An Arms Control Association Report

Assessing Progress on Nuclear Nonproliferation and Disarmament

UPDATED REPORT CARD
2010–2013

April 2013

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About the Authors

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The authors are responsible for the content of the report, and the assessments do not necessarily represent the views of the ACA Board of Directors or its members.

Cover Photo

Doves are released at the Hiroshima Peace Memorial Park in August 2012 to commemorate the 67th anniversary of the atomic bombing of Hiroshima. Photo credit: Kazuhiro Nogi/AFP/GettyImages

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Preface

For more than six decades, the international community has recognized the need to control the spread and prevent the use of nuclear weapons, but has struggled to agree on a common strategy.

In its first resolution, adopted in London in January 1946, the United Nations General Assembly embraced the goal of eliminating all nuclear weapons and other "weapons adaptable to mass destruction." Later that year, the U.S. government produced the Acheson-Lilienthal report and Baruch Plan, and the Soviet Union offered its own Gromyko Plan, all ostensibly aimed at achieving a nuclear-weapon-free world.

Though early proposals to control the bomb failed to gain traction, a body of mutually reinforcing, internationally recognized standards, norms, and legal obligations for nuclear disarmament, nonproliferation, and nuclear material security have gradually emerged. By the 1960s, following the Cuban Missile Crisis, years of atmospheric nuclear weapons testing, and the emergence of additional nuclear-armed states, international support for a balanced, comprehensive strategy to stem proliferation and invigorate support for disarmament began to grow.

In September 1961, U.S. President John F. Kennedy outlined a package of disarmament proposals, including banning all nuclear testing, stopping the production or transfer of fissile materials for weapons, prohibiting the transfer of nuclear weapons to non-nuclear weapon states, and gradually destroying nuclear weapons and delivery systems.

By the end of the decade, multilateral negotiations produced the nuclear Nonproliferation Treaty (NPT) in 1968, which incorporates many of the initiatives and ideas put forward by Kennedy and others. The NPT regime is now embraced by the vast majority of the world's nations and is viewed as a critical element of international security.

Over the years, the global nonproliferation, disarmament, and nuclear security regime has been strengthened, updated, and reaffirmed through NPT review conferences, UN Security Council resolutions, national policy statements, multilateral coalitions, and concrete actions.

Though uneven and incomplete, this body of self-imposed standards and commitments provides a useful baseline for measuring progress toward a world without nuclear weapons. As such, it applies to all countries, whether inside, outside, or at odds with the regime.

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 2013 version of this report is our attempt to describe what constitutes the "mainstream" of nonproliferation and disarmament behavior expected of responsible members of the international community, and to provide a straightforward, transparent measurement of the performance over the past 32 months of 11 key states in meeting 10 major, universally-recognized nuclear disarmament, nonproliferation, and nuclear security standards.

This report also assesses the extent to which states have adhered to the commitments and actions taken in support of these standards in the past. We hope it provides a better understanding of how much progress has or has not been achieved in each area in the past 32 months (July 2010–March 2013). Over time, such periodic report cards might also serve to track longer-term progress and trends. This is the second such report card we have produced.

Although every state has some responsibility to uphold and support these standards, the records of those states possessing nuclear weapons—China, France, India, Israel, Pakistan, Russia, the United Kingdom, and the United States—nuclear weapons aspirant—North Korea—and those that are under investigation for possible nuclear weapons-related activities—Iran and Syria—are most critical to the health of the nuclear disarmament and nonproliferation regime and to international peace and security, and are therefore the focus of this report.

The report card assesses the performance of the 11 key states according to a clearly defined, "A" through "F", letter-grade scale for each of the 10 major standards.

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 have been 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. Clearly, depending on one's perspective on the nature of the nuclear threat, the performance of certain states in some categories is more important to international peace and security. 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 32 months.

It is also important to note that our report card is intended to provide a snapshot of the key states' performance within the past 32 months on these 10 well-recognized standards. It does not attempt to grade them on their historical nuclear disarmament, nonproliferation, and nuclear security record. 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.

For example, a simple comparison of the size of current nuclear stockpiles shows that the United States and Russia possess more than 90 percent of the world's nuclear weapons. China and the United Kingdom, on the other hand, possess far fewer nuclear weapons. On this basis alone, China and the United Kingdom might be assigned better grades than the United States and Russia. But making an assessment on stockpile sizes alone would ignore the historical factors behind them.

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.

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.

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' performance is inadequate. It is imperative that states agree to meet more stringent standards and more ambitious goals and that the pace of progress be accelerated.

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.

As President Kennedy cautioned more than 50 years ago: "Every man, woman and child lives under a nuclear sword of Damocles, hanging by the slenderest of threads, capable of being cut at any moment by accident or miscalculation or by madness. The weapons of war must be abolished before they abolish us."

DARYL G. KIMBALL
Executive Director
Arms Control Association
April 2013

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. This update draws on a baseline established in the first report, published in 2010, which used the same 10 standards, and assesses the positive or negative actions taken between July 2010 and March 2013. The intent is to describe the progress that has been made, and the challenges that remain, in preventing the spread of nuclear weapons and ultimately eliminating the nuclear arsenals that exist today. The following trends emerged from our assessment:

- States possessing nuclear weapons have taken limited steps on select standards to reduce the dangers posed by nuclear weapons, but these steps have not translated into widespread progress across all 10 topics covered in this report. Although the actions do fortify international support for the norms associated with these standards, the nuclear nonproliferation and disarmament regime remains far less robust than desired and significantly distant from the goal of complete nuclear disarmament adopted by the international community.

- Another general trend is the worsening performance of the states of proliferation concern: the Democratic People's Republic of Korea (North Korea), Iran, and Syria. In the two and a half years since the publication of the first report, each of these states has failed to resolve international concerns about the nature of the nuclear programs. In the cases of North Korea and Iran, both countries have engaged in activities that heightened international concern and rebuffed concerted attempts by the international community to diplomatically address these areas. Additionally, each country has failed to fully comply with International Atomic Energy Agency (IAEA) safeguards. Lack of transparency plays a significant role in the low grades received by these three states. These countries also have taken actions that increase the suspicion of proliferation in contravention of UN Security Council resolutions, particularly those regarding the import and export of dual-use technology.

- In the area of nuclear disarmament, three of the five nuclear-weapon states recognized by the nuclear Nonproliferation Treaty (NPT) have taken significant steps to reduce their arsenals in the time frame covered by this report. The United Kingdom unilaterally reduced the size of its arsenal, and with the entry into force of the New Strategic Arms Reduction Treaty (New START) in February 2011 there are ongoing, verifiable nuclear force reductions by the United States and Russia. This stands in stark contrast to the expanding arsenals of states with nuclear weapons outside of the NPT, namely India, North Korea, and Pakistan. A lack of transparency makes it difficult to determine if any expansion or reduction has occurred in Chinese or Israeli arsenals within the time frame of this report.

- Nuclear-weapon states continue to refrain from testing nuclear weapons, and their public support for ratification and entry into force of the Comprehensive Test Ban Treaty (CTBT) has grown more vocal. China and the United States, however,

United Nations—Geneva

Delegates meet at the Conference on Disarmament in March 2013 in Geneva. Negotiations have yet to commence on a fissile material cutoff treaty.

have again failed to make any measurable progress towards ratification of the treaty. Non-NPT states India, Israel, and Pakistan continue to remain an obstacle to entry into force of the CTBT and are unlikely to pursue ratification without proactive action from China and the United States. North Korea continues to flout the norm against nuclear testing, conducting a third nuclear test explosion in February 2013. Widespread condemnation of the explosion, however, combined with the unanimous passage of a robust set of UN Security Council sanctions, underscores the international consensus opposing nuclear testing.

- Efforts to negotiate a fissile material cutoff treaty (FMCT) continue to be impeded by Pakistan in the Conference on Disarmament (CD). Although there is widespread support for the treaty in the international community and the recognized nuclear-weapon states are no longer producing fissile material for nuclear weapons purposes, frustration with the lack of meaningful negotiations on the topic has led to calls for a new approach. Members of the Non-Proliferation and Disarmament Initiative and other countries have expressed a preference for negotiating an FMCT in the CD, but due to a lack of progress in the body, these states advocate the pursuit of negotiations in an alternative forum. Several meetings on an FMCT will occur outside of the CD in 2013.

- Transparency regarding fissile material production, expansions in nuclear arsenals by non-NPT states, and IAEA safeguards remains problematic. Israel's policy of "nuclear ambiguity," in which it will neither confirm nor deny possessing nuclear weapons, meant that it was assigned a grade denoting a lack of progress because no declared actions have been taken. Additionally, no progress has been made by the IAEA into its investigations of Iranian and Syrian suspicious nuclear activities and non-compliance with their safeguards agreements. Yet, there have been several positive developments on transparency in the period of this report. The New START treaty between the United States and Russia reintroduced transparency measures on arms reductions for the first time since the expiration of START on December 5, 2009. In addition, France allowed international observers into its former fissile material production sites to verify that the facilities were permanently closed—the first nuclear-weapon state to do so.

- Although nuclear-weapon-free zones (NWFZs) remain an important regional approach to strengthen nonproliferation efforts, the nuclear-weapon states, particularly the United States, remain slow to ratify the protocols to existing treaties. To date, none of the five recognized nuclear-weapon states have signed or ratified the protocols to the treaties establishing zones in Central Asia and Southeast Asia. Additionally, little progress has been made on establishing new zones. In particular, efforts to establish a zone free of weapons of mass destruction (WMD) in the Middle East suffered a setback when a conference originally scheduled for December 2012 to begin discussions on creating the zone was postponed indefinitely due to a lack of regional agreement on the parameters for the meeting. India and Pakistan also consistently rebuff calls to establish a NWFZ in South Asia.

- In the area of export controls, significant steps have been taken by states to codify regulations to comply with international norms set by multilateral initiatives since the previous report was issued. Although the recognition that export controls are integral to stemming WMD proliferation is a positive step, implementation of these regulations in a number of countries, including China, India, and Pakistan, remains problematic. It is outside the scope of this report to systematically assess implementation, but failure to comply with export control commitments outlined in multilateral initiatives is noted.

- North Korea once again received the lowest grade of the states evaluated in this report due to the escalatory nature of its actions taken in defiance of UN Security Council resolutions to advance its nuclear and ballistic missile programs, including a third nuclear test in February 2013. In addition to demonstrating a blatant disregard for international norms, North Korea remains a proliferation threat, circumventing sanctions designed to prevent Pyongyang from selling technology applicable to WMD development.

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
G-8	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	Illicit 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

Introduction

In the first edition of this report, published in October 2010, the Arms Control Association (ACA) identified 10 standards based on the responsibilities derived from the nuclear nonproliferation and disarmament regime. The nuclear Nonproliferation Treaty (NPT) defined the obligations and goals in nonproliferation and disarmament, but state responsibilities under the treaty are further fortified by additional agreements, shared norms, and binding legal commitments. Together, these practices and agreements constitute and define the 10 standards used in this report. The standards are designed to prevent the spread of nuclear weapons and ultimately lead to their elimination.

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 and second editions of this report, however, the passage of time continues to strengthen and define some of these criteria, particularly in areas such as export controls and multilateral security commitments.

Likewise, the responsibilities that states are expected to fulfill differ. Although all countries have roles to play 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.

The 2010 report focused on 11 states particularly relevant to nuclear disarmament and nonproliferation and divided them into three categories based on their current status: nuclear-weapon states, non-NPT states, and states of concern. This report covers the same

Vyacheslav Oseledko/AFP/Getty Images

This memorial commemorates the victims of the 456 nuclear tests conducted by the Soviet Union at the Semipalatinsk Test Site in Kazakhstan.

states.

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. Additionally, as UN members, these three states 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 are in noncompliance with their NPT treaty obligations and under 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 three times, in 2006, 2009, and 2013. 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 make it 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 are under investigation by the IAEA for suspicion of past or present nuclear weapons programs. Iran has not complied with the safeguards obligations associated with the nuclear program it claims to be developing for peaceful use. In addition, Tehran has failed to account for evidence that the IAEA finds is indicative of nuclear activities with military dimensions. In the case of Syria, Damascus has failed to answer questions about, and provide the IAEA with access to, facilities that likely housed undeclared nuclear activities.

Since the first edition of this report was published in 2010, these states have failed to cooperate with the IAEA and resolve their outstanding issues. Taken together, these three states continue to undermine the goals of nonproliferation and disarmament, despite coercive actions taken multilaterally by the United Nations and unilaterally by other states.

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 to upholding and strengthening the standards and obligations outlined in 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.

Nuclear Nonproliferation Standards

Methodology

This report updates ACA's "2009-2010 Report Card" and uses the same basic methodology. The reports use letter grades to assess how the 11 states examined fare 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 the declared policies of the state itself, such as positions regarding treaties and agreements, multilateral arrangements it has joined, or domestic laws it has enacted to address nuclear nonproliferation issues. This report also draws on assessments by international organizations such as the IAEA and the committee established under UN Security Council Resolution 1540 (1540 Committee), unclassified intelligence judgments, and independent evaluations,

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

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

The time frame covered in this report is July 2010 to March 2013. 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 before it becomes public.

Standards and Criteria

ACA research staff has 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 upon 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 signed by 183 countries, is intended to be a significant obstacle to additional states acquiring nuclear weapons and nuclear-armed states adding new nuclear weapons designs to their arsenals.

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 NPT.[2] 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. Most recently, 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."[3] The 44 Annex 2 countries negotiated the text of the treaty, and ratification by all of these states is necessary for its entry into force. Eight Annex 2 states have yet to ratify the treaty.[4] The UN General Assembly First Committee most recently overwhelmingly passed a resolution in support of the CTBT in 2012, with just North Korea voting in opposition. In addition, the UN Security Council issued a statement in February 2013 deploring North Korea's February 12 nuclear test explosion, that country's third nuclear test and the world's 2,053rd.

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	*If in possession of nuclear weapons:* State has signed the CTBT, indicated its intent to ratify the treaty, and declared a testing moratorium.	*If not in possession of nuclear weapons:* State has signed the CTBT and signed and ratified the NPT.
C	*If in possession of nuclear weapons:* State has signed the CTBT and declared a testing moratorium, but has indicated that it does not currently intend to ratify the treaty.	*If not in possession of nuclear weapons:* 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), but 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.

Grade	Criteria: Ending Fissile Material Production for Weapons
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] NPT 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.

Grade	Criteria: Reducing Nuclear Weapons Alert Levels
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 norms by reassuring states that have foresworn nuclear weapons that they are not at risk of nuclear attack. The value of NSAs was recognized in Resolution 1887, 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. Because states that have adopted a no-first-use policy have indicated that they would only use nuclear weapons in response to a nuclear attack, they will be considered to have exhibited 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 originated 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." NPT review conference documents since the treaty's entry into

IAEA

Leaders from 53 countries met in Seoul in March 2012 to advance the goal of securing vulnerable nuclear material and strengthening multilateral nuclear security initiatives.

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. At the 2010 NPT Review Conference, states-parties decided that a conference on a Middle East WMD free zone should be convened by 2012. Furthermore, in the 2000 and 2010 NPT review conferences, states-parties agreed that the establishment of NWFZs "enhances global and regional peace and security, strengthens the nuclear nonproliferation regime and contributes towards realizing the objectives of nuclear disarmament."

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 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.

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.	

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.

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.

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IAEA Director General Yukiya Amano speaks during an Agency meeting in September 2012. The IAEA plays a central role in the nonproliferation regime.

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 proliferators from acquiring and sharing goods and technology relevant to nuclear weapons development and the means to deliver them. 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. 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 nuclear 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. In 2004, UN Security Council Resolution 1540 established an international mandate for all states to implement laws, regulations, and authorities to account for, protect, and secure nuclear material and facilities.

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.

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. 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.

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),[16] which was adopted in 2005 by the UN General Assembly. 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 Illicit Trafficking Database (ITDB), which was established in 1995 as a catalogue comprised of state-reported incidents of unauthorized activities and events involving nuclear and radiological material.

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 or loss of or trafficking in 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 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 Assessments

State-By-State Grades

	NUCLEAR-WEAPON STATES										NON-NPT STATES						STATES OF CONCERN					
Standard	China		France		Russia		UK		U.S.		India		Israel		Pakistan		DPRK		Iran		Syria	
	'10	'13	'10	'13	'10	'13	'10	'13	'10	'13	'10	'13	'10	'13	'10	'13	'10	'13	'10	'13	'10	'13
Banning Nuclear Testing	B	B	A	A	A	A	A	A	B	B	D+	D+	C	C	D+	D+	F	F	B-	B-	C	C
Ending Fissile Material Production for Weapons	B	B	A	A	A	A	A	A	A	A	F	F	F	F	F	F	F	F	N/A	N/A	N/A	N/A
Reducing Nuclear Weapons Alert Levels	A	A	B	B	C	C-	B	B	C	C	A	A	D+	D+	A	A	D	D	N/A	N/A	N/A	N/A
Nuclear Force Reductions	F	D	C+	D+	B-	B+	D+	C+	B-	B	F	F	D	D	F	F	F	D	N/A	N/A	N/A	N/A
Negative Security Assurances	B+	B+	C	C	C	C	C	C	B	C	B+	B+	D+	D+	B	B	F	F	N/A	N/A	N/A	N/A
Nuclear-Weapon-Free Zones	B	B	B	B	C	B	B	B	C	C	C-	C-	C-	D-	C-	C-	F	F	C-	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	C+	C	C	C	C	C	F	F	F	F	F	F
Nuclear Weapons-Related Export Controls	C-	F	A	A	C	C	A	A	A	A	A-	A-	A	A	F	C-	F	F	F	F	F	F
Multilateral Nuclear Security Commitments	B	A	B+	A	A-	A-	A	A	B+	B+	A	A	B	A	A*	B*	D	D	D+	D+	D+	D+
Criminalization and Illicit Trafficking Commitments	B+	A	B+	B+	A	A	A	A	B+	B+	A	A	B+	B+	B	B	D	F	C	C	D+	F
OVERALL GRADE	**B-**	**B-**	**B**	**B**	**B-**	**B**	**B**	**B+**	**B**	**B-**	**C+**	**C+**	**C-**	**C-**	**C-**	**C-**	**F**	**F**	**D**	**D+**	**D**	**D-**

* This assessment does not take into account steps Pakistan has taken to address risks related to its internal political instability and the security of its nuclear arsenal, facilities, and material. The scope of this report does not address relative nuclear security needs or evaluate the strength of a country's nuclear security controls, only the scope of the controls in place as they relate to recognized international standards.

China

China remained outside of the nuclear nonproliferation regime for several decades, joining the NPT in 1992. During that time, Beijing is believed to have shared critical nuclear weapons technology, including weapons designs, 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 sanctioning of proliferators. Yet, Chinese entities are still believed to supply goods and technology relevant to nuclear weapons and their means of delivery to states of proliferation concern.[18] **Overall grade: B-**

1. Banning Nuclear Testing: B

China has maintained a nuclear testing moratorium since July 1996 and signed the CTBT in September of that year.[19] Beijing has declared its intent to ratify the CTBT and has stated support for its entry into force. China has claimed to be in the process of ratifying the treaty for the past decade, but the government has not pursued steps to do so in the period covered in this report.[20] **2010 grade: B**

2. Ending Fissile Material Production for Weapons: B

Since joining the May 2009 consensus on the CD's program of work, China has supported action on the treaty in the CD for four consecutive years.[21]

Despite China's official statements in support of an FMCT, it has yet to officially declare a moratorium on fissile material production. Beijing reportedly ceased production of HEU for weapons in 1987 and of weapons-grade plutonium in 1991.[22] China is believed to have military stockpiles of about 16 metric tons of HEU and four metric tons of weapons-grade plutonium. Beijing is believed to have produced a total of 20 metric tons of HEU, but is estimated to have consumed four metric tons in nuclear weapons tests and as research reactor fuel.[23] **2010 grade: B**

3. Reducing Nuclear Weapons Alert Levels: A

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.[24]

Beijing voted in favor of UN General Assembly resolutions calling for decreasing the operational readiness of nuclear weapons in 2010 and 2012 after voting against a similar resolution in 2008.[25] Following the 2010 vote, China explained that steps to reduce nuclear weapons alert levels "should abide by the two important principles of maintaining global strategic stability and not harming any country's security" and should be implemented as part of the larger effort to eliminate nuclear weapons.[26]

Beijing 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."[27] Beijing has not made any statement to the contrary in subsequent defense white papers. China's Second Artillery Force maintains control over its strategic nuclear missile forces.

China is currently replacing the Xia-class submarines and the JL-1S ballistic missiles with second-generation Jin-class submarines armed with JL-2 ballistic missiles.[28] This will provide Beijing with an enhanced second-strike capability. The Jin-class submarine was deployed in 2012, although it is unclear when China's JL-2 missiles will be paired with the submarines.[29] This will require the warheads to be mated with the missiles onboard the submarines.

UN Photo

President Hu Jintao of China addresses the UN Security Council. China worked with the United States to develop sanctions against North Korea in response to the Pyongyang's February 2013 nuclear test.

This new development will increase China's nuclear alert levels, although China has a "limited capacity to communicate with submarines at sea" and "has no experience" in managing a ballistic missile submarine fleet "that performs strategic patrols with live nuclear warheads mated to missiles."[30] Beijing's Xia-class submarine has not performed strategic patrols and was not considered to be a viable nuclear deterrent for the purpose of this report.[31] **2010 grade: A**

4. Nuclear Force Reductions: D

The exact composition of China's nuclear force is not known publicly, but independent estimates suggest China has a total of about 240 nuclear warheads, of which 180 are considered nondeployed or in reserve.[32] China's grade improved because the 2012 Department of Defense report to Congress no longer indicates that China is currently increasing the size of its nuclear weapons stockpile.[33] An estimated 50 to 75 warheads are believed to be on silo-based and road-mobile intercontinental ballistic missiles (ICBMs).[34] Beijing is in the process of modernizing its arsenal by replacing its liquid-fueled missiles with mobile solid-fueled missiles. **2010 grade: F**

5. Negative Security Assurances: B+

China issued unilateral NSA pledges in 1978 and 1995. These pledges are non-binding.

A plus (+) is added to the grade because China is the only NPT nuclear-weapon state that has declared a no-first-use nuclear weapons policy.[35] China's 2010 defense white paper declared that "China consistently upholds the policy of no first use of nuclear weapons, adheres to a self-defensive nuclear strategy, and will never enter into a nuclear arms race with any other country."[36] **2010 grade: B+**

6. Nuclear-Weapon-Free Zones: B

Although China has signed and ratified NSA protocols to the Latin American, South Pacific, and African NWFZ treaties, it has not signed the protocols for the Central Asian zone. The nuclear-weapon states announced in 2013 that they had reached an agreement with the Association of Southeast Asian Nations (ASEAN) on a revised protocol to the Southeast Asia NWFZ and that a signing of the protocol should take place soon, but China has expressed its willingness to ratify the protocol since 2011.[37] Beijing announced in April 2004 that it "undertakes unconditionally not to use or threaten to use nuclear weapons" against NWFZs.[38]

On September 17, 2012, Beijing released a joint declaration, in collaboration with the four other nuclear-weapon states, which recognized Mongolia's status as an NWFZ.[39] **2010 grade: B**

7. IAEA Safeguards: N/A

China concluded voluntary safeguards with the IAEA in 1998 with the signing of an additional protocol.[40] **2010 grade: N/A**

8. Nuclear Weapons-Related Export Controls: F

China joined the NSG in 2004 and applied to join the MTCR the same year, but the country's membership has been blocked although Beijing has voluntarily pledged to follow the group's export control guidelines.[41] Serious concerns remain over the Chinese government's ability to control the proliferation of missile-related technologies by Chinese entities, and although Beijing has agreed to adhere to the MTCR Guidelines, it has not adopted the full annex, which includes a common list of controlled items.[42] China's national export controls include provisions related to export licensing, control lists, end-user controls, and import controls.[43]

Despite adopting export control legislation, Chinese entities are still believed to be involved in exporting dual-use goods of relevance to nonconventional weapons and missile programs. A 2012 unclassified intelligence report to Congress on the acquisition of weapons of mass destruction states that "Chinese entities—including private and state-owned firms—continue to engage in WMD-related proliferation activities."[44] The report states that although China has adopted controls that approximate the MTCR, "enforcement continues to fall short." The United States continues to levy proliferation sanctions on Chinese companies and individuals, including a February 2013 set of sanctions for violating existing missile proliferation laws.[45]

China's grade was lowered to an F because Beijing stated in 2012 that it is moving ahead with the construction of two nuclear power reactors in Pakistan, which is neither an NPT member nor under full-scope IAEA safeguards and therefore is ineligible to receive such assistance under NSG rules.[46] According to a senior U.S. official, "Without an exception granted by the NSG by consensus, Chinese construction of additional nuclear power plants in Pakistan beyond what was grandfathered in 2004 would be inconsistent with NSG guidelines and China's commitments to the NSG."[47] China has argued that the reactor transfer was based on a contract negotiated with Pakistan in 2003, one year before Beijing joined the NSG.[48] 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. Reports in March 2013 have also noted that China has agreed to sell and construct of a fifth nuclear power reactor at the Chashma site in Pakistan.

The deal 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."[49] **2010 grade: C-**

9. Nuclear Security Commitments: A

China has a regulatory framework in place consistent with the IAEA Code of Conduct, which includes material accounting, material security, and licensing.[50] In 2007, China signed a "practical cooperation arrangement" to strengthen its national nuclear security measures and signed a supplementary "practical arrangements on nuclear security" with the IAEA in August 2010.[51] Beijing ratified the CPPNM in 1989 and its 2005 amendment in September 2009. At the 2010 Washington Nuclear Security Summit, China pledged to cooperate in the establishment of a nuclear security "Center of Excellence." Beijing completed the Memorandum of Understanding for Cooperation in Establishing a Center of Excellence on Nuclear Security with the United States in January 2011 and has started construction on the facility.[52]

China's grade improved in 2013 because Beijing worked with the Global Threat Reduction Initiative (GTRI) and converted HEU research reactors to use low-enriched uranium (LEU) fuel in cooperation with the United States.[53] China also participated as an observer in the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction (hereinafter referred to as Global Partnership) as an invited member of the Group of Five emerging economies.[54] **2010 grade: B+**

10. Criminalization and Illicit Trafficking Commitments: A

China participates in the ITDB and the Global Initiative to Combat Nuclear Terrorism. Beijing implemented 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 will use radiation inspection equipment to minimize incidences of illicit trafficking.[55] China signed the Nuclear Terrorism Convention in September 2005. Beijing's grade improved because the country ratified the convention in November 2010. **2010 grade: B+**

France

France was the last of the five nuclear-weapon states to join the NPT, doing so 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. Paris, 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 stemming the proliferation of technology applicable to developing nuclear weapons.

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 is the only state possessing nuclear weapons that has closed its nuclear test site. **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.[56] Paris 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.[57] 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.[58] **2010 grade: A**

3. Reducing Nuclear Weapons Alert Levels: B

France announced the detargeting 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.[59] With these steps in place, French nuclear weapons are believed to need "several days" of preparation to be launched.[60]

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.[61] Explaining its 2012 vote, France said, "We would like to restate that the operational readiness of our respective nuclear weapons systems is maintained at a level consonant with our national security requirement and our obligations to our allies, within the larger context of the current global strategic situation."[62] **2010 grade: B**

4. Nuclear Force Reductions: D+

In March 2008, President Nicolas Sarkozy delivered a speech in Cherbourg in which he discussed the future of France's nuclear forces, announcing that it would reduce its arsenal by one-third, to comprise fewer than 300 nuclear warheads.[63] 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.[64] France's grade was lowered because no further reductions were completed during the time frame covered in this report.

A plus (+) is added to the grade because 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.

Mychele Daniau/AFP/Getty Images

French President Nicolas Sarkozy delivers a speech at the inauguration of the nuclear submarine "Le Terrible." He announced significant reductions in French nuclear forces at this event.

No formal verification measures are in place to provide transparency for these reductions. **2010 grade: C+**

5. Negative Security Assurances: C

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.[65]

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. A 2008 French defense white paper states that "the sole purpose of the nuclear deterrent is to prevent any state-originating aggression against the vital interests of the nation wherever it may come from and in whatever shape or form."[66] **2010 grade: C**

6. Nuclear-Weapon-Free Zones: B

France has ratified protocols of the Latin American, African, and South Pacific NWFZs. It has not signed protocols associated with the Central Asian zone.[67] 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.[68]

On September 17, 2012, Paris released a joint declaration, in collaboration with the four other nuclear-weapon states, which recognized Mongolia's status as an NWFZ.[69] **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.[70] **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.[71] **2010 grade: A**

9. Nuclear Security Commitments: A

France has a variety of national controls and regulations in place with regard to nuclear security consistent with the requirements under Resolution 1540. These include the establishment of a nuclear regulatory authority, material accounting measures, physical protection regulations, and licensing for materials, facilities, and entities.[72] Paris joined the CPPNM in 1991 and ratified the 2005 amendment in February 2013, causing France's grade to improve. France is also a participant in the Global Partnership and the GTRI.[73]

During the 2012 Seoul Nuclear Security Summit, France pledged to host an international seminar on the IAEA International Physical Protection Advisory Service in 2013.[74] **2010 Grade: B+**

10. Criminalization and Illicit Trafficking Commitments: B+

France participates in the ITDB, PSI, and the Global Initiative to Combat Nuclear Terrorism. Paris also organized an additional course on nuclear smuggling for the EU atomic agency.

A plus (+) is added to the grade because Paris signed the Nuclear Terrorism Convention in 2005. **2010 grade: B+**

Russia

In the aftermath of the Cold War, Russia inherited the massive nuclear arms stockpile accumulated by its predecessor, the Soviet Union, and continues to maintain an arsenal numbering in the many thousands. Beginning in the early 1990s, it started to dramatically reduce its arsenal of about 40,000 nuclear warheads in accordance with arms control agreements with Washington. 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. **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 at the 2011 Article XIV Conference of the Comprehensive Test Ban Treaty Organization.[75] **2010 grade: A**

2. Ending Fissile Material Production for Weapons: A

Moscow has supported negotiations on an FMCT and has declared that it ceased production of fissile material for nuclear weapons in 1994. Moscow is currently estimated to have about 737 tons of HEU and about 128 tons of weapons-grade plutonium, a decrease of 213 metric tons and 22 metric tons, respectively, over a two-year period.[76] In 1993, Russia and the United States agreed to down-blend 500 tons of HEU from Russian warheads to LEU for civilian use. At the end of 2009, 382 tons of that HEU had been converted to LEU.[77] 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. Plutonium disposition has not begun as of the date of this report.[78] Moscow closed its last reactor capable of plutonium production in the spring of 2010. This reactor was solely used for energy production since 1994 and has been replaced with a coal-powered plant.[79] **2010 grade: A**

3. Reducing Nuclear Weapons Alert Levels: C-

Russia is believed to maintain many of 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 seconds."[80] About 75 to 80 percent of Russian missiles are kept at this level of readiness, according to outside assessments.[81]

Russia received a minus (-) because it voted against a 2012 UN General Assembly resolution on reducing the readiness of nuclear forces after abstaining in a 2010 vote on a similar resolution.[82] 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.[83] **2010 grade: C**

4. Nuclear Force Reductions: B+

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 will be carried out under new verification provisions, but those reductions will not apply to reserve warhead stockpiles.

A plus (+) is added to Russia's grade because Moscow rapidly reduced its deployed strategic warheads below New START levels well before the treaty's 2018 implementation deadline. As of March 1, 2013, Russia had 1,480 deployed strategic warheads.[84]

In spite of these steps taken by Russia to reduce the number of its strategic nuclear weapons, Moscow has resisted calls to take actions to reduce its nonstrategic weapons, and there are concerns that Russia has instead increased its reliance on these systems.[85] 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.[86] **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 nuclear-weapon state.[87] 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.

NNSA

Russia successfully recovered all of its highly enriched uranium from Romania, in cooperation with the U.S. National Nuclear Security Administration. The material was moved to Russia for secure storage.

According to the February 2010 Russian Military Doctrine Paper, Russia may use nuclear weapons in response to conventional attacks "when the very existence of the state is under threat."[88] This phrase demonstrates a willingness to use nuclear weapons against non-nuclear states in the event of an impending conventional military loss. **2010 grade: C**

6. Nuclear-Weapon-Free Zones: B

Russia has ratified the relevant protocols for the Latin American, African, and South Pacific NWFZs. It has not signed the protocols for the Central Asian zone.[89]

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.[90]

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.[91] **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.[92] **2010 grade: N/A**

8. Nuclear Weapons-Related Export Controls: C

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 catchall clause, and controls over re-export and transshipment.[93]

Unclassified U.S. intelligence reports assess, however, that Russia continues to provide dual-use goods and technologies that may contribute to proliferation in the Middle East and South Asia.[94] It is unclear the extent to which such transfers are taking place with the knowledge or complicity of the Russian government. **2010 grade: C**

9. Nuclear Security Commitments: A-

Domestically, Russia has implemented measures to account for and secure the production, use, storage, and transport of nuclear weapons and related materials.[95] Regulations for the physical protection of nuclear facilities and materials, licensing, and 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 participates in the Global Partnership and the GTRI.

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.[96] Additionally, Russia has assisted in the conversion of Russian-supplied HEU reactors abroad.[97]

A minus (–) is added to Russia's grade because, in spite of these commitments, independent assessments suggest that the Russian government has not developed a comprehensive strategy for reducing risks related to its fissile material stores and devotes insufficient resources to securing its stockpile.[98] For example, HEU and plutonium are still present at a large number of sites despite the shutdown and conversion of several HEU reactors, the security of which remains in question. **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, Russia and the GTRI announced that they completed the installation of radiation detectors at all Russian border points.[99]

Russia also announced creation of the Global Initiative to Combat Nuclear Terrorism (GICNT) in collaboration with the United States on July 15, 2006.[100] The GICNT is developing guidelines on nuclear and radiological detection, nuclear forensics analysis, and national emergency response plans. **2010 grade: A**

United Kingdom

The United Kingdom was the third state to test a nuclear weapon and played a major role in the first successful nuclear weapons development effort as part of the Manhattan Project. In recent years, it has moved to the forefront of nuclear disarmament efforts by the nuclear-weapon states, having reduced its nuclear arsenal to the lowest levels of those five states. London continues to engage in an internal debate over the salience of its nuclear deterrent. **Overall Grade: B+**

1. Banning Nuclear Testing: A

The United Kingdom, an Annex 2 state, signed the CTBT in 1996 and ratified the treaty in 1998. **2010 grade: A**

2. Ending Fissile Material Production for Weapons: A

The United Kingdom has consistently expressed support for negotiations on an FMCT in statements to the CD and other UN disarmament forums and in votes on resolutions in the UN General Assembly. The British government stated in 1995 that it had ceased production of HEU and weapons-grade plutonium for nuclear arms. London is estimated to have a stockpile of 21.9 metric tons of HEU and 11.7 metric tons of plutonium for weapons.[101] **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 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.'"[102] The report also stated that only one of the United Kingdom's four ballistic missile submarines, each of which carry 40 to 48 nuclear warheads, will be on patrol at any given time. **2010 grade: B**

4. Nuclear Force Reductions: C+

In June 2011, the United Kingdom announced planned reductions in its deployed nuclear forces that would be accomplished by early 2015. When complete, the United Kingdom will have 120 deployed strategic warheads, with 60 warheads in reserve to "support the maintenance and management of the operational force."[103] All excess warheads will be dismantled by the mid-2020s.[104] The country will also reduce the number of warheads on each nuclear submarine from 48 to 40. These reductions are believed to have left the United Kingdom with the smallest nuclear arsenal among the five NPT nuclear-weapon states.[105] The grade was raised because these reductions are currently taking place and one submarine has already reduced its nuclear payload from 48 to 40 warheads.[106]

In a March 2009 speech on nuclear nonproliferation, Prime Minister Gordon Brown said that London constantly reviews its stockpile levels and "[i]f it is possible to reduce the number of UK warheads further, consistent with our national deterrence and with the progress of multilateral discussions, Britain will be ready to do so."[107] The British government is currently engaged in a debate over possibly replacing the Trident missile in light of their high maintenance cost, as well as potentially reducing the number of ballistic missile submarines in its fleet from four to three.[108]

A plus (+) is added to the grade because, despite the absence of formal verification measures for British nuclear arms reductions, the United Kingdom has engaged in efforts to develop verification measures

Danny Lawson/AFP/Getty Images

The Trident-equipped HMS Victorious is undergoing maintenance work at HM Naval Base Clyde in Scotland in October 2012. These Vanguard-class submarines are the last remaining leg of the United Kingdom's nuclear deterrent.

for long-term nuclear reductions. 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. Both countries submitted working papers on these efforts during the NPT review process, and the 2010 NPT Review Conference Final Document noted their cooperation.
2010 grade: D+

5. Negative Security Assurances: C

The United Kingdom issued unilateral NSAs to non-nuclear-weapon states in 1978 and 1995, indicating that it would reserve the right to use nuclear weapons against non-nuclear-weapon states that attack the United Kingdom "in association or alliance with a nuclear-weapon state."[109] In May 2010, London announced that it would review its policy regarding the use of nuclear weapons. Foreign Office Minister Alistair Burt said at that time that according to British policy, "the use of nuclear weapons would only be in the most extreme circumstances of self-defense following attack in certain particular circumstances."

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, with British officials issuing conflicting or ambiguous statements on the matter. Secretary of State for Defense Geoff Hoon said in 2002 that "long-standing British government policy" maintained that "if our forces—if our people—were threatened by weapons of mass destruction, we would reserve the right to use appropriate proportionate responses which might…in extreme circumstances include the use of nuclear weapons."[110]
2010 grade: C

6. Nuclear-Weapon-Free Zones: B

The United Kingdom has ratified the relevant protocols for the Latin American, South Pacific, and African NWFZs. It has not signed the protocols for the Central

Asian zone.[111] 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.[112]

On September 17, 2012, London released a joint declaration, in collaboration with the four other nuclear-weapon states, which recognized Mongolia's status as an NWFZ.[113] **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.[114] **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 Group of Eight (G-8) members, has expressed the need for the NSG to adopt stricter guidelines involving the transfer of enrichment and reprocessing technology and, along with the G-8, has agreed to abide by draft criteria-based guidelines for such transfers.[115]

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.[116] **2010 grade: A**

9. Nuclear Security Commitments: A

The United Kingdom has taken steps domestically and internationally to secure nuclear material. In addition to ratifying the CPPNM in 1992 and its 2005 amendment in 2010, the United Kingdom has endorsed the IAEA Code of Conduct. It also has an extensive regulatory system for nuclear security, overseen by the Office for Nuclear Security, including accounting, physical protection, and licensing regulations.[117] 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."[118]

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.

On a multilateral basis, the United Kingdom participates in the GTRI.[119] London has offered states assistance through the 1540 Committee with the implementation of that resolution, including its nuclear security provisions.[120] The United Kingdom is chairing the Global Partnership in 2013, during which the nuclear and radiological security working group will set new priorities. **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 and the Global Initiative to Combat Nuclear Terrorism. **2010 grade: A**

United States

The United States was the first nation to test and produce nuclear weapons and is the only nation 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.[121] 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. **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. 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[122] and in 2011,[123] but the administration has not yet launched efforts to win Senate support for the treaty. The president and officials from his administration have continued to voice support for the treaty as recently as March 2013 and have indicated that the president still intends to bring the treaty up for ratification.[124] As an Annex 2 state, U.S. ratification is necessary for entry into force. The United States has no plans to resume nuclear testing. **2010 grade: B**

2. Ending Fissile Material Production for Weapons: A

Obama pledged in 2009 to "lead a global effort to negotiate a verifiable treaty ending the production of fissile materials for weapons purposes."[125] 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 advance progress toward negotiating an FMCT at the CD and have engaged India and Pakistan in informal consultations on the issue during the period covered by this report. The United States declared a halt to the production of fissile materials for nuclear weapons in 1992 and is estimated to have 260 tons of HEU and 92 tons of separated plutonium remaining in its military stockpile.[126]

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. Plutonium disposition has yet to begin as of the publication of this report.[127] Since 2010, the United States has down-blended 10.5 metric tons of HEU and helped Russia down-blend two tons of HEU.[128] **2010 grade: A**

3. Reducing Nuclear Weapons Alert Levels: C

U.S. nuclear ballistic missile forces are reportedly

U.S. Air Force

The B-2 Spirit is an central part of the U.S. nuclear bomber force. This particular plane is undergoing inspection at Whiteman Air Force Base, MO in July 2012.

ready to launch on short notice. Independent experts estimate that virtually all 450 Minuteman III ICBMs and 96 Trident II SLBMs are on alert and ready for launch within 15 minutes.[129] 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."[130] 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."[131] The results of that review were not announced during the time frame of this report. **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 ratified by the U.S. Senate in December 2010. As of March 1, 2013, Washington had 1,654 nuclear warheads deployed, a reduction from 1,800 since the United States began reporting New START numbers in February 2011.[132]

The U.S. grade improved during this time period because the agreement put in place verification measures absent since the expiration of START in December 2009.

Obama has also indicated that the United States will seek to discuss further reductions in nuclear stockpiles with Russia, including tactical nuclear weapons.[133] **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."[134] In 1997 the United States issued a Presidential Decision Directive reaffirming these pledges.[135]

In its 2010 NPR Report, 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."[136] This declaration effectively removes the caveats to previous NSAs issued that the United States that may have left non-nuclear-weapon states believed to possess or to be seeking chemical weapons open to possible nuclear weapons use.

This grade was lowered because, despite strengthening the NSAs, 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."[137]

Additionally, Obama asserted that he "will take no options off the table" in preventing Iran from becoming a nuclear power, including "a military effort."[138] This rhetoric, combined with the loophole in the NSA, leaves open the possibility of a nuclear attack against a state like Iran, which is not in compliance with IAEA safeguards. **2010 grade: B**

6. Nuclear-Weapon-Free Zones: C

The United States has ratified the relevant protocol to the Latin American NWFZ, but has only signed the protocols for the treaties of the African and South Pacific zones. It has not signed the protocols for the Central Asian zone.

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.[139] 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.[140]

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.[141] **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.[142] **2010 grade: N/A**

Charles Dharapak/AFP/Getty Images

President Barack Obama delivers the State of the Union address before Congress on February 12, 2013. He spoke about the need to seek further nuclear reductions with Russia and improve nuclear security.

8. Nuclear Weapons-Related Export Controls: A

The United States was a founding a member of the NSG and MTCR. It has agreed to G-8 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.[143]

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 40 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.[144] **2010 grade: A**

9. Nuclear Security Commitments: B+

Washington joined the CPPNM in 1982 and 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.[145] 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 2004, Washington launched the GTRI, aimed at preventing the illicit acquisition of nuclear and radiological material. Since 2009, the GTRI has shutdown or converted 20 HEU research reactors in 12 countries and removed nearly 1,400 kilograms of weapons-usable materials from over a dozen countries. The United States also participates in the Global Partnership.

A plus (+) is added to the grade because, in September 2008, the Senate provided its advice and consent to ratify the 2005 CPPNM amendment, and the Obama administration submitted implementing legislation to the Senate Judiciary Committee in 2010, where it remains stalled.[146] **2010 grade: B+**

10. Criminalization and Illicit Trafficking Commitments: B+

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 Global Initiative to Combat Nuclear Terrorism.

A plus (+) is added to the grade because the United States signed the Nuclear Terrorism Convention in September 2005. The Senate gave its advice and consent to ratify the convention in September 2008, but has yet to approve implementing legislation for the accord. The United States pledged to pass implementing legislation at the 2012 Nuclear Security Summit.[147] **2010 grade: B+**

NON-NPT STATES

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."[148] 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. **Overall Grade: C+**

1. Banning Nuclear Testing: D+

India has not signed the CTBT, sought to block adoption of the CTBT in the CD in 1996,[149] and has abstained from subsequent UN General Assembly votes calling for its early entry into force, including the most recent in December 2012.[150] 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. 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 its nuclear cooperation with other countries. Following the 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.[151] **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.[152] 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."[153] 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.[154] It is unclear what cooperation this pledge has yielded. In May 2012, Sujata Mehta, Indian permanent representative to the CD, reaffirmed that New Delhi "remains committed to participating in the FMCT negotiations in the CD."[155]

At the end of 2011, India's stockpile of weapons-grade plutonium was estimated at approximately one-half ton.[156] India is still producing weapons-grade plutonium, but at a slower rate after having shut down

one of its two reactors in December 2010.[157]Another reactor is under construction and scheduled to begin operation during 2017 or 2018. Although India is known to produce HEU enriched to 30 to 45 percent for naval reactors, it is unknown whether it does so for nuclear weapons. Independent satellite imagery analysis from October 2011 assessed that India was significantly expanding its military uranium-enrichment capacity.[158] **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.[159] New Delhi annually sponsors a UN General Assembly resolution that calls for de-altering and detargeting] nuclear weapons, saying in 2012 that India views "de-altering as an important step in the process of de-legitimization of nuclear weapons."[160]

Currently, India's land-based delivery systems are comprised of nuclear-capable missiles and nuclear-capable aircraft. In 2003, India established its Nuclear Command Authority to exercise command and control over its nuclear arsenal.

In 2012, India began sea trials of its prototype ballistic missile submarine, the INS Arihiant, and declared that it had successfully developed an SLBM.[161] 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. **2010 grade: A**

4. Nuclear Force Reductions: F

India continues to expand the size of its nuclear arsenal and 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."[162] India's arsenal is now estimated at 80-100 warheads.[163]

India currently possesses a dyad, composed of land-based ballistic missiles and air delivery capabilities, and has the stated goal of a full triad. Toward this end in May 2011, Prime Minister Manmohan Singh convened a meeting to assess the progress made toward an operational triad.[164]

India has continued to develop its land-based missiles, including the long-range Agni-5 ballistic missile, which it successfully test-fired in April 2012.[165] 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 Organisation, said in May 2012 that India is "working in this area."[166] India is also

Raveendran/AFP/Getty Images

India continues to extend the range of its nuclear-capable ballistic missiles. It successfully tested the long-range Agni-5 in April 2012.

investing in qualitative improvements that will allow it to operationalize and deploy shorter-range ballistic and cruise missiles.[167]

In July 2012, India announced that it completed development of an SLBM, the K-15. Tests of the K-15 system date back to at least 2008, but it has not yet been tested in India's ballistic missile submarine, the Arihant.[168] **2010 grade: F**

5. Negative Security Assurances: B+

India maintains a policy of the nonuse of nuclear weapons against non-nuclear-weapon states. Ambassador Suha Mehta said in 2012 that India believes non-nuclear-weapon states "have a legitimate right to be assured against the use or threat of use of nuclear weapons."[169] India has consistently voted in favor of UN General Assembly resolutions, including in December 2012, on concluding "effective international arrangements" to assure non-nuclear-weapon states against the use or threat of use of nuclear weapons,[170] 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."[171] Although officially India has adopted a no-first-use policy, some Indian strategists have called the pledge's validity

into question.[116] 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.[172] During debate at the CD in 2012, however, 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."[173] **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.

A minus (−) is added to the grade because India has consistently voted against UN measures supporting an NWFZ in South Asia, including the most recent reference to creating the zone in a December 2010 resolution.[174] **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 December 2012, India had placed 19 civilian facilities under IAEA safeguards.[175]

India received a C+ in the previous version of this report because the IAEA approved an additional protocol for India in March 2009 and India ratified it in May 2009. 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.[176] The IAEA also does not have complementary access to Indian facilities to inspect undeclared sites. Since 2009, the additional protocol has not entered into force. As a result, India's grade was reduced. **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.[177] New Delhi is believed to have harmonized its national export controls with those regimes in 2008, according to an April 18, 2012, speech by Foreign Secretary Shri Ranjan Mathai.[178] 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 years.[179]

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.[180]

A minus (-) is added because independent assessments suggest 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.[181] According to the independent assessments, Indian trading companies did not disclose the true end user of the goods acquired in their procurement efforts. The extent to which these import activities have continued remains uncertain. **2010 grade: A-**

9. Nuclear Security Commitments: A

India acceded to the CPPNM in 2002 and ratified the 2005 amendment in 2007.

Also, India has 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. India is implementing the IAEA Code of Conduct. During the 2010 nuclear security summit, India pledged to create a Nuclear Energy Center with a nuclear security component and is currently working on the construction of the center.[182] In the meantime, India has begun holding training courses that will be included in the center's curriculum. In November 2011, India held its first training course on physical protection.[183] New Delhi is a GTRI participant. **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 Global Initiative to Combat Nuclear Terrorism. **2010 grade: A**

NON-NPT STATES

Israel

Israel is widely believed to possess an undeclared nuclear arsenal of up to 200 nuclear weapons. 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."[184] Its 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. **Overall Grade: C-**

1. Banning Nuclear Testing: C

Israel has signed but not ratified the CTBT. As an Annex 2 state, Israel's ratification is necessary for the entry into force of the treaty. Although the country has expressed its support for the treaty as an important aspect of the nuclear nonproliferation regime, Israel has linked its full membership in the CTBT to the security environment in the region. At a 2011 conference of signatories to the CTBT, Israel expressed its "unequivocal support for the CTBT," but said that its ratification was guided by "adherence to and compliance with the CTBT by states in the Middle East."[185] Israel also expressed concern over the rules that will govern the on-site inspections from the Comprehensive Test Ban Treaty Organization (CTBTO) and its lack of sovereign equality status in the policymaking bodies, such as the organization's Executive Council and regional bodies related to the Middle East.

Israel's claim that it shall not be the state that introduces nuclear weapons to the region serves as a de facto moratorium on nuclear testing. At the 2011 conference of CTBTO member states, Israel also expressed its support for a "universal commitment not to carry out any nuclear test explosions and any other nuclear explosions."[186] **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.[187] Yet, it has not blocked consensus in the CD to move forward on negotiating such a treaty and did not oppose a December 2012 UN General Assembly consensus resolution urging the CD to start FMCT negotiations in 2013.

It is unclear if Israel continues to produce fissile materials at its Dimona reactor at the Negev Nuclear Research Center, but under its policy of nuclear ambiguity, it has not declared a cessation of such production for weapons purposes. Some experts assess that Dimona may currently primarily produce tritium.[188] As of 2012, it is estimated that Israel has 600 to 950 kilograms of weapons-grade plutonium.[189] There is less certainty about Israel's HEU stockpile, which could be roughly 300 kilograms. **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 in December 2012.[190]

A plus (+) is added to the grade because Israel is believed to maintain its nuclear weapons demated

Jack Guez/AFP/Getty Images

Israel's nuclear weapons can be delivered by ballistic missiles and several types of aircraft, including the F-15 Eagle fighter.

from their delivery systems and may store them in a disassembled state.[191] However, in 2012, reports that Israel may have fitted its Dolphin-class submarines, purchased from Germany, with nuclear-tipped submarine-launched cruise missiles, call into question that assertion.[192] Israeli delivery vehicles include land- and sea-based, nuclear-capable ballistic and cruise missiles as well as air-delivered gravity bombs.[193] **2010 grade: D+**

4. Nuclear Force Reductions: D

Israel is suspected to have an arsenal of up to 200 weapons, and there is no indication that it has made any force reductions.[194] Israel may be pursuing qualitative improvements to its delivery vehicles. In November 2011, Israel is believed to have successfully tested its nuclear-capable Jericho-3 multistage ballistic missile for the second time.[195] Reports in June 2012 allege that Israel's Dolphin-class submarines are carrying nuclear-tipped cruise missiles.[196]

Israel has continued to abstain from annual UN General Assembly resolutions concerning nuclear disarmament, such as those introduced by Japan, the New Agenda Coalition, and the Non-Aligned Movement.[197] **2010 grade: D**

5. Negative Security Assurances: D+

Because 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.

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. 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 December 2012.[198] **2010 grade: D+**

6. Nuclear-Weapon-Free Zones: D-

As the only state in the region in possession of nuclear weapons, Israel's cooperation is integral to the prospect of establishing a WMD-free zone, as called for in the 1995 Resolution on the Middle East. Israel has issued statements in support of creating

such a zone and has voted in favor of UN General Assembly resolutions to that effect, but it continues to maintain that the political and security environment in the region must change before such a restriction could take effect.[199] NPT states-parties agreed to hold a conference of Middle East states in 2012 to discuss the creation of the zone and hold consultations to prepare for the conference in the interim.

A minus (-) is added because Israel's support for the establishment of a WMD-free zone in the Middle East is unclear. In response to the reaffirmation in the 2010 NPT Review Conference Final Document of "the importance of Israel's accession" to the NPT and the placement of its nuclear facilities under safeguards, Israel declared that it would not participate in the steps agreed to at the conference on establishing a WMD-free zone in the Middle East.[200] A statement issued in March 2010 by the office of Israeli Prime Minister Benjamin Netanyahu said that the agreement "singles out Israel, the Middle East's only true democracy and the only country threatened with annihilation."[201] The United States, as one of the conveners of the conference, announced in November 2012 that the conference would not be held in December as originally planned.[202] At this time, Israel was the only country not to have publicly said that it would participate in the conference. In a September 2012 statement to the IAEA, Shaul Chorev, the director-general of Israel's Atomic Energy Commission, said that current regional realities render the creation of such as zone as "futile" at this time.[203] **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. Its Dimona nuclear complex, thought to be the location of Israel's nuclear weapons program, is not included in this agreement. The IAEA issues an annual safeguards implementation report that details the achievements and developments of the safeguards arrangement. The latest IAEA report on safeguards implementation, issued in 2008, indicates that Israel is in compliance with its safeguards agreement.[204]

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.[205] A similar resolution failed in 2010 and 2011 and was tabled without a vote in 2012. **2010 grade: C+**

8. Nuclear Weapons-Related Export Controls: A

Israel has agreed to adhere to NSG guidelines with respect to nuclear transfers. An Israeli Atomic Energy Commission release dated May 14, 2009, highlights Israel's continuing compliance with NSG guidelines, as well as "ways to enhance the ongoing dialogue between Israel and the NSG in light of Israel's adherence to the NSG."[206] Israel pledged in October 1992 to abide by the MTCR Guidelines.

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.[207] **2010 grade: A**

9. Nuclear Security Commitments: A

Israel joined the CPPNM in January 2002. Israel's grade improved from the previous report because it ratified the 2005 CPPNM amendment in March 2012. Israel has endorsed the IAEA Code of Conduct and participates in the GTRI. The Israeli Atomic Energy Commission has some independent nuclear regulatory responsibilities.[208] **2010 grade: B**

10. Criminalization and Illicit Trafficking Commitments: B+

Israel participates in the ITDB, as well as the Global Initiative to Combat Nuclear Terrorism and the PSI. Israel, in cooperation with the United States, is implementing a Megaports Initiative Agreement to provide radiation monitoring at its major ports.

A plus (+) is added to the grade because Israel signed the Nuclear Terrorism Convention in 2006 and, at the 2012 Nuclear Security Summit in Seoul, committed to ratifying the treaty. **2010 grade: B+**

NON-NPT STATES

Pakistan

Pakistan began a concerted drive to develop nuclear weapons in the early 1970s in response to its rival India's nuclear ambitions and has not joined the NPT. 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, terrorist attacks on military targets in Pakistan have raised serious concerns regarding the security of its nuclear arsenal and facilities, escalating fears that militants may acquire nuclear material or a nuclear device.[209] **Overall Grade: C-**

1. Banning Nuclear Testing: D+

Pakistan has not signed the CTBT, and in 2009, Pakistani officials ruled out signing the treaty due to its security situation with India. Pakistani Foreign Ministry spokesman Abdul Basit told reporters in June 2009 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.[210] Yet, Pakistan may be reverting back to its 1998 pledge. 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.[211] Following the 1998 nuclear test explosions by India and Pakistan, the UN Security Council in Resolution 1172 demanded that they refrain from conducting further nuclear tests.

A plus (+) is added to the grade because Islamabad declared a test moratorium following its 1998 nuclear tests. Pakistan also voted in favor of a UN General Assembly resolution supporting the CTBT in 2012.

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 ability to do so would essentially freeze the asymmetry between its fissile material stores and that of India, leaving it at a permanent disadvantage.[212] Pakistan has argued that the 2008 NSG exemption for nuclear cooperation with India will increase that disadvantage. A 2012 report estimated that Pakistan has produced a total of approximately 135 kilograms of separated plutonium. Pakistan has two operating heavy-water reactors. A third reactor is believed to have begun operations in 2012, and satellite imagery suggests that construction on a fourth reactor began in 2011.[213] Pakistan also produces HEU for its nuclear-weapons program and its stockpile is estimated at 2.75 tons. It has a confirmed centrifuge plant for this purpose at Kahuta, and a possible second facility at Gadwal.[214]

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 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.[215] 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.[216] Pakistan again blocked consensus on approving an agenda at the CD in 2013.

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.[217] **2010 grade: F**

3. Reducing Nuclear Weapons Alert Levels: A

Pakistan's nuclear warheads are believed to be stored in a disassembled state, with the fissile core kept separate from the warhead package.[218] Pakistani officials maintain that its nuclear weapons are equipped with permissive action links and require at least two people to authorize their use.[219]

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.[220] 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 and U.S. Undersecretary of Defense Michele Flournoy described Pakistan's command and control system as "very solid" during an April 29, 2010, hearing.[221] **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 90-110 warheads. Khalid Banuri, director of arms control and disarmament affairs for the Strategic Plans Division, said in December 2011, that Pakistan's nuclear deterrence requirement "remains dynamic" and "cannot be quantified."[222]

U.S. Defense Intelligence Agency Director Stephen Burgess told the Senate Armed Services Committee on March 10, 2011, that 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.[223] In particular, Pakistan has continued to develop ballistic and cruise missile capabilities. In April 2011, Pakistan test-fired the Hatf-9, a short-range nuclear-capable ballistic missile that experts assess could indicate Islamabad's intention to develop tactical nuclear weapons.[224] **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 the 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 2008, Pakistani President Asif Ali Zadari said that Islamabad would not use nuclear weapons first against India.[225] It is not clear, however, if this statement reflects current doctrine. 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.[226] **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.

A minus (–) is added to the grade because 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.[227]

Pakistan's objection to resolutions supporting an NWFZ in the region appears at odds with Zadari's claim that he has asked India to join Pakistan in establishing a nuclear-free South Asia. In a 2008 interview, Zadari said, "I am willing to assure the world through—on behalf of my parliament, that if India comes with us, we can together jointly sign… a nuclear-free [zone in] South Asia."[228] **2010 grade: C-**

7. IAEA Safeguards: C

Currently, only select Pakistani civilian nuclear facilities, including the Karachi Nuclear Power Plant and the Chashma Nuclear Power Plant, are governed under a limited-scope IAEA safeguards arrangement.[229] **2010 grade: C**

8. Nuclear Weapons-Related Export Controls: C-

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.[230] Case studies provided by the French National Directorate of Customs Intelligence and Investigations to the Financial Action Task Force for a June 2008 report on proliferation financing detail efforts by the Pakistani Department of Defense and associated entities to illegally acquire equipment for missiles and unmanned aerial vehicles.[231] Pakistani trading companies are also believed to be involved in illicit efforts to acquire components for Islamabad's uranium-enrichment program.[232]

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.[233] 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.

Pakistan's grade in this category has improved because Islamabad has taken many steps since 2010 to adhere to Resolution 1540 following revelations regarding the nuclear smuggling network run by Khan.[234] 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."[235] In a March 2012 report to Congress, the State Department described the Khan network as "defunct."[236] 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."[237]

A minus (-) is added because certain dual-use items may be slipping past Pakistan's export control system, according to an assessment by the U.S. National Director of Intelligence in 2011. **2010 grade: F**

9. Nuclear Security Commitments: B*

Pakistan acceded to the CPPNM in 2000, but it has not yet acceded to the 2005 amendment.[238] 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. Pakistan participates in the GTRI. Pakistan's grade in this category has been updated to a B because Pakistan has not ratified the 2005 amendment to the CPPNM.

An asterisk (*) is added to the grade because severe political instability in Pakistan in 2009 stemming from the actions of the Taliban and other extremists significantly raised international concerns regarding nuclear security in the country, including that of its nuclear arsenal. Pakistani officials continue to maintain that Islamabad's arsenal is secure and that they are prepared to deal with any contingency.[239] After an attack on a Pakistani air force base in August 2012, the United States stated that it is the opinion of the U.S. government that Islamabad's nuclear weapons are adequately secured.[240] This report does not intend to address whether Pakistani nuclear security measures are sufficient to address its internal threats, but rather whether Islamabad has undertaken commitments to adhere to global standards on nuclear security.

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.[241] Cooperation has been limited by speculation over U.S. contingency plans designed to secure Pakistani nuclear weapons in a crisis.[242]

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.[243] **2010 grade: A**

10. Criminalization and Illicit Trafficking Commitments: B

Pakistan participates in the ITDB and the Global Initiative to Combat Nuclear Terrorism. **2010 grade: B**

Democratic People's Republic of Korea

The only state to have declared its withdrawal from the NPT, North Korea has been a focal point for nuclear nonproliferation efforts for 20 years. After IAEA inspectors found North Korea to be cheating on its nonproliferation obligations in the 1990s, the United States entered into the so-called Agreed Framework in 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, having now tested three nuclear devices. In addition, North Korea continues to pursue advances in ballistic missiles as a stated delivery vehicle for its nuclear warheads. The six-party talks framework was established 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 three sets of sanctions in response to its 2006, 2009, and 2013 nuclear tests.[244] In December 2012, 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 is directly applicable to ballistic missile development. Despite this success, experts assess that North Korea remains years away from development of an ICBM, given the many technical differences between the two types of systems.[245] In addition to its own nuclear weapons efforts, North Korea has been a key supplier of nuclear weapons-related and missile technologies to other states, increasing proliferation threats in South and Southeast Asia and the Middle East. **Overall Grade: F**

1. Banning Nuclear Testing: F

Pyongyang has not signed the CTBT and is the only country to have tested a nuclear weapon in the past 14 years, conducting tests in June 2006, May 2009, and February 2013. Also, Pyongyang has left open the possibility that it will test additional nuclear devices.[246]

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 2012. In a September

7, 2012, statement for a conference on nuclear disarmament and nonproliferation in Moscow, a North Korean Foreign Ministry official said that the CTBT entry into force would "make a great contribution to world peace and stability" but any "unilateral execution" of the treaty would "give rise to serious inequality and imbalance."[247]

On February 29, 2012, North Korea and the United States negotiated the so-called Leap Day agreement, whereby Pyongyang would refrain from further nuclear and missile tests and allow for IAEA inspectors in exchange for food aid from the United States. The deal fell apart in April of that year after North Korea attempted to launch a satellite. The United States said that because satellite technology is applicable to ballistic missile development and prohibited by UN Security Council resolutions, North Korea violated the terms of the agreement. North Korea claimed that the Leap Day agreement did not cover satellite launches.[248] **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, it declared that it would restart plutonium production in response to UN condemnation of its missile tests in April 2009.[249] 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.[250] North Korea is also constructing a light-water reactor (LWR) that experts assert could be configured to produce weapons-grade plutonium.[251]

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.[252] 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.[253] **2010 grade: F**

3. Reducing Nuclear Weapons Alert Levels: D

North Korea claims that it has weaponized all of its plutonium, but it is unclear if it has nuclear weapons in a deliverable form. The U.S. Defense Intelligence Agency assesses that North Korea may be capable of mating a nuclear warhead with a ballistic missile.[254] It remains unclear in what status Pyongyang's nuclear devices would be maintained or what procedures are in place to prevent unauthorized use. **2010 grade: D**

4. Nuclear Force Reduction: D

North Korea has declared that it would continue to enhance its nuclear weapons capabilities. 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. Currently, experts estimate that Pyongyang has enough weapons-grade plutonium for four to eight bombs, although it is not clear how North Korea would deliver its nuclear weapons. In October 2012, soon after South Korea announced that it would extend its ballistic missile range, Pyongyang indicated that it would start testing long-range ballistic missiles for the purposes of delivering nuclear warheads, although North Korea's ability to miniaturize a warhead to fit on a missile is questionable, and it remains years away from an ICBM capability.[255] The February 2013 nuclear test and December 2012 satellite launch, however, likely increased Pyongyang's knowledge and technical capacity for nuclear and ballistic missile development. **2010 grade: F**

5. Negative Security Assurances: F

Although North Korea generally refers to its nuclear weapons capabilities as a deterrent, it has threatened to use nuclear weapons against perceived threats, including against the United States and South Korea, a non-nuclear-weapon state.[256] These threats are often made in response to annual U.S.-South Korean joint military exercises. **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.[257] 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.[258]

North Korea has occasionally supported UN General Assembly resolutions on various NWFZs.[259] **2010 grade: F**

KNS/AFP/Getty Images

On December 12, 2012, North Korea launched a satellite using an Unha-3 rocket. Unha-3 technology is applicable to ballistic missile development.

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.[260] The IAEA maintains that North Korea is still bound by its safeguards agreement despite North Korea's insistence otherwise. 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.[261] The IAEA continues to monitor developments in North Korea's nuclear program and submits reports to the agency's Board of Governors. **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.[262] In June 2012 the UN committee that monitors the implementation of sanctions on North Korea released a report, which noted that North Korea maintains extensive networks that allow it to procure illicit materials for its nuclear and ballistic missile programs.[263] Press reports of October 2012 testimony to the UN committee that monitors sanctions enforcement indicates that North Korea has continued these activities over the past year.[264]

North Korea has not submitted a report to the 1540 Committee and is currently facing sanctions resulting from its nuclear tests in 2006 and 2009. 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.[265] 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.[266] **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. It is not a participant in any international nuclear security initiatives. **2010 grade: D**

10. Criminalization and Illicit Trafficking Commitments: F

North Korea is a key nuclear trafficking concern and is not known to have enacted any measures to address the issue. In 2012, several countries reported to the UN Security Council sanctions committee interdictions of materials related to ballistic missile or centrifuge development, including a suspected shipment of graphite rods to Syria.[267] Japanese Chief Cabinet Secretary Yoshihide Suga confirmed one of these reports on March 18, 2013, when he issued a statement saying that the North Korean cargo confiscated by Japan last August contained graphite rods bound for Burma.[268] North Korea is prohibited from exporting graphite rods because they can be used for centrifuges and ballistic missiles. **2010 grade: D**

Iran

Iran has been a major international concern for nuclear proliferation since the existence of previously undeclared nuclear activities was revealed in the fall of 2002. The IAEA has continued to press Iran for clarification regarding the history of those activities dating back to the mid-1990s, and has sought to enhance its monitoring capabilities in the country, including calling on Tehran to ratify and implement an additional protocol to its safeguards agreement. The IAEA Board of Governors referred Iran's nuclear file to the UN Security Council in 2006. Since that time, the council has adopted four increasingly severe sanctions resolutions in response to Iran's failure to meet the council's demand to suspend uranium enrichment.[269] In addition to concerns about Iran's enrichment program, the IAEA has expressed concern that Tehran has engaged in activities relevant to the development of a nuclear warhead and has unsuccessfully sought answers from Iran regarding these suspicions. In an annex to the November 2011 report to the IAEA Board of Governors, the agency laid out its suspicions about possible military dimensions of Iran's nuclear program.[270] Beginning in early 2012, the agency has been in negotiations with Iran on a modality to investigate these activities. After a year of negotiations between the IAEA and Iran, however, no progress has been made on a structured approach.[271] **Overall Grade: D+**

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. After signing, 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.[272] 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."[273]

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.[274]

A minus (–) is added to the grade because Iran's commitment to the CTBT has come into question in recent years, as the IAEA laid out its suspicions that Iran pursued activities related to the development of nuclear weapons. Documentation includes alleged diagrams for an underground test site consistent with a nuclear weapons test and computer simulations of nuclear explosions.[275] Iran claims that the

Office of the Presidency of the Islamic Republic of Iran via Getty Images

Iranian President Mahmoud Ahmadinejad visits the Natanz nuclear facility in April 2008. Iran continues to increase its uranium enrichment capabilities at Natanz, installing more-advanced centrifuges at the facility in 2013.

documentation has been fabricated. **2010 grade: B-**

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

2010 grade: N/A

3. Reducing Nuclear Weapons Alert Levels: N/A

2010 grade: N/A

4. Nuclear Force Reductions: N/A

2010 grade: N/A

5. Negative Security Assurances: 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, and that has been a key international nonproliferation goal since that proposal in 1974.[276] 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. It has also supported resolutions pertaining to NWFZs in other regions.

Suspicions of an Iranian nuclear weapons effort and Tehran's lack of cooperation with the IAEA regarding its nuclear program severely undermine Iran's stated commitment to fostering conditions in which a zone in the region could be established. Therefore, in spite of its rhetorical support for an WMD-free zone in the Middle East, it cannot currently be considered to be taking steps toward that purpose. Iran agreed to participate in a conference on establishing a WMD-free zone in the Middle East in December 2012, as mandated by the 2010 NPT Review Conference. Although the meeting was postponed, some analysts question whether Iran seriously intended to attend the conference.[277] **2010 grade: C-**

7. IAEA Safeguards: F

In September 2005, the IAEA Board of Governors adopted a resolution that found that Iran's undeclared nuclear activities prior to 2003 constituted noncompliance with its safeguards obligations.[278] Since 2003, Iran has failed to cooperate fully with the

agency in an ongoing investigation into its past and present nuclear activities. In particular, the IAEA stated in a November 2009 report to its Board of Governors that Iran's failure to notify the agency of the construction of an enrichment plant near the city of Qom prior to September of that year "was inconsistent with its obligations" under its safeguards agreement.[279] Along the same lines, the report also stated that Iran could not unilaterally reinterpret a provision of its safeguards agreement regarding when it is required to notify the agency about the construction of nuclear facilities. According to the IAEA, Iran is the only country "with significant nuclear activities" that is not implementing a safeguards provision requiring a state to provide the agency with notification and design information as soon as a decision is made to construct a nuclear facility.[280]

Iran also has failed to fully account for a number of activities it has admittedly or allegedly carried out that the IAEA has declared may have relevance to a nuclear weapons program, including in areas like high-explosives testing and computer simulations of re-entry vehicles for warheads. In November 2011, the IAEA laid out these suspicions in an annex to its quarterly report to the IAEA Board of Governors.[281] Beginning in early 2012, the IAEA attempted to negotiate an approach with Iran for investigating these allegations, but has made no progress.[282]

Iran voluntarily began implementing an additional protocol after signing it in December 2003, but halted this cooperation in February 2006 in response to its referral to the Security Council by the IAEA that month. Iranian officials have stated that Tehran will only ratify its additional protocol once the Security Council drops its consideration of Iran's nuclear program and it is addressed solely by the IAEA.[283] Both the IAEA and the Security Council have repeatedly called on Iran to ratify the measure. **2010 grade: F**

8. Nuclear Weapons-Related Export Controls: F

Iran has been 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. The UN Security Council established international controls 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.[284]

Iran is still believed to be engaged in a concerted effort to acquire prohibited technologies by circumventing NSG, MTCR, and UN restrictions. A 2012 report by the U.S. Director of National Intelligence concluded that Iran "remains dependent on foreign suppliers for some key missile components" and has "marketed at least one ballistic missile system for export."[285] The U.S. Department of the Treasury sanctioned more than 100 entities suspected of involvement in Iran's nuclear and missile programs, including procurement.[286] Moreover, in the last several years, including in 2012, a number of Iranian nationals or Iranian officials have been arrested in other countries for involvement in procuring goods and technologies in violation of national and international export restrictions.[287] These procurements included items relevant for Iran's nuclear and missile programs. **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.[288]

A plus (+) is added to the grade because Iran has an IAEA safeguards agreement in force, and the AEOI acts as a nuclear regulatory authority that addresses physical protection and the licensing of facilities and entities.[289] **2010 grade: D+**

10. Criminalization and Illicit Trafficking Commitments: C

Iran participates in the ITDB. **2010 grade: C**

Syria

Concerns about Syrian nuclear aspirations became particularly acute in 2007 when Israel destroyed a facility widely suspected of being 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 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 extent of any nuclear weapons program is still unknown. Violent conflict broke out in Syria between opposition forces and Syrian President Bashar al-Assad's military forces in March 2011. The International Committee of the Red Cross designated the conflict a civil war in July 2012 and in March 2013, the Arab League recognized the delegation from the opposition as the representative of Syria for its plenary meeting. However, the positions reflected in this report are those of the Assad government.

Overall Grade: D-

1. Banning Nuclear Testing: C

Syria is an NPT member, but has not signed the CTBT. Its ratification is not required for the treaty's entry into force. **2010 grade: C**

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

2010 grade: N/A

3. Reducing Nuclear Weapons Alert Levels: N/A

2010 grade: N/A

4. Nuclear Force Reductions: N/A

2010 grade: N/A

5. Negative Security Assurances: 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 proposed a resolution in the UN Security Council toward that goal in April 2003, although suspicion of possible Syrian nuclear weapons efforts suggests that commitment was not sincere.[290] In April 2008, the United States publicly accused Syria of building a nuclear reactor at a site called Dair al Zour, intended to produce plutonium for weapons.[291] Syria is not believed to have continued its suspected nuclear weapons effort following the destruction of the Dair al Zour facility by Israel in September 2007, but it has not cooperated with the IAEA investigation into the facility, according to the August 2012 report by the agency.[292]

Syria has supported UN General Assembly resolutions, most recently in 2012, supporting the establishment of NWFZs in Central Asia, the Middle East and Southeast Asia and the recognition of a nuclear-weapon-free Southern Hemisphere.[293] **2010 grade: C**

7. IAEA Safeguards: F

Syria concluded a comprehensive nuclear safeguards agreement with the IAEA in 1992.[294] Since June 2008, however, Syria has failed to cooperate with an ongoing IAEA probe into suspected undeclared nuclear activities, including any role played by the facility at Dair al Zour prior to its destruction. In the May 2011 report on Syria to the IAEA Board of Governors, the agency concluded that it was very likely that the Dair al Zour site was a nuclear reactor that should have been declared to the IAEA. The agency was unable to confirm the nature of three other sites. The U.S. intelligence community assessed that the reactor "would have been capable of producing plutonium for nuclear weapons."[295]

In October 2011 meetings with the IAEA, Syria indicated that it would cooperate with an agency investigation and allow inspectors access to Dair al Zour, but would not discuss or provide access to the other locations about which the IAEA expressed concern. In February 2012, Syria said it would respond to the IAEA request to visit all facilities, but as of the August 2012 IAEA report, no response from Syria has been noted.[296] In late February 2013, Syrian opposition forces allegedly took over the site. IAEA Director-General Yukiya Amano said on March 4, 2013, that he was aware of reports that the opposition forces offered to invite the IAEA personnel to Dair al Zour to inspect the remains of the facility, but the agency had not received any communication to that effect.[297]

The IAEA has been able to carry out physical inventory verification missions at Syria's Miniature Neutron Source Reactor and continues to monitor the yellowcake storage area near Homs.[298] **2010 grade: F**

8. Nuclear Weapons-Related Export Controls: F

Damascus is believed to continue to import materials and technology for its ballistic missile program from Iran and North Korea in violation of UN sanctions.[299] 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."[300] Press reports have indicated that North Korea attempted to send graphite rods to Syria in 2012 that could be used for ballistic missiles.[301] **2010 grade: F**

9. Nuclear Security Commitments: D+

Syria has not signed the CPPNM.

A plus (+) is added to the grade because Syria has taken some steps to implement nuclear security measures domestically, including agreeing to implement the IAEA Code of Conduct.[302] **2010 grade: D+**

10. Criminalization and Illicit Trafficking Commitments: F

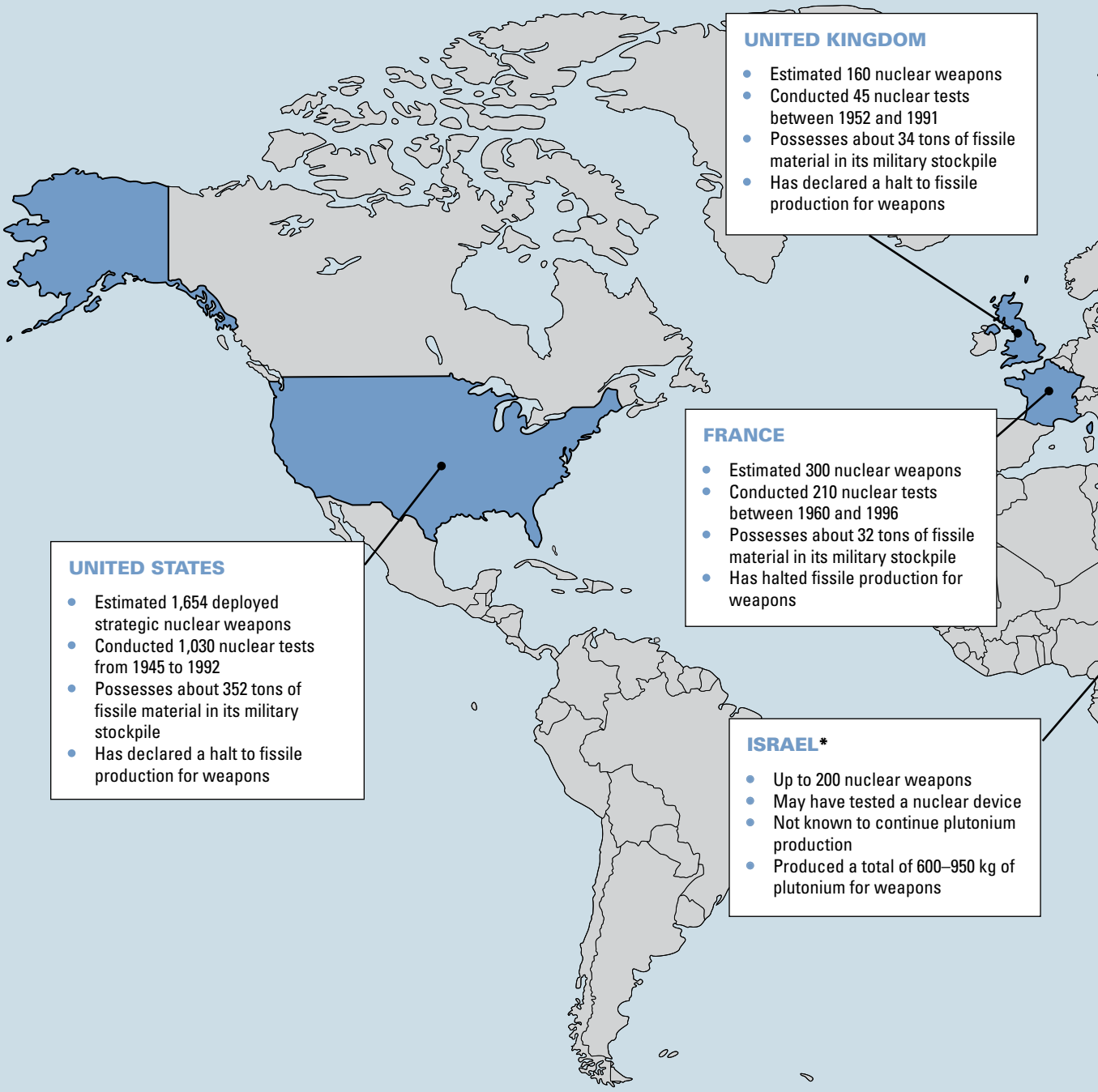
Syria does not participate in any arrangements on preventing nuclear terrorism and illicit trafficking, and experts widely believe that the Syrian regime has transferred Scud missiles and other armaments across the border with Lebanon to Hezbollah.[303]

Syria signed the Nuclear Terrorism Convention in September 2005, but has yet to ratify the treaty. **2010 grade: D+**

Atta Kenare/AFP/Getty Images

Syrian President Bashar al-Assad has not cooperated with a 2008 request by the IAEA to investigate undeclared nuclear activities in Syria.

Key Figures for 11 Select States



UNITED KINGDOM

- Estimated 160 nuclear weapons
- Conducted 45 nuclear tests between 1952 and 1991
- Possesses about 34 tons of fissile material in its military stockpile
- Has declared a halt to fissile production for weapons

FRANCE

- Estimated 300 nuclear weapons
- Conducted 210 nuclear tests between 1960 and 1996
- Possesses about 32 tons of fissile material in its military stockpile
- Has halted fissile production for weapons

UNITED STATES

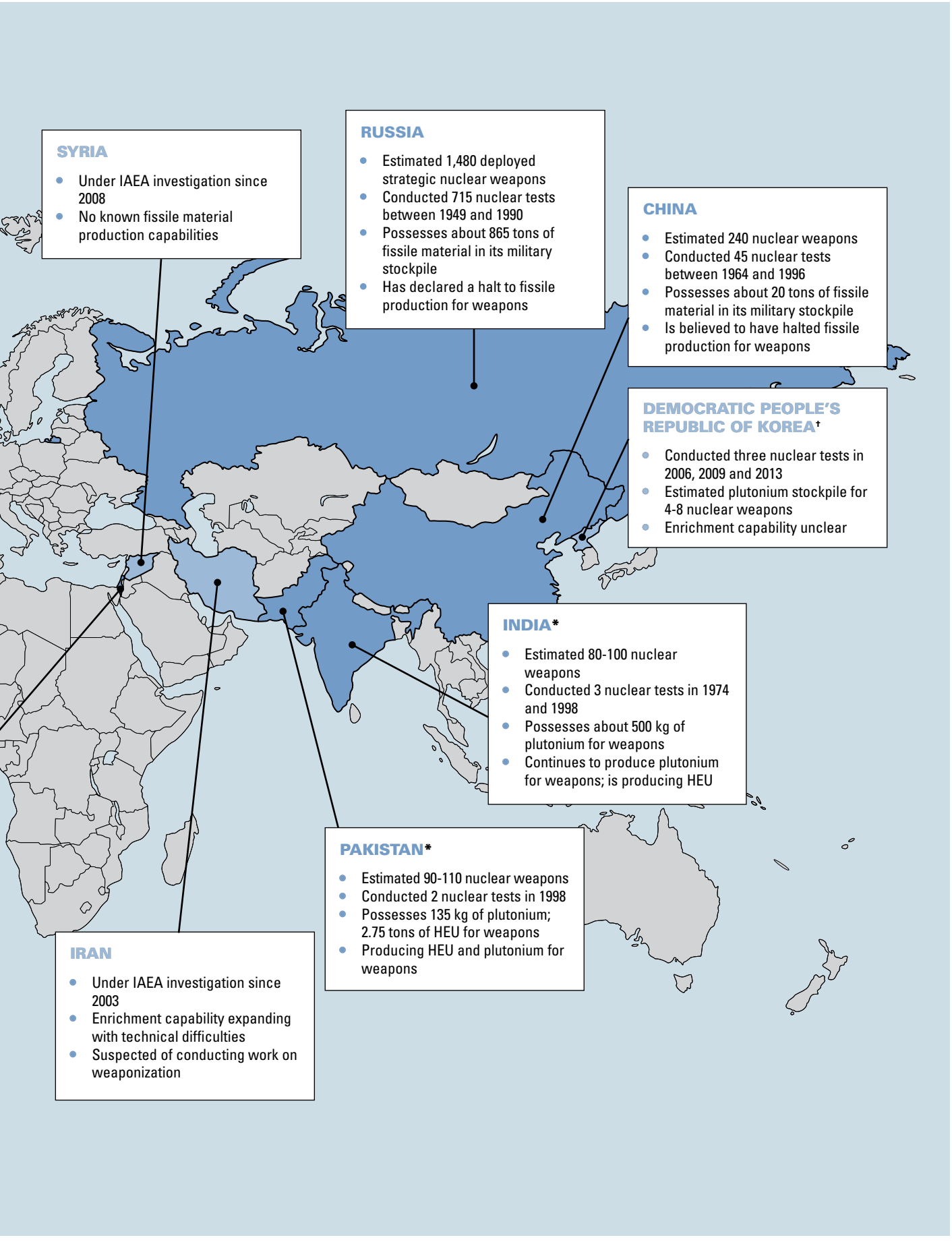
- Estimated 1,654 deployed strategic nuclear weapons
- Conducted 1,030 nuclear tests from 1945 to 1992
- Possesses about 352 tons of fissile material in its military stockpile
- Has declared a halt to fissile production for weapons

ISRAEL*

- Up to 200 nuclear weapons
- May have tested a nuclear device
- Not known to continue plutonium production
- Produced a total of 600–950 kg of plutonium for weapons

* 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 1,480 deployed strategic nuclear weapons
Conducted 715 nuclear tests between 1949 and 1990
Possesses about 865 tons of fissile material in its military stockpile
Has declared a halt to fissile production for weapons
CHINA
Estimated 240 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 three nuclear tests in 2006, 2009 and 2013
Estimated plutonium stockpile for 4-8 nuclear weapons
Enrichment capability unclear
INDIA*
Estimated 80-100 nuclear weapons
Conducted 3 nuclear tests in 1974 and 1998
Possesses about 500 kg of plutonium for weapons
Continues to produce plutonium for weapons; is producing HEU
PAKISTAN*
Estimated 90-110 nuclear weapons
Conducted 2 nuclear tests in 1998
Possesses 135 kg of plutonium; 2.75 tons of HEU for weapons
Producing HEU and plutonium for weapons
IRAN
Under IAEA investigation since 2003
Enrichment capability expanding with technical difficulties
Suspected of conducting work on weaponization

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 on 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

Indonesia, an Annex 2 state, ratified the treaty in 2012. Egypt, another Annex 2 state, has signed the CTBT and professes support for its aims, but so far has not ratified the pact.

Indonesia

Indonesia announced in May 2010 that it would seek ratification of the accord, and its legislature ratified the CTBT on December 6, 2011, formally depositing its instrument of ratification with UN Secretary-General Ban Ki-moon on February 6, 2012. Indonesia's ratification lowered the number of Annex 2 states that have not ratified the treaty to eight. Indonesian Foreign Minister Marty Natalegawa said in September 2011 that Indonesia hopes to "create new momentum so that the other countries in a similar position to Indonesia can also follow suit in beginning their ratification process," adding that Indonesia believes that the CTBT is "one of the main instruments for nuclear disarmament."[304]

Egypt

Of the eight remaining Annex 2 states whose ratification is necessary for the CTBT to enter into force, Egypt is the only one not assessed as one of the 11 states in the report. Cairo has linked progress on CTBT ratification to efforts to implement the 1995 Resolution on the Middle East, which calls for the establishment of a WMD-free zone in the region. Egypt reiterated this position in its statement at the 2011 Conference on Facilitating the Entry Into Force of the CTBT, stating that "the faithful implementation" of the resolution, which includes a call for NPT universality, is necessary for the successful ratification of the CTBT.[305] Toward this end, Egypt co-hosted a conference entitled "Towards a Zone Free of Nuclear Weapons and All Other WMD in the Middle East" with the Arab League in May 2012 and agreed to participate in a December 2012 formal conference on establishing such a zone, which was indefinitely postponed by the United States on November 23, 2012.[306] Cairo has not indicated whether it will adjust its position on the CTBT following the postponement of the conference.

Nuclear Force Reductions

NATO

Long-standing nuclear-sharing arrangements between the United States and several of its NATO allies allow some non-nuclear-weapon states to play a direct role in nuclear force reductions.[307] Independent estimates suggest that the United States continues to station 150 to 240 nonstrategic nuclear weapons at six bases in Belgium, Germany, Italy, the Netherlands, and Turkey.[308] Under the nuclear-sharing arrangements, these countries provide the aircraft that would deliver the nuclear bombs to their targets.

In October 2009, the German government said that, in the context of discussions on NATO's new Strategic Concept over the following year, Berlin would "advocate a withdrawal of remaining nuclear weapons from Germany."[309] Senior German officials continue to express their support for the removal of these weapons. Rolf Nikel, Germany's federal government commissioner for disarmament and arms control said on February 21, 2013 that "[s]ubstrategic nuclear weapons in Europe are of a questionable military value. If it had only been for us, we could live without them."

The 2010 Strategic Concept stated that NATO should "seek Russian agreement to increase

CTBTO Preparatory Commission

Indonesian Foreign Minister Marty Natalegawa speaks to members of parliament on December 6, 2011, the day that the country ratified the CTBT. Indonesia's ratification was necessary for the CTBT to enter into force.

transparency on its nuclear weapons in Europe and relocate these weapons away from the territory of NATO members" and called for a NATO Deterrence and Defense Posture Review (DDPR) to evaluate issues and options.

However, NATO's May 2012 DDPR did not call for any immediate shift regarding the stationing of U.S. nuclear gravity bombs in five European NATO member states, including in Germany.[310] The 2012 DDPR stated that nuclear weapons remain "a core component of NATO's overall capabilities for deterrence and defence" and that the organization's "nuclear force posture currently meets the criteria for an effective deterrence and defence posture."[311] The United States is planning to extend the service life of the B61 bombs currently stationed Europe.

NATO members continue to reiterate that the weapons stationed in Europe could be removed in the context of negotiations on nonstrategic nuclear weapons with Russia, which has a much larger arsenal of such weapons.[312] The 2012 NATO DDPR also indicated that the alliance would be willing to reduce its nonstrategic nuclear weapons "in the context of reciprocal steps by Russia."[313] In early 2013, NATO formally created a committee to help develop proposals for transparency measures relating to nonstrategic weapons in Europe.

Nuclear-Weapon-Free Zones

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.

Within the time frame of this report, Russia is the only nuclear-weapon state to have ratified the protocol of a treaty establishing an NWFZ, depositing its ratification of the Treaty of Pelindaba, which established an NWFZ in Africa, in April 2011.[314]

None of the five states have signed or ratified protocols to the Central Asian NWFZ, which entered into force in 2009 with five states-parties: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan.

France, the United Kingdom, and the United States objected to the stipulation in the treaty that allows for previous security agreements to take precedence over its provisions. In particular, they are concerned about terms in the 1992 Tashkent Collective Security Treaty that allow Russia to transport nuclear weapons through the region or deploy them there in the future.[315]

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.

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. Little progress has been made to implement that resolution.

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. The states-parties also agreed that the conference would be preceded by a series of preparatory consultations among states in the region, led by a UN-appointed facilitator, Finnish Undersecretary of State Jaako Laajava. Relevant international organizations, including the Organisation for the Prohibition of Chemical Weapons and the IAEA, are to be engaged in this preparatory work.

In November 2012, the United States, as one of the convenors of the conference, announced that the December meeting would be postponed due to an inability of the states in the region to reach agreements on core issues and the agenda for the conference.[316] At the time of the November statement, all of the countries in the proposed zone had agreed to attend the meeting, with the exception of Israel.

The Arab League threatened to boycott the NPT preparatory committee meeting in April 2013 if the conference is not rescheduled.[317]

South Pacific Nuclear Weapons Free Zone

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. 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.[318]

In 2011, 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. Since then, the Australian government has engaged in talks with New Delhi on a civil nuclear cooperation agreement that would allow for the sale of uranium to India for energy production. The arrangement appears to be at odds with Australia's past political and treaty commitments.

Mongolia

In September 2012, the five nuclear-weapon states signed political declarations recognizing Mongolia's nuclear-weapon-free status. Although these declarations are not legally binding, the five states did reaffirm their pledges not use nuclear weapons against Mongolia. Mongolia's own domestic laws prohibit any activities related to nuclear weapons development within the state.[319]

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 February 2013, the following 12 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, Djibouti, Guinea, Timor-Leste	Equatorial Guinea, Eritrea, Federated States of Micronesia, Liberia, Sao Tome and Principe, Somalia, Vanuatu

Nuclear Weapons-Related Export Controls

Nuclear Suppliers Group

One of the critical elements of strengthening the nuclear nonproliferation regime has been efforts to address the most sensitive aspects of the nuclear fuel cycle: uranium enrichment and spent fuel reprocessing. One decision that has been under consideration over the past several years has been the development of criteria under which NSG members would agree to transfer these technologies to additional states.[320]

The criteria being discussed by the NSG for transfers of sensitive fuel-cycle technology include objective and subjective elements. The objective criteria include requirements that the state is a member of the NPT, has comprehensive safeguards and an additional protocol in force, and is in compliance with its IAEA safeguards obligations. The subjective standards include taking into account the security environment of the region and the potential impact of any transfers on regional stability.

After years of negotiations, the NSG reached an

agreement on criteria for transferring enrichment and reprocessing technology during the June 2011 meeting of member states. Under the new guidelines, the transfer of reprocessing and enrichment technology to countries that are not in compliance with or party to the NPT, do not have comprehensive IAEA safeguards, or do not allow for more-extensive IAEA monitoring are banned.[321] Prior language from the NSG guidelines required only that member states "exercise restraint" when exporting these technologies.

Nuclear Security, Criminalization, and Illicit Trafficking Commitments

Nuclear Security Summit

The United States convened the first nuclear security summit in April 2010 to agree on steps to secure fissile material from theft or misuse within four years. The summit was chaired by President Barack Obama and attended by 47 national delegations and representatives of major international organizations.[322] Discussion focused on the threat posed by unsecured nuclear material falling into the hands of terrorists, and the participants agreed to a communiqué and a work plan outlining steps to address that threat.

A second summit, held in Seoul in March 2012 and attended by 53 countries, reaffirmed the commitments made in 2010.[323] The communiqué from the Seoul summit set the aspirational goal of entry into force of the 2005 amendment to the CPPNM by 2014 and requested that states announce steps on HEU use minimization. Additionally, it emphasized the importance of the GICNT and implementation of Resolution 1540. Many countries offered further unilateral commitments to improve nuclear security and prevent nuclear trafficking.

State	National Achievements and Commitments of the 2012 Nuclear Security Summit[324]
Algeria	Updating its domestic regulations to strengthen nuclear security; joining the Global Initiative to Combat Nuclear Terrorism (GICNT); established a Nuclear Security Training and Support Center in 2011
Argentina	Incorporating nuclear security in courses on nuclear and radiation safety in its training centers; ratified the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material (CPPNM); joined the GICNT in June 2010
Armenia	Ratifying the 2005 Amended CPPNM; enacting a Law on Regulation of State Register and Control of nuclear materials; developing national rules on the physical protection of radioactive materials
Australia	Repatriating surplus stocks of HEU in 2013; inviting the IAEA's International Physical Protection Advisory Service (IPPAS) in 2013; developing technologies to improve nuclear detection and forensic capabilities
Azerbaijan	Established a national registry of all radioactive sources; strengthening export control system to combat illicit trafficking of nuclear materials
Belgium	Repatriating unneeded HEU and separated plutonium to the US; converting a research reactor and a processing facility for medical radioisotopes from using HEU to LEU; participating in a joint project to qualify high-density LEU fuel to replace HEU fuel in research reactors; contributing to the IAEA Nuclear Security Fund (NSF)
Brazil	Ratifying the 2005 Amended CPPNM; revising domestic regulations on nuclear and radiological security; establishing a Nuclear Security Support Centre
Canada	Ratifying the 2005 Amended CPPNM and the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT); repatriating US-origin spent HEU to the US; exploring an alternate method to replace HEU in the production of medical radioisotopes; supporting US-led HEU cleanout projects in Mexico and Viet Nam; championing the expansion of the membership of the Global Partnership; contributing to the IAEA NSF
Chile	Working toward the legislation of a Nuclear Security Bill; strengthening monitoring capability at critical border posts; drafting and updating national regulatory instruments on nuclear security; establishing a Nuclear Security Support Center; developing a centralized remote system to monitor radioactive sources
China	Converting miniature research reactors in China and those in other countries from using HEU fuel to LEU fuel; advancing the establishment of a Center of Excellence on nuclear security; establishing a Radiation Detection Training Center in customs; implemented the Yangshan Port Pilot Program in Shanghai as part of the Megoport Initiative

Czech Republic	Repatriating remaining HEU from research reactors to its origin state; enacting a new version of the Atomic Act to harmonize it with international norms on nuclear security and safety
Denmark	Contributing to the IAEA NSF directed at activities in the wider Middle-Eastern and North African region; championing the development of an EU report on the security of nuclear power plants by the EU Ad Hoc Council Working Group
Egypt	Established an independent authority for controlling nuclear materials; intending to organize a regional workshop on IAEA ITDB in 2012
Finland	Revising its nuclear security regulatory requirements to reflect the latest developments of the IAEA's recommendations; conducting a follow-up mission of the IAEA's IPPAS; updating the national DBT (Design Basis Threat) process
France	Participating in a joint project to qualify high-density LEU fuel to replace HEU fuel in research reactors; working on a joint project to replace HEU targets with LEU targets in the production of medical radioisotopes; ratifying the 2005 Amended CPPNM and the ICSANT; hosting an international seminar on the IAEA IPPAS in 2013 in collaboration with the IAEA; repatriating French origin radioactive sources worldwide to France
Gabon	Enacting a new Bill on the Regulatory Framework of Nuclear and Radiation Safety, Security and Safeguards; establishing the Gabonese Agency on Nuclear Safety and Security
Georgia	Ratifying the 2005 Amended CPPNM; enacting the Lawon Nuclear and Radiation Safety to reflect international norms on nuclear security and safety
Germany	Installing a special CBRN reporting scheme for police and customs; championing a gift basket joint statement on security of radioactive sources
Hungary	Completing the conversion of research reactors from using HEU fuel to LEU fuel in 2012 and repatriating remaining HEU to Russia in 2013; compiled a national central registry of all radioactive materials and waste above exemption level; upgrading the physical security system in sites of category 1 or 2 radioactive sources
India	Advancing the establishment of a Global Centre for Nuclear Energy Partnership; establishing an independent Nuclear Safety Regulatory Authority; pledged US $1 million to the IAEA NSF in 2012-13; developed an advanced heavy water reactor based on LEU with new safety and proliferation-resistant features
Indonesia	Ratifying the ICSANT; installing radioactive portal monitors at major key seaports; championing a gift basket joint statement on national legislation implementation kit on nuclear security; preparing a Presidential Decree on the safety and security of nuclear institutions; converting HEU to LEU in the production of radio isotope
Israel	Ratifying the ICSANT; ratified the 2005 Amended CPPNM in March 2012; completed the repatriation of US-origin HEU spent fuel from its Soreq research reactor; operating the Megaport Initiative
Italy	Working to repatriate excess HEU and plutonium to the US by the 2014 Summit; ratifying the 2005 Amended CPPNM and the ICSANT; developing a National Nuclear Security Plan; intending to make permanent the International School on Nuclear Security in Trieste; operating the Megaport Initiative
Japan	Establishing an independent Nuclear Regulatory Agency; augmenting measures to overcome the vulnerabilities in nuclear facilities; established US-Japan Nuclear Security Working Group in November 2010; working on the feasibility study for converting the Kyoto Univ. Critical Assembly to LEU use; working toward the shipment of HEU fuel in Material Testing Reactor to the US; contributing to the IAEA NSF; championing a gift basket joint statement on transport security
Jordan	Creating a counter nuclear smuggling team; championing a gift basket joint statement on activity and cooperation to counter nuclear smuggling
Kazakhstan	Moving spent nuclear fuels which contain more than 10 tonnes of HEU and 3 tonnes of weapons-grade Pu equivalent to 775 nuclear weapons to a safe storage facility; converting a research reactor from using HEU fuel to LEU fuel; strengthening nuclear security measures at the former nuclear test site "Semipalatinsk"; joined the Global at Partnership January 2012; developing the Kazakhstan Regional Training Centre for accounting, control and physical protection of nuclear materials and facilities
Lithuania	Establishing a Nuclear Security Centre of Excellence; hosting a regional workshop on the implementation of the UN Security Council Resolution 1540 in June 2012

Malaysia	Ratifying the 2005 Amended CPPNM and the ICSANT; joining the GICNT; established a Nuclear Security Support Centre; planning to expand the Megaport Initiative to Penang Port in 2012
Mexico	Completed the removal of all HEU stockpiles in February 2012; ratifying the 2005 Amended CPPNM; hosting the 2013 GICNT Plenary Meeting; completing a two-year pilot program on building national capacity to implement the UN Security Council Resolution 1540; joined the GICNT in June 2010
Morocco	Ratifying the 2005 Amended CPPNM; enhancing border control and national capacity to detect illicit trafficking; legislating a new law on nuclear and radiological safety and security which envisages the establishment of an independent authority for nuclear safety and security; established a center of excellence
The Netherlands	Working on a joint project to replace HEU targets with LEU targets in the production of medical radioisotopes; contributing to the IAEA NSF; establishing a Center of Excellence; organizing an international table top exercise on nuclear forensics in November 2012; making mandatory the use of a DBT concept on cyber terrorism for the nuclear sector as from January 2013
New Zealand	Ratifying the 2005 Amended CPPNM and the ICSANT; developing a new radiation safety legislation; provided financial contribution for the work of WINS
Nigeria	Converting a miniature research reactor from using HEU fuel to LEU fuel in cooperation with China, US and the IAEA; ratifying the ICSANT; passing the Nuclear Safety, Security and Safeguards Bill to domesticate international treaties; establishing a nuclear security supporting centre
Norway	Ratifying the ICSANT within the year 2012; contributing to the IAEA NSF; continues to provide financial contribution to the Global Partnership; hosted the 2nd international symposium on HEU minimization in January 2012
Pakistan	Opening Nuclear Security Training Center to act as a regional and international hub; deploying Special Nuclear Material Portals on key exit and entry points to counter the illicit trafficking of nuclear and radioactive materials
Philippines	Ratifying the 2005 Amended CPPNM, and the ICSANT; joined the GICNT in June 2010; drafting regulation on the security of radioactive materials during transport; expanding the Megaport Initiative to Cebu port in 2012
Poland	Removing spent HEU nuclear fuel from research reactors by the end of 2016; completing the conversion of MARIA reactor in the first quarter of 2014; established a system of accounting and controlling nuclear material as well as a registry of radioactive sources
Republic of Korea	Championing a joint project to develop high-density LEU fuel to replace HEU fuel in research reactors; launching a pilot project of real time tracking system of radiological materials based on GPS technology in Viet Nam; ratifying the 2005 Amended CPPNM and the ICSANT; inviting the IAEA's IPPAS mission in 2013; contributing US $1 million to the IAEA NSF; advancing the establishment of a Center of Excellence
Romania	Intending to provide assistance and expertise on conversion of research reactor from using HEU to LEU and repatriation of HEU; inviting IAEA's IPPAS mission; contributing to the IAEA NSF; operating the Megaport Initiative
Russia	Converted excess military HEU to LEU for use in nuclear power plants; received Russian-origin HEU from those countries that have been provided with Russian HEU; assessing the economic and technical feasibility of converting six research reactors from using HEU fuel to LUE fuel jointly with the US; hosting a workshop on nuclear security culture in 2012 in collaboration with the IAEA; organizing a GICNT training on transport security of nuclear and radiological materials in late 2012
Saudi Arabia	Established a Center of Excellence; pledged to contribute US 500,000 dollars to the UN Security Council 1540 Committee
Singapore	Ratifying the 2005 Amended CPPNM and the ICSANT; establishing a national nuclear forensics laboratory by 2013; hosting an ASEM seminar on nuclear safety in 2012; joined the GICNT in June 2010
South Africa	Successfully converted Mo-99 production from the use of HEU to LEU; ratifying the 2005 Amended CPPNM; considering establishing a Center of Excellence in collaboration with the IAEA

Spain	Contributing to the IAEA NSF; serving as the Implementation Assessment Group (IAG) Coordinator for GICNT since 2010; operating the Megaport Initiative; amended anti-smuggling act and export control regulations to effectively respond to illicit nuclear trafficking; launched a nuclear forensics task force
Sweden	Removed several kilograms of separated plutonium to the US in March 2012; ratifying the ICSANT; contributing to the IAEA NSF; implementing the recommendations from the IAEA's IPPAS mission carried out in May 2011
Switzerland	Implementing full administrative compatibility with the IAEA Code of Conduct on the Safety and Security of Radioactive Sources in future revisions of pertinent legislations; drafting a strategy for the protection against cyber attacks
Thailand	Acceding to the CPPNM and ratifying the ICSANT; establishing a nuclear forensics center; operating the Megaport Initiative; initiating the proposal of establishing a network of nuclear regulatory bodies in Southeast Asia; joined the GICNT in June 2010; considering joining the Proliferation Security Initiative (PSI)
Turkey	Ratifying the 2005 Amended CPPNM and the ICSANT; inviting the IAEA's IPPAS mission for a follow-up review in 2012; drafting a new regulation on the physical protection of the nuclear facilities and nuclear material
United Arab Emirates	Establishing a regulatory infrastructure regarding the management of radioactive material; issued new regulations related to nuclear security
Ukraine	Completed the removal of all HEU stockpile; developing a new plan on nuclear security assistance in cooperation with the IAEA; established the State Nuclear Inspectorate to enhance regulatory aspects of nuclear security; established the radioactive detection system to secure the border crossing points in the North of the country and at all main airports and interstate motorways
United Kingdom	Intending to share cutting edge technology in detecting radiological and nuclear material; supporting countries in ratifying the 2005 Amended CPPNM and the ICSANT; chairing a working group on coordinating Centers of Excellence within the Global Partnership; championing a gift basket joint statement on nuclear information security
United States	Put into effect the Plutonium Disposal Agreement signed with Russia on the disposal of 68 tonnes of plutonium (equivalent to 17,000 nuclear weapons); converted 10.5 tonnes of HEU to LEU for use as fuel in nuclear power plants; assisted Russia in converting 2 tonnes of HEU to LEU; assisted the removal of over 400 kilograms of HEU from eight countries; championing gift basket joint statements on the contributions of the GICNT and on the Nuclear Security Summit outreach efforts; championing gift basket joint statements on nuclear security training and support centers and on the Global Partnership; removing all category I and II material at Lawrence Livermore National Laboratory; intending to host a first "International Regulators Conference on Nuclear Security" by the end of 2012; completing new security assessments at all NNSA facilities and completing security upgrades at the Y-12 National Security Complex and a Los Alamos National Laboratory facility; enhancing force-on-force and performance testing for US facilities; recovering over 4,000 unneeded radiological sources; upgrading physical protection at over 175 domestic facilities; enhancing the capability to counter nuclear smuggling; conducting exercise to increase nuclear preparedness; intending to host a workshop on nuclear security as the chair of the Global Partnership; intending to support WINS activities
Viet Nam	Repatriating spent HEU fuels to Russia (expected to be completed in 2013); launching a pilot project on the establishment of a real time tracking system of radiological materials in the country in cooperation with the Republic of Korea and the IAEA; ratifying the 2005 Amended CPPNM; operating the Megaport Initiative; joined the GICNT in June 2010

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.

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4. 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.

5. UN General Assembly resolution, "Prohibition of the production of fissile materials for nuclear weapons or other nuclear explosive devices," A/RES/48/75L.

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.

8. 2010 NPT Review Conference Final Document (Action 3).

9. The earliest proposed nuclear-weapon-free zone (NWFZ) was in 1958, when the Polish government issued a failed call for such a zone in Central Europe in order to prevent the deployment of Soviet nuclear weapons on its territory. See Jozef Goldblat, "Nuclear Weapon Free Zones: A History and an Assessment," *Nonproliferation Review*, No. 4 (Spring-Summer 1997), p. 19.

10. In 1978 legislation, the United States mandated that importers have full-scope safeguards to receive U.S. nuclear exports. At the urging of the United States, the Nuclear Suppliers Group (NSG) adopted the same rule in 1992. NPT states-parties subsequently endorsed this standard in 1995 and 2000.

11. The International Atomic Energy Agency (IAEA) General Conference is an annual meeting of IAEA member states and the agency's "highest policymaking body."

12. Gustavo Zlauvinen, Presentation to the UN General Assembly First Committee, October 17, 2007 (IAEA director-general representative to the United Nations).

13. NSG members are Argentina, Australia, Austria, Belarus, Belgium, Brazil, Bulgaria, Canada, China, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Kazakhstan, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Turkey, Ukraine, the United Kingdom, and the United States.

14. 2010 NPT Review Conference Final Document (Action 36).

15. IAEA, "Nuclear Security," n.d., http://www-ns.iaea.org/security/.

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APPENDIX

Glossary of Terms

1540 Committee: A UN Security Council committee established in 2004 to monitor the implementation of Resolution 1540.

1997 Model Additional Protocol: An agreement designed for states having a safeguards agreement with the International Atomic Energy Agency (IAEA), in order to strengthen the effectiveness and improve the efficiency of the safeguards system as a contribution to global nuclear nonproliferation objectives. The protocol empowers the IAEA to inspect facilities throughout the state. Based on the Model Additional Protocol detailed in IAEA document INFCIRC/540, it is currently a voluntary measure supplementing the Comprehensive Safeguards Agreement.

Conference on Disarmament (CD): The lone multilateral disarmament negotiating forum of the international community, established in 1979 as a result of the Special Session on Disarmament of the United Nations General Assembly held in 1978. The CD, based in Geneva, comprises 65 member states and is sponsored by the United Nations.

Convention on the Physical Protection of Nuclear Material (CPPNM): The only international, legally binding undertaking in the area of physical protection of nuclear material. Signed in Vienna and New York on March 3, 1980, it establishes measures related to the prevention, detection, and punishment of offenses involving nuclear material. A diplomatic conference in July 2005 was convened to amend the convention and strengthen its provisions. The amended convention makes it legally binding for states-parties to protect nuclear facilities and material in peaceful domestic use and storage as well as transport. It provides for expanded cooperation between and among states regarding rapid measures to locate and recover stolen or smuggled nuclear material, mitigate any radiological consequences of sabotage, and prevent and combat related offenses. The amendments will take effect once they have been ratified by two-thirds of the states-parties of the convention.

Convention for the Suppression of Acts of Nuclear Terrorism (Nuclear Terrorism Convention): International agreement opened for signature in 2005 that criminalizes the planning, threatening, or implementation of acts of nuclear terrorism and requires states-parties to pass national legislation to that effect.

Comprehensive Safeguards Agreement: Applies IAEA safeguards to all of the nuclear facilities and activities where source or special fissionable material exists in non-nuclear-weapon states. Known as full-scope safeguards because they apply to a state's entire peaceful nuclear complex, these measures have become a condition for international nuclear trade.

Comprehensive Test Ban Treaty (CTBT): The international treaty that prohibits all nuclear explosions on earth. A global alarm system of 337 facilities worldwide, of which 274 are certified, to stations monitor for any sign of an underground, atmospheric, or underwater nuclear explosion. It was negotiated between 1994 and 1996 and opened for signature on September 24, 1996, at the UN General Assembly.

Comprehensive Test Ban Treaty Organization (CTBTO): Known by the acronym CTBTO, it is the organization set up to implement the provisions of the Comprehensive Test Ban Treaty (CTBT). CTBTO activities include the establishment of a global verification regime to monitor compliance with the treaty and the promotion of the CTBT signature and ratification for early entry into force. The CTBTO was established on November 19, 1996, and consists of a plenary body of state signatories and the Provisional Technical Secretariat. The Comprehensive Nuclear-Test-Ban Treaty Organization, which will also be known by the acronym CTBTO, will be established after entry into force of the CTBT.

Dual-use item: An item that has civilian and military applications.

Enrichment: Increases the percentage of fissile

uranium-235 in a batch of nuclear fuel. Low levels of enrichment are suitable for use in civilian nuclear power reactors, while highly enriched uranium (HEU) can be used to build a nuclear weapon.

Final Document: The final product of a nuclear Nonproliferation Treaty (NPT) review conference. The document represents the consensus view of the states-parties.

Fissile material: Material that contains elements whose nuclei are able to be split by neutrons of various speeds. Uranium-233, uranium-235, and plutonium-239 are all fissile materials. Fissile materials undergo fission more easily than other fissionable materials and are more desirable for most reactor types and essential for nuclear explosives.

Fissile material cutoff treaty (FMCT): A treaty that would end the production of fissile material for weapons purposes and may or may not address existing stocks (see Shannon Mandate). Such a treaty is under discussion at the CD.

Full-scope safeguards: See Comprehensive Safeguards Agreement.

Global Initiative to Combat Nuclear Terrorism: A voluntary association of states, established in 2006, committed to sharing information and expertise in order to prevent nuclear terrorism. Seventy-six states currently participate in the initiative.

Global Partnership Against the Spread of Weapons and Materials of Mass Destruction: An initiative launched in 2002 at the Group of Eight summit in Kananaskis, Canada, to prevent terrorists and those who harbor them from acquiring or developing nuclear, chemical, radiological, and biological weapons; missiles; and related materials, equipment, and technology. There are currently 85 state participants in the program.

Global Threat Reduction Initiative (GTRI): A collaborative program aimed at reducing and protecting vulnerable nuclear and radiological materials located at civilian sites worldwide. Launched in 2004, the GTRI helps the U.S. Department of Energy achieve its nuclear security goal to prevent the acquisition by states and nonstate actors of nuclear and radiological materials for use in weapons of mass destruction and other acts of terrorism by repatriating or otherwise securing nuclear fuel and converting reactors to use new, more proliferation-resistant technology. Three key subprograms of the GTRI—convert, remove, and protect—provide a comprehensive approach to denying terrorists access to nuclear and radiological materials. The program is run by the U.S. National Nuclear Security Administration.

Nonaligned Movement: A 120-member bloc of developing states, the largest group in the context of the NPT.

Highly enriched uranium (HEU): Uranium that has been processed to increase the proportion of the uranium-235 isotope to more than 20 percent. HEU is required for the construction of a gun-type nuclear device, the simplest type of nuclear weapon. The greater the proportion of uranium-235, i.e., the higher the enrichment level, the less material that is needed to cause a nuclear detonation. Weapons-grade uranium generally refers to uranium enriched to at least 90 percent, but material of far lower enrichment levels can be used to create a nuclear explosive device.

IAEA Nuclear Security Fund: A voluntary funding mechanism, to which IAEA member states are called to contribute. The fund was established to support, among others things, the implementation of nuclear security activities to prevent, detect, and respond to nuclear terrorism.

Illicit Trafficking Database (ITDB): The IAEA information system on incidents of illicit trafficking and other unauthorized activities and events involving nuclear and radioactive materials. Established in 1995, the ITDB facilitates the exchange of authoritative information on incidents among states. As of December 2012, 120 states participated in the ITDB program. In some cases, nonparticipating member states have provided information to the ITDB.

INFCIRC/66-type safeguards agreement: The model safeguards agreement approved by the IAEA in February 1965 to safeguard individual nuclear facilities. The guidelines were later revised to include reprocessing and fuel fabrication plants. It was most widely employed prior to the advent of the 1968 NPT, which required full-scope safeguards. INFCIRC/66-type safeguard agreements leave a broad scope of practical decisions to the IAEA as well as to the discretion of its inspectors.

International Atomic Energy Agency (IAEA): International organization based in Vienna charged with monitoring and safeguarding nuclear material and facilities under the NPT and with

helping states pursue peaceful nuclear programs through technical cooperation. It was set up as the Atoms for Peace organization in 1957 within the UN structure. The IAEA Secretariat is a team of 2,200 multidisciplinary professional and support staff from more than 90 countries. The agency is led by Director-General Yukiya Amano and six deputy directors-general who head the major departments.

Missile Technology Control Regime (MTCR): An informal, voluntary association of countries that share the goals of nonproliferation of unmanned delivery systems capable of delivering weapons of mass destruction and that seek to coordinate national export licensing efforts aimed at preventing their proliferation. The MTCR was originally established in 1987 by Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States. Since that time, the number of MTCR partner countries has increased to 34. The MTCR relies on adherence to common export policy guidelines (the MTCR Guidelines) applied to an integral common list of controlled items (the MTCR Equipment, Software and Technology Annex). The regime places particular focus on missiles capable of delivering a payload of at least 500 kilograms over a distance of at least 300 kilometers, so-called Category I, or MTCR-class, missiles.

Negative Security Assurance: 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 foresworn nuclear weapons that they are not at risk of nuclear attack. The value of NSAs was recognized in Resolution 1887, which "affirms that such security assurances strengthen the nuclear nonproliferation regime."

New Strategic Arms Reduction Treaty (New START): An arms reduction treaty signed by U.S. President Barack Obama and Russian President Dmitry Medvedev on April 8, 2010. And ratified in December 2010. New START consists of the treaty text, a protocol to the treaty, and technical annexes to the protocol. Under the treaty, the United States and Russia will be limited to significantly fewer strategic arms within seven years from the date the treaty entered into force. The limits are 1,550 warheads (warheads on deployed intercontinental ballistic missiles [ICBMs] and deployed submarine-launched ballistic missiles [SLBMs] count toward this limit, and each deployed heavy bomber equipped for nuclear armaments counts as one warhead toward this limit); a combined limit of 800 deployed and nondeployed ICBM launchers, SLBM launchers, and heavy bombers equipped for nuclear armaments; and a separate limit of 700 deployed ICBMs, deployed SLBMs, and deployed heavy bombers equipped for nuclear armaments. The treaty's verification regime includes on-site inspections and exhibitions, data exchanges and notifications related to strategic offensive arms and facilities covered by the treaty, and provisions to facilitate the use of national technical means for treaty monitoring. It also provides for the exchange of telemetry. The treaty's duration will be 10 years, unless superseded by a subsequent agreement. The treaty does not contain any constraints on testing, development, or deployment of current or planned U.S. missile defense programs or current or planned U.S. long-range conventional strike capabilities.

No-first-use pledge: A pledge on the part of a nuclear-weapon state not to be the first party to use nuclear weapons in a conflict or crisis. No-first-use guarantees may be made in unilateral statements, in bilateral or multilateral agreements, or as part of a treaty creating a nuclear-weapon-free zone (NWFZ).

Non-nuclear-weapon state: As defined by the NPT, any state that did not detonate a nuclear explosive device prior to January 1, 1967.

Nuclear-weapon state: As defined by NPT Article IX, a state that manufactured and exploded a nuclear weapon prior to January 1, 1967. Those states are China, France, Russia, the United Kingdom, and the United States.

Nuclear fuel cycle: The life cycle of uranium used as fuel for a reactor. The "front end" of the cycle (prior to use in a reactor) includes mining, milling, and enrichment. After uranium has been used in a reactor, the spent fuel can be placed in long-term storage or reprocessed (the "back end" of the cycle). Reprocessing allows a portion of the spent fuel to be returned to a reactor as useable fuel, but is costly and presents a proliferation risk.

Nuclear Nonproliferation Treaty (NPT): International agreement on nuclear disarmament, nonproliferation, and the peaceful use of nuclear energy that entered into force March 5, 1970. Nuclear-armed states-parties pledged to work toward disarmament, non-nuclear-weapon states-parties agreed to forswear nuclear weapons, and all agreed to share in the peaceful use of nuclear energy.

Nuclear Posture Review (NPR): A periodic review

of U.S. nuclear strategy, mandated by Congress.

Nuclear Security Summits: The first summit involving 47 national delegations and the European Union, the IAEA, and the United Nations and held in Washington, DC, April 12-13, 2010, to enhance international cooperation in preventing nuclear terrorism. The summit was first proposed by President Barack Obama in an April 2009 speech in Prague where he outlined his vision of a world free of nuclear weapons and nuclear threats. The participants agreed on a communiqué and a work plan. In their national statements, many states described specific steps they would take to advance nuclear security. The second summit was held in Seoul in March 2012, where 53 states participated.

Nuclear Suppliers Group (NSG): A group of nuclear supplier countries that seeks to contribute to the nonproliferation of nuclear weapons through the implementation of guidelines for nuclear and nuclear-related exports. The NSG guidelines are implemented by each participating government in accordance with its national laws and practices. Decisions on export applications are taken at the national level in accordance with national export licensing requirements. The NSG was founded in 1974 and currently has 46 members.

Nuclear-weapon-free zone (NWFZ): A specified region in which countries commit themselves not to manufacture, acquire, test, or possess nuclear weapons but may use nuclear energy for peaceful purposes. Five such zones currently exist, in Latin America (the 1967 Treaty of Tlatelolco), the South Pacific (the 1985 Treaty of Rarotonga), Southeast Asia (the 1995 Treaty of Bangkok), Africa (the 1996 Treaty of Pelindaba), and Central Asia (the 2006 Treaty of Semipalatinsk). NPT Article VII affirms the right of countries to establish specified zones free of nuclear weapons. Each treaty establishing an NWFZ includes a legally binding protocol calling on the nuclear-weapon states to respect the status of the zones and not to use or threaten to use nuclear weapons against treaty states-parties, also known as negative security assurances.

Preparatory Committee: Meetings that precede each NPT review conference. The meetings decide on procedural matters such as the agenda for the review conference and may also issue substantive recommendations.

Proliferation Security Initiative (PSI): A global, nonbinding effort of 102 states, launched in 2003, that aims to stop trafficking of weapons of mass destruction, their delivery systems, and related materials to and from states and nonstate actors of proliferation concern. The PSI operates on the basis of existing international and national law and does not create any new powers or responsibilities. When a country endorses the PSI, it endorses the PSI Statement of Interdiction Principles, which commit participants to establish a more coordinated and effective basis through which to impede and stop trafficking of weapons of mass destruction, their delivery systems, and related items.

Prompt Launch: A nuclear strategy under which a state launches their missiles at the first warning of a nuclear launch, before its launch sites are destroyed.

Reprocessing: A chemical process whereby uranium and plutonium may be extracted from used nuclear fuel and returned to the fuel supply. Reprocessing can increase the amount of energy extracted from a batch of fuel, but is costly and presents proliferation risks.

Research reactor: Small nuclear reactors used for scientific research and the production of radioactive materials used in medicine and industry. Many utilize HEU as a fuel, unlike larger civilian power reactors, which operate on LEU.

Resolution 984: A UN Security Council resolution passed in 1995 formally acknowledging the commitments of the nuclear-weapon states to negative security assurances. All nuclear-weapon states except China made reservations, however, and have expressed in their military doctrines that using nuclear weapons against non-nuclear-weapon states could be an option under certain circumstances. A resolution is not considered to be legally binding, and the assurances in Resolution 984 are conditional.

Resolution 1540: A UN Security Council resolution passed in 2004 mandating that states establish domestic controls to prevent nonstate actors from acquiring nuclear, chemical, and biological weapons or related materials.

Resolution 1887: A UN Security Council resolution passed in September 2009 committing states to work toward a world without nuclear weapons and endorsing a broad framework of actions to reduce global nuclear dangers. The resolution includes new provisions to deter withdrawal from the NPT and to ensure that a peaceful nuclear program is not diverted to a weapons program. The resolution calls on states to conclude safeguards agreements

and an additional protocol with the IAEA and for strengthened implementation for Resolution 1540.

Review Conference: Conferences of the NPT states-parties held every five years to review and enhance the implementation of the treaty.

Shannon Mandate: A 1995 compromise on FMCT negotiating parameters set out by Canadian Ambassador Gerald Shannon, according to which the formal mandate for fissile materials negotiations would focus on a "ban on the production of fissile material" but would allow delegations to raise other issues, including controls on and reductions of existing stocks, during the course of negotiations.

Strategic Arms Reduction Treaty (START): Signed in 1991, START limits the United States and Russia to no more than 6,000 strategic warheads on 1,600 delivery vehicles. The treaty contains extensive counting rules and verification procedures. It expired December 5, 2009.

Strategic Offensive Reductions Treaty (SORT): Signed in 2002, SORT limited the United States and Russia to 1,700 to 2,200 operationally deployed strategic nuclear warheads by December 31, 2012, the day the treaty expired. The treaty did not contain counting rules or verification procedures.

Tactical nuclear weapons: Nuclear weapons typically deployed on shorter-range delivery systems intended for use on the battlefield.

Treaty of Bangkok (Southeast Asia NWFZ treaty): A treaty that prohibits the development, manufacture, acquisition, and testing of nuclear weapons anywhere within the region of the 10 full-member parties: Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. It also prohibits the transport of nuclear weapons through the region. Signatories undertake to enact IAEA safeguards and to refrain from dumping at sea, discharging into the atmosphere, or burying on land any radioactive material or waste. Opened for signature in December 1995, the treaty entered into force in March 1997. All 10 states-parties have ratified the treaty, although none of the nuclear-weapon states have signed the treaty's protocols.

Treaty of Pelindaba (African NWFZ treaty): A treaty that prohibits the research, development, manufacturing, stockpiling, acquisition, testing, possession, control, and stationing of nuclear explosive devices in the members' territory. The treaty also prohibits the deposit of radioactive waste originating from outside the continent within the region. Under the treaty, signatories are required to put all their nuclear programs under IAEA safeguards. The treaty provides for the establishment of the African Commission on Nuclear Energy, which will supervise treaty implementation and ensure compliance. The treaty was opened for signature in Cairo in April 1996 and entered into force in July 2009. As of March 2013, there were 36 parties to the treaty and an additional 14 signatories. China, France, Russia and the United Kingdom have ratified the treaty's protocols while the United States has not.

Treaty of Rarotonga (South Pacific NWFZ treaty): A treaty that prohibits the testing, manufacturing, acquiring, and stationing of nuclear explosive devices in any member's territory. The treaty prohibits dumping radioactive wastes into the sea. In addition, the treaty requires all parties to apply IAEA safeguards to all their peaceful nuclear activities. It was opened for signature on August 6, 1985, and entered into force on December 11, 1986. As of March 2013, there were 13 parties to the treaty: Australia, Cook Islands, Fiji, Kiribati, Nauru, New Zealand, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu. The treaty has three protocols that refer to provisions of territories within the zone that belong to China, France, Russia, the United Kingdom, and the United States. All five nuclear-weapon states have signed the protocols.

Treaty of Semipalatinsk (Central Asian NWFZ treaty): Since March 21, 2009, the treaty is the first of its kind, comprising states of the former Soviet Union, and is the first such zone in the Northern Hemisphere. It forbids the development, manufacture, stockpiling, acquisition, or possession of any nuclear explosive device within the zone. Peaceful uses of nuclear energy are permitted if placed under enhanced IAEA safeguards. The treaty is the first to explicitly oblige Central Asian countries to accept enhanced IAEA safeguards on their nuclear material and activities. The treaty encompasses an environmental component that addresses concerns unique to the Central Asian region. Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan are parties to the treaty. France, the United Kingdom, and the United States objected to the treaty, expressing concerns about a treaty article regarding previous international agreements. The United States also objected to a provision in the draft treaty that provided for the possible expansion of the treaty to neighboring

states. Another objection expressed by France, the United Kingdom, and the United States relates to provisions of the treaty governing the possible transit of nuclear weapons through the zone.

Treaty of Tlatelolco (NWFZ treaty in Latin America and the Caribbean): A treaty that created the first international agreement aimed at excluding nuclear weapons from an inhabited region of the globe. In addition to prohibiting nuclear testing by all states-parties, member states accept the application of IAEA safeguards for all their nuclear activities to assist in verifying compliance with the treaty. The treaty establishes a regional organization, the Agency for the Prohibition of Nuclear Weapons in Latin America, to help ensure compliance with its provisions. The treaty was opened for signature on February 14, 1967, and entered into force on April 25, 1969. It has since been signed and ratified by all 33 nations of Latin America and the Caribbean, with Cuba being the last country to ratify it on October 23, 2002. China, France, the Netherlands, the Russian Federation, the United Kingdom, and the United States have signed the relevant protocols of the treaty.

United Nations (UN): An international organization founded in 1945 after World War II by 51 countries committed to maintaining international peace and security, developing friendly relations among nations, and promoting social progress, better living standards, and human rights. Due to its unique international character and the powers vested in its founding charter, the organization can take action on a wide range of issues and provide a forum for its 193 member states to express their views, through the UN General Assembly, Security Council, Economic and Social Council, and other bodies and committees. The organization works on a broad range of fundamental issues, from sustainable development, environment and refugees protection, disaster relief, counterterrorism, disarmament, and nonproliferation to promoting democracy, human rights, governance, economic and social development, and international health; clearing landmines; expanding food production; and more, in order to achieve its goals and coordinate efforts for a safer world.

UN General Assembly First Committee on Disarmament and International Security: A subsidiary of the UN General Assembly responsible for drafting resolutions on disarmament issues. The First Committee meets every year in October for four to five weeks after the UN General Assembly General Debate. All 193 UN member states can attend.

UN General Assembly: Occupies a central position as the chief deliberative, policymaking, and representative organ of the United Nations. Established in 1945 under the UN Charter. Comprising all 193 UN members, it provides a unique forum for multilateral discussion of the full spectrum of international issues covered by the charter. It plays a significant role in the process of standard-setting and the codification of international law. The assembly meets in regular session intensively from September to December each year and thereafter as required. Each member state in the assembly has one vote. Votes taken on designated important issues, such as recommendations on peace and security and the election of Security Council members, require a two-thirds majority of member states, but other questions are decided by simple majority.

The Arms Control Association (ACA), founded in 1971, is a national nonpartisan membership organization dedicated to promoting public understanding of and support for effective arms control policies. Through its public education and media programs and its magazine, *Arms Control Today (ACT),* ACA provides policy-makers, the press and the interested public with authoritative information, analysis and commentary on arms control proposals, negotiations and agreements, and related national security issues. In addition to the regular press briefings ACA holds on major arms control developments, the Association's staff provides commentary and analysis on a broad spectrum of issues for journalists and scholars both in the United States and abroad.

This Arms Control Association (ACA) report describes what constitutes the 'mainstream' of nuclear nonproliferation and disarmament behavior expected of all members of the international community and tracks state adherence to these standards over time.

The nuclear Nonproliferation Treaty defines many core obligations and goals, but state responsibilities regarding nonproliferation and disarmament are also defined by additional agreements, UN Security Council resolutions, shared norms, and binding legal commitments. ACA's research staff has identified 10 internationally-recognized standards for nuclear nonproliferation, disarmament, and nuclear security. Each of these standards plays an important role in addressing the complex nature of the threat posed by nuclear weapons.

The 2010-2013 update of *Assessing Progress on Nuclear Nonproliferation and Disarmament* assesses the performance of China, France, Russia, the United Kingdom, the United States, India, Israel, Pakistan—each of which possess nuclear weapons—and North Korea—which maintains a nuclear weapons capability—as well as Iran and Syria, which are under investigation for possible nuclear weapons-related activities.

Overall, progress has been achieved in many key areas, although the pace of progress to meet key nuclear nonproliferation, disarmament, and nuclear security goals has been limited and does not meet the urgency of the grave threats posed by nuclear weapons.

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