts I and II), 2000.
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6. In December 2008, the UN General Assembly adopted a resolution entitled "Decreasing the Operational Readiness of Nuclear Weapons Systems," which called for further steps to reduce nuclear weapons readiness levels "with a view to ensuring that all nuclear weapons are removed" from high-alert status. The measure was adopted by a vote of 141-3 (France, the United Kingdom, and the United States) with 34 abstentions. UN General Assembly, A/RES/63/41, January 12, 2009.
7. In accordance with Article X of the nuclear Nonproliferation Treaty (NPT), which calls for a conference to decide on the indefinite extension of the treaty 25 years after its entry into force, states-parties held a review and extension conference in 1995. The result was a package of decisions that included the treaty's indefinite extension, a series of principles and objectives guiding the further implementation of the NPT, and a Resolution on the Middle East calling for a weapons of mass destruction-free zone in the region.
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11. The International Atomic Energy Agency (IAEA) General Conference is an annual meeting of IAEA member states and the agency's "highest policymaking body."
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The Arms Control Association, founded in 1971, is a national nonpartisan membership organization dedicated to promoting public understanding and support for effective policies to address the threats posed by the world's most dangerous weapons. Through its research, public education, and media outreach programs, including the monthly journal, *Arms Control Today*, the Arms Control Association provides policymakers, the press and the interested public with authoritative information, analysis and commentary on arms control proposals, negotiations and agreements, and related national security issues.

The nuclear Nonproliferation Treaty defines many core obligations and goals for what constitutes mainstream nuclear non-proliferation and disarmament behaviour. State responsibilities regarding non-proliferation and disarmament are also defined by additional agreements, UN Security Council resolutions, shared norms, and binding legal commitments.

The Arms Control Association has identified 10 internationally recognized standards for nuclear non-proliferation, disarmament, and nuclear security. Each of these standards plays an important role in addressing the complex nature of the threat posed by nuclear weapons. Since 2010, the Arms Control Association has tracked state adherence to these standards.

The 2013-2016 update of this report, *Assessing Progress on Nuclear Nonproliferation and Disarmament*, grades the performance of the recognized nuclear-weapon states, China, France, Russia, the United Kingdom, and the United States, the states outside of the nuclear non-proliferation treaty that have developed nuclear weapons, India, Israel, and Pakistan, as well as states of concern, North Korea for its expanding nuclear arsenal, and Iran, and Syria for conducting covert nuclear weapons activities in the past.

Overall, the third edition of this report finds that while limited progress has been made on non-proliferation and nuclear security objectives, the moribund pace of disarmament does not meet the urgency required to counter the grave threats posed by nuclear weapons.

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