



Appendix **F**

Nuclear-Related Treaties and International Agreements

F.1 Overview

The size and composition of the U.S. nuclear weapons stockpile has been influenced by several arms control initiatives and international treaties. For example, the 1987 Intermediate-Range Nuclear Forces (INF) Treaty eliminated an entire class of weapons; in compliance with the INF Treaty, the United States retired all Pershing II missiles and all U.S. ground-launched cruise missiles (GLCMs). In 1991, the United States unilaterally eliminated all Army tactical nuclear weapons and most Navy non-strategic nuclear systems.

There are a number of arms control agreements restricting the deployment and use of nuclear weapons, but no conventional or customary international law prohibits nations from employing nuclear weapons in armed conflict. This chapter describes the treaties and international agreements that have affected the size and composition of the U.S. nuclear weapons stockpile. See **Figure F.1** for a timeline of nuclear-related treaties.

Antarctic Treaty

Opened for signature: 1959 | Entry into force: 1961

Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water (Limited Test Ban Treaty or LTBT)

Opened for signature: 1963 | Entry into force: 1963

Treaty for the Prohibition of Nuclear Weapons in Latin America (Treaty of Tlatelolco)

Opened for signature: 1967 | Entry into force: 1968

Treaty on the Nonproliferation of Nuclear Weapons (Nuclear Nonproliferation Treaty or NPT)

Opened for signature: 1968 | Entry into force: 1970

Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems (Anti-Ballistic Missile Treaty or ABM Treaty)

Signed: 1972 | Entry into force: 1972 (The United States withdrew from the ABM Treaty in 2002)

Interim Agreement Between the United States of America and the Union of Soviet Socialist Republics on Certain Measures with Respect to the Limitation of Strategic Offensive Arms (Strategic Arms Limitation Talks or SALT I)

Signed: 1972 | Entry into force: 1972

Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitations of Underground Nuclear Weapon Tests (Threshold Test Ban Treaty or TTBT)

Signed: 1974 | Entry into force: 1990

Treaty between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes (Peaceful Nuclear Explosions Treaty or PNET)

Signed: 1976 | Entry into force: 1990

Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Strategic Offensive Arms (Strategic Arms Limitation Treaty or SALT II)

Signed: 1979 | SALT II never entered into force, although both sides complied with its provisions until 1986.

South Pacific Nuclear-Free Zone Treaty (Treaty of Rarotonga)

Opened for signature: 1985 | Entry into force: 1986

Treaty between the United States of America and the Union of Soviet Socialist Republics on the Elimination of their Intermediate-Range and Shorter-Range Missiles (Intermediate-Range Nuclear Forces Treaty or INF Treaty)

Signed: 1987 | Entry into force: 1988

Treaty between the United States of America and the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms (Strategic Arms Reduction Treaty or START I)

Signed: 1991 | Entry into force: 1994

Presidential Nuclear Initiatives (PNI)

Announced: 1991 (The PNI were “reciprocal unilateral commitments” and thus are politically, not legally, binding and non-verifiable)

Treaty between the United States of America and the Russian Federation on Further Reduction and Limitation of Strategic Offensive Arms (START II)

Signed: 1993 | START II never entered into force.

Treaty on the Southeast Asia Nuclear Weapon-Free Zone (Bangkok Treaty)

Opened for signature: 1995 | Entry into force: 1997

African Nuclear Weapon Free Zone Treaty (ANWFZ or Treaty of Pelindaba)

Opened for signature: 1996 | Entry into force: 2009

Comprehensive Nuclear-Test-Ban Treaty (CTBT)

Opened for signature: 1996 | At the date of this publication, the CTBT has not yet entered into force.

Treaty between the United States of America and the Russian Federation on Strategic Offensive Reductions (Strategic Offensive Reductions Treaty, SORT, or Moscow Treaty)

Signed: 2002 | Entry into force: 2003

Central Asian Nuclear Weapon-Free Zone Treaty (CANWFZ)

Opened for signature: 2006 | Entry into force: 2009

Treaty between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms (New START)

Signed: 2010 | Entry into force: 2011

Figure F.1 Nuclear-Related Treaties

F.2 Nuclear Weapon-Free Zones

Nuclear Weapon-Free Zones prohibit the stationing, testing, use, and development of nuclear weapons inside a particular geographical region. This is true whether the area is a single state, a region, or land governed solely by international agreements. There are several regional agreements to exclude or preclude the development and ownership of nuclear weapons. These agreements were signed under the assumption that it is easier to exclude/preclude weapons than to eliminate or control them once they have been introduced.

There are six existing Nuclear Weapon-Free Zones (see **Figure F.2**) established by treaty: Antarctica, Latin America, the South Pacific, Southeast Asia, Africa, and Central Asia.

F.2.1 The Antarctic Treaty

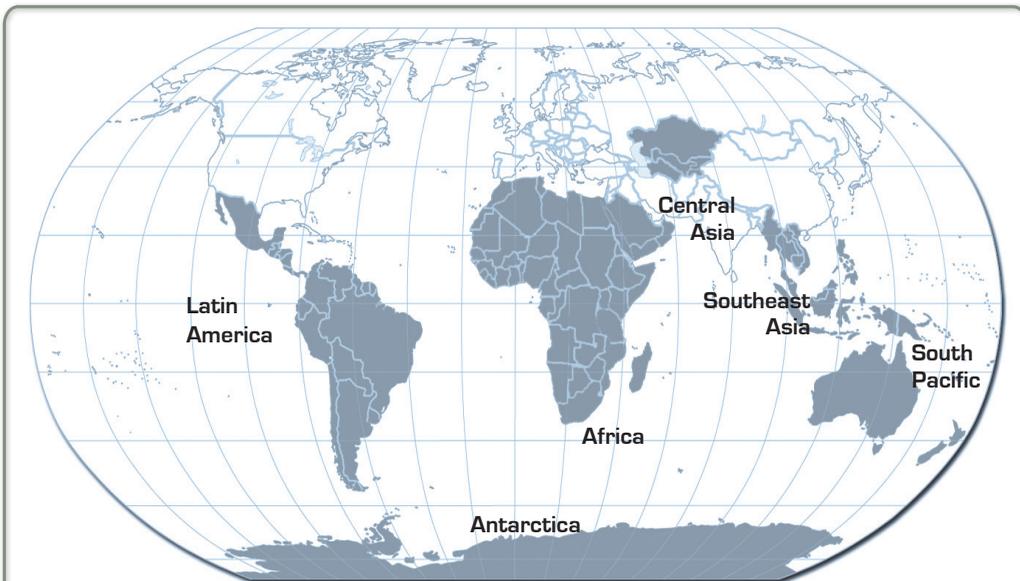
Scientific interests rather than political, economic, or military concerns dominated the expeditions sent to Antarctica after World War II. International scientific associations made informal agreements to guide scientific study and cooperation in Antarctica. On May 3, 1958, the United States proposed a conference to consider the points of agreement that had been reached in informal multilateral discussions. Specifically, the conference sought to formalize international recognition that:

- the legal status quo of the Antarctic Continent would remain unchanged;
- scientific cooperation would continue; and
- the continent would be used for peaceful purposes only.

The Washington Conference on Antarctica culminated in a treaty signed on December 1, 1959. The treaty entered into force on June 23, 1961, when the formal ratifications of all participating nations had been received.

The treaty provides that Antarctica shall be used for peaceful purposes only. It specifically prohibits “any measures of a military nature, such as the establishment of military bases and fortifications, the carrying out of military maneuvers, as well as the testing of any type of weapons.” Military personnel or equipment, however, may be used for scientific research or for any other peaceful purpose. Nuclear explosions and the disposal of radioactive waste material in Antarctica are prohibited, subject to certain future international agreements on these subjects. There are provisions for amending the treaty; for referring disputes that cannot be handled by direct talks, mediation,

Figure F.2 Map of Nuclear Weapon-Free Zones



Africa

Algeria, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Chad, Comoros, Congo, Cote d'Ivoire, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea-Bissau, Guinea, Kenya, Lesotho, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, Sahrawi Arab Democratic Republic, Senegal, South Africa, Swaziland, Togo, Tunisia, Tanzania, Zambia, Zimbabwe

Central Asia

Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan

Latin America

(Mexico, Central America, South America)

Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela

Southeast Asia

Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam

South Pacific

Australia, Cook Islands, Fiji, Kiribati, Nauru, New Zealand, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu

arbitration, or other peaceful means to the International Court of Justice; and for calling a conference 30 years post-entry into force to review the implementation of the treaty if any parties so request.

F.2.2 The Treaty for the Prohibition of Nuclear Weapons in Latin America (Treaty of Tlatelolco)

The concept of a Latin American Nuclear Weapon-Free Zone was first introduced to the United Nations General Assembly in 1962. On November 27, 1963, this concept was codified and received the support of the U.N. General Assembly, with the United States voting in the affirmative.

On February 14, 1967, the treaty was signed at a regional meeting of Latin American countries in Tlatelolco, a section of Mexico City. The treaty entered into force in 1968.

The basic obligations of the treaty are contained in Article I:

The Contracting Parties undertake to use exclusively for peaceful purposes the nuclear material and facilities which are under their jurisdiction, and to prohibit and prevent in their respective territories: (a) the testing, use, manufacture, production, receipt, storage, installation, deployment, or acquisition by any means whatsoever of any nuclear weapons by the parties themselves, directly or indirectly, on behalf of anyone else or in any other way, and (b) the receipt, storage, installation, deployment and any form of possession of any nuclear weapons, directly or indirectly, by the parties themselves, or by anyone on their behalf or in any other way.

In Additional Protocol II to the treaty, states outside of Latin America undertake to respect the denuclearized status of the zone, not to contribute to acts involving violation of obligations of the parties, and not to use or threaten to use nuclear weapons against the Contracting Parties.

The United States ratified Additional Protocol II on May 8, 1971, and deposited the instrument of ratification on May 12, 1971, subject to several understandings and declarations. France, the United Kingdom, China, and Russia are also parties to Protocol II.

F.2.3 South Pacific Nuclear-Free Zone Treaty (Treaty of Rarotonga)

On August 6, 1985, the South Pacific Forum, a body comprising the independent and self-governing countries of the South Pacific, endorsed the text of the *South Pacific Nuclear-Free Zone Treaty* and opened it for signature.

The treaty is in force for 13 of the 16 South Pacific Forum members (Australia, Cook Islands, Fiji, Kiribati, Nauru, New Zealand, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu). The Federated States of Micronesia, the Marshall Islands, and Palau are not eligible to be parties to the treaty because of their Compact of Free Association with the United States.¹ The United States, the United Kingdom, France, Russia, and China have all signed the Protocols that directly pertain to them (France and the UK have ratified all three protocols. Russia and China have only ratified Protocols II and III). On May 3, 2010, Secretary of State Clinton announced that the United States would submit the protocols for Senate ratification.

The parties to the Treaty agreed:

- not to manufacture or otherwise acquire, possess, or have control over any nuclear explosive device by any means anywhere inside or outside the South Pacific Nuclear-Free Zone;
- not to seek or receive any assistance in the manufacture or acquisition of any nuclear explosive device;
- to prevent the stationing of any nuclear explosive device in their territory;
- to prevent the testing of any nuclear explosive device in their territory; and
- not to take any action to assist or encourage the testing of any nuclear explosive device by any state.

F.2.4 Treaty on the Southeast Asia Nuclear Weapon-Free Zone (Bangkok Treaty)

Indonesia and Malaysia originally proposed the establishment of a Southeast Asia Nuclear Weapon-Free Zone in the mid-1980s. On December 15, 1995, ten Southeast

¹ The Compact of Free Association defines the relationship into which these three sovereign states have entered with the United States. As part of this compact, the United States is allowed to move nuclear submarines through the countries' waters.

Asian states signed the *Treaty on the Southeast Asian Nuclear Weapon-Free Zone* at the Association of Southeast Asian Nations (ASEAN) Summit in Bangkok.

The treaty commits parties not to conduct or receive, or to aid in the research, development, manufacture, stockpiling, acquisition, possession, or control over any nuclear explosive device by any means. Each state party also undertakes not to dump at sea or discharge into the atmosphere any radioactive material or wastes anywhere within the zone. Under the treaty protocol, each state party undertakes not to use or threaten to use nuclear weapons against any state party to the treaty and not to use or threaten to use nuclear weapons within the zone. The treaty entered into force in 1997.

The United States has not signed the Protocol to the Bangkok Treaty.

F.2.5 African Nuclear Weapon-Free Zone (ANWFZ) Treaty (Pelindaba Treaty)

The Organization of African Unity (OAU) first formally enunciated the desire to draft a treaty ensuring the denuclearization of Africa in July 1964. No real progress was made until South Africa joined the *Nuclear Nonproliferation Treaty* (NPT) in 1991. In April 1993, a group of U.N. and OAU experts convened to begin drafting a treaty.

The Pelindaba Treaty commits parties not to conduct or receive or give assistance in the research, development, manufacture, stockpiling, acquisition, possession, or control over any nuclear explosive device by any means anywhere.

The treaty was opened for signature on April 11, 1996 and entered into force on July 15, 2009. The United States, the United Kingdom, France, China, and Russia have all signed the relevant protocols to the treaty. The United States submitted Protocols I and II on May 3, 2011 for Senate ratification.

F.2.6 Central Asian Nuclear Weapon-Free Zone (CANWFZ) Treaty

The concept of a Central Asian Nuclear Weapon-Free Zone (CANWFZ) first arose in a 1992 Mongolian initiative in which the country declared itself a nuclear weapon-free zone and called for the establishment of a regional NWFZ. A formal proposal for a Central Asian Nuclear Weapon-Free Zone was made by Uzbekistan at the 48th session of the United Nations General Assembly in 1993, but a lack of regional consensus on the issue blocked progress on a CANWFZ until 1997. On February 27, 1997, the five presidents

of the Central Asian states (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) issued the *Almaty Declaration*, which called for the creation of a CANWFZ.

The text of the CANWFZ treaty was agreed upon at a meeting held in Uzbekistan from September 25-27, 2002. On February 8, 2005, the five states adopted a final draft of the treaty text, and the treaty was opened for signature on September 8, 2006. The treaty establishing the CANWFZ entered into force on March 21, 2009. On April 27, 2015 President Obama submitted the Protocol to the CANWFZ for Senate ratification.

F.3 Limited Test Ban Treaty

The *Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water* or the Limited Test Ban Treaty (LTBT) of 1963 prohibits nuclear weapons tests “or any other nuclear explosion” in the atmosphere, in outer space, and under water. While the treaty does not ban tests underground, it does prohibit nuclear explosions in this environment if they cause “radioactive debris to be present outside the territorial limits of the state under whose jurisdiction or control” the explosions were conducted. In accepting limitations on testing, the nuclear powers accepted as a common goal “an end to the contamination of the environment by radioactive substances.”

The LTBT is of unlimited duration. The treaty is open to all states, and most of the countries of the world are parties to it. The treaty has not been signed by France, the People’s Republic of China (PRC), or North Korea.

F.4 Nuclear Nonproliferation Treaty

In 1968, the United States signed the *Treaty on the Nonproliferation of Nuclear Weapons*, often called the Nuclear Nonproliferation Treaty. Most nations of the world are parties to the treaty; it forms the cornerstone of the international nuclear nonproliferation regime. The NPT recognizes the five nuclear powers that existed in 1968: the United States, Russia, the United Kingdom, France, and China. The treaty prohibits all other signatories from acquiring or even pursuing a nuclear weapons capability. This requirement has prevented three states from signing onto the treaty: India, Israel, and Pakistan. (In 2003, North Korea, a former signatory, formally withdrew from the NPT.)

While the non-nuclear signatories to the NPT are prohibited from developing nuclear weapons, the nuclear weapons states are obligated to assist them in acquiring peaceful applications for nuclear technology.

In broad outline, the basic provisions of the treaty are designed to:

- prevent the spread of nuclear weapons (Articles I and II);
- provide assurance, through international safeguards, that the peaceful nuclear activities of states that have not already developed nuclear weapons will not be diverted to making such weapons (Article III);
- promote, to the maximum extent consistent with the other purposes of the treaty, the peaceful uses of nuclear energy, including the potential benefits of any peaceful application of nuclear technology to be made available to non-nuclear parties under appropriate international observation (Articles IV and V); and
- express the determination of the parties that the treaty should lead to further progress in comprehensive arms control and nuclear disarmament measures (Article VI).

In accordance with the terms of the NPT, a conference was held in 1995 to decide whether the NPT should continue in force indefinitely or be extended for an additional fixed period or periods. On May 11, 1995, more than 170 countries attending the NPT Review and Extension Conference in New York decided to extend the treaty indefinitely and without conditions.

F.5 Strategic Arms Limitation Talks/Treaty

The first series of Strategic Arms Limitation Talks (SALT) extended from November 1969 to May 1972. During that period, the United States and the Soviet Union negotiated the first agreements to place limits and restraints on some of their most important nuclear armaments.

At the time, American and Soviet weapons systems were far from symmetric. Further, the defense needs and commitments of the two superpowers differed considerably. The United States had obligations for the defense of Allies overseas, including the nations of the North Atlantic Treaty Organization, Japan, and South Korea, while the Soviet Union's allies were its near neighbors. All these circumstances made for difficulties in equating specific weapons, or categories of weapons, and in defining overall strategic equivalence.

The first round of SALT was brought to a conclusion on May 26, 1972, after two and a half years of negotiation, when President Richard M. Nixon and General Secretary Leonid

Brezhnev signed the Anti-Ballistic Missile Treaty and the Interim Agreement on strategic offensive arms.

F.5.1 Anti-Ballistic Missile Treaty

In the *Treaty on the Limitation of Anti-Ballistic Missile (ABM) Systems*, the United States and the Soviet Union agreed that each party may have only two ABM deployment areas, restricted and located to preclude providing a nationwide ABM defense or from becoming the basis for developing one. Thus, each country agreed not to challenge the penetration capability of the other's retaliatory nuclear missile forces.

The treaty permitted each side to have one ABM system to protect its capital and another to protect one ICBM launch area. The two sites defended had to be at least 1,300 kilometers apart to prevent the creation of any effective regional defense zone or the beginnings of a nationwide system. A 1974 protocol provides that each side could only have one site, either to protect its capital or to protect one ICBM launch area.

Precise quantitative and qualitative limits were imposed on the deployed ABM systems. Further, to decrease the pressures of technological change and its unsettling effect on the strategic balance, both sides agreed to prohibit the development, testing, or deployment of sea-based, air-based, or space-based ABM systems and their components, along with mobile land-based ABM systems. Should future technology bring forth new ABM systems “based on other physical principles” than those employed in then-current systems, it was agreed that limiting such systems would be discussed in accordance with the treaty's provisions for consultation and amendment.

In June 2002, the United States withdrew from the ABM Treaty to pursue a ballistic missile defense program.

F.5.2 Interim Agreement—Strategic Arms Limitation Talks (SALT) I

As its title suggests, the *Interim Agreement on Certain Measures with Respect to the Limitation of Offensive Arms* was limited in duration and scope. It was intended to remain in force for only five years. Both countries agreed to continue negotiations toward a more comprehensive agreement as soon as possible. The scope and terms of any new agreement were not to be prejudiced by the provisions of the 1972 interim accord.

Thus, the Interim Agreement was intended as a holding action, which was designed to complement the ABM Treaty by limiting competition in offensive strategic arms and by providing time for further negotiations. The agreement essentially froze existing levels of strategic ballistic missile launchers (operational or under construction) for both sides. It permitted an increase in SLBM launchers up to an agreed level for each party provided that the party dismantle or destroy a corresponding number of older ICBM or SLBM launchers.

In view of the many asymmetries between the United States and the Soviet Union, imposing equivalent limitations required complex and precise provisions. At the date of signing, the United States had 1,054 operational land-based ICBMs, with none under construction, and the Soviet Union had an estimated 1,618 ICBMs, including operational missiles and missiles under construction. Launchers under construction were permitted to be completed. Yet, neither side would be authorized to start construction of additional fixed land-based ICBM launchers during the period of the agreement, in effect, excluding the relocation of existing launchers. Launchers for light or older ICBMs could not be converted into launchers for modern heavy ICBMs. This prevented the Soviet Union from replacing older missiles with missiles such as the SS-9, which in 1972 was the largest and most powerful missile in the Soviet inventory and a source of particular concern to the United States.

Within these limitations, modernization and replacements were permitted, but in the process of modernizing, the dimensions of silo launchers could not be significantly increased. A discussion on mobile ICBMs was not included in the text of this treaty.

F.5.3 Strategic Arms Limitation Treaty—SALT II

In accordance with Article VII of the Interim Agreement, in which the sides committed themselves to continue active negotiations on strategic offensive arms, the SALT II negotiations began in November 1972. The primary goal of SALT II was to replace the Interim Agreement with a long-term comprehensive treaty providing broad limits on strategic offensive weapons systems. The principal U.S. objectives as the SALT II negotiations began were: to provide for equal numbers of strategic nuclear delivery vehicles for the two sides, to begin the process of reducing the number of these delivery vehicles, and to impose restraints on qualitative developments that could threaten future stability.

Early discussion focused on two key areas: the weapon systems to be included and factors used to determine equality in numbers of strategic nuclear delivery vehicles. Such factors accounted for the important differences between each side's military forces, bans on new systems, qualitative limits, and a Soviet proposal to restrict U.S. forward-based systems. The two sides held widely diverging positions on many of these issues. In subsequent negotiations, the United States and the Soviet Union agreed on a general framework for SALT II.

The treaty included detailed definitions of limited systems, provisions to enhance verification, a ban on circumvention of the provisions of the agreement, and a provision outlining the duties of the Security Council in connection with the SALT II. The terms of the treaty were intended to remain in force through 1985.

The completed SALT II agreement was signed by President James E. Carter and General Secretary Leonid Brezhnev in Vienna on June 18, 1979. President Carter transmitted it to the Senate on June 22, 1979 for ratification. U.S. ratification of SALT II was delayed due to the Soviet invasion of Afghanistan. Although the treaty remained unratified, each party was individually bound under international law to refrain from acts that would defeat the object and purpose of the treaty until the country had made its intentions clear not to become a party to the treaty.

SALT II never entered into force.

F.6 Threshold Test Ban Treaty

The *Treaty on the Limitation of Underground Nuclear Weapon Tests*, also known as the Threshold Test Ban Treaty (TTBT), was signed in July 1974. It established a nuclear “threshold” by prohibiting tests with a yield exceeding 150 kilotons (equivalent to 150,000 tons of TNT).

The TTBT included a Protocol that specified the technical data to be exchanged and limited weapon testing to designated test sites to simplify verification efforts. The data to be exchanged included information on geographical boundaries and the geology of the testing areas. Geological data, including such factors as density of rock formation, water saturation, and depth of the water table, are useful in verifying test yields because the seismic signal produced by a given underground nuclear explosion varies with these factors at the test location. After an actual test had taken place, the geographic

coordinates of the test location were to be furnished to the other party to help in assessing geological setting and yield.

The treaty also stipulated that data would be exchanged on a certain number of tests for calibration purposes. By establishing the correlation between the stated yield of an explosion at the specified sites and the seismic signals produced, both parties could more accurately assess the yields of explosions based primarily on the measurements derived from their seismic instruments.

Although the TTBT was signed in 1974, it was not sent to the U.S. Senate for ratification until July 1976. Submission was held in abeyance until the companion *Treaty on Underground Nuclear Explosions for Peaceful Purposes* (or the Peaceful Nuclear Explosions Treaty (PNET)) had been successfully negotiated in accordance with Article III of the TTBT.

Neither the United States nor the Soviet Union ratified the TTBT or the PNET until 1990. However, in 1976 each party separately announced its intention to observe the treaty limit of 150 kilotons, pending ratification.

The United States and the Soviet Union began negotiations in November 1987 to reach an agreement on additional verification provisions that would make it possible for the United States to ratify the two treaties. In 1990, the parties reached an agreement on additional verification provisions; these provisions were introduced in new protocols substituting for the original protocols. The TTBT and PNE Treaty both entered into force on December 11, 1990.

F.7 Peaceful Nuclear Explosions Treaty

In preparing the TTBT, the United States and the Soviet Union recognized the need to establish an appropriate agreement to govern underground nuclear explosions for peaceful purposes.

In the *Treaty on Underground Nuclear Explosions for Peaceful Purposes*, the United States and the Soviet Union agreed not to carry out:

- any individual nuclear explosions with a yield exceeding 150 kilotons;
- any group explosion (consisting of a number of individual explosions) with an aggregate yield exceeding 1,500 kilotons; and

- any group explosion with an aggregate yield exceeding 150 kilotons unless the individual explosions in the group could be identified and measured by agreed verification procedures.

The parties reserved the right to carry out nuclear explosions for peaceful purposes in the territory of another country if requested to do so, but only in full compliance with the yield limitations and other provisions of the PNET and in accordance with the NPT.

The Protocol to the PNET sets forth the specific agreed arrangements for ensuring that no weapons-related benefits precluded by the TTBT are derived by carrying out a nuclear explosion used for peaceful purposes.

The agreed statement that accompanies the Peaceful Nuclear Explosions Treaty specifies that a “peaceful application” of an underground nuclear explosion would not include the developmental testing of any nuclear explosive. Nuclear explosive testing must be carried out at the nuclear weapon test sites specified by the terms of the TTBT and would be treated as the testing of a nuclear weapon.

The provisions of the PNET, together with those of the TTBT, establish a comprehensive system of regulations to govern all underground nuclear explosions of the United States and the Soviet Union. The interrelationship of the TTBT and the PNET is further demonstrated by the provision that neither party may withdraw from the PNET while the TTBT remains in force. Conversely, either party may withdraw from the PNET upon termination of the TTBT.

F.8 Intermediate-Range Nuclear Forces Treaty

The *Treaty between the United States of America and the Union of Soviet Socialist Republics on the Elimination of their Intermediate-Range and Shorter-Range Missiles*, commonly referred to as the Intermediate-Range Nuclear Forces (INF) Treaty, was signed by President Ronald Reagan and General Secretary Mikhail Gorbachev on December 8, 1987 at a summit meeting in Washington, DC. The INF Treaty requires the destruction of ground-launched ballistic and cruise missiles with ranges between 500 and 5,500 kilometers, their launchers, and their associated support structures and support equipment within three years following the treaty’s entry into force and ensures compliance with the total ban on possession and use of these missiles. At the time of its signature, the treaty’s verification regime was the most detailed and stringent in the history of nuclear arms control.

The treaty entered into force upon the exchange of instruments of ratification in Moscow on June 1, 1988. In late April and early May 1991, the United States eliminated its last ground-launched cruise missile and ground-launched ballistic missile covered under the INF Treaty. The last declared Soviet SS-20 was eliminated on May 11, 1991. In total, 2,692 missiles were eliminated after the treaty's entry into force.

Following the December 25, 1991 dissolution of the Soviet Union, the United States secured full continuation of the INF Treaty regime through the multilateralization of the INF Treaty with the 12 former Soviet Republics considered to be INF Treaty successor states. Six of these 12 former Soviet Republics had facilities - subject to inspection, on their territory, namely Russia, Ukraine, Belarus, Kazakhstan, Turkmenistan, and Uzbekistan. Converting what was previously a bilateral U.S.-Soviet INF Treaty to a multilateral treaty required establishing agreements between the United States and the relevant Soviet successor states on numerous issues. Among the tasks undertaken were: the settlement of costs connected with implementation of the new, multilateral treaty; the establishment of new points of entry in Belarus, Kazakhstan, and Ukraine through which to conduct inspections of the former INF facilities in those countries; and the establishment of communications links between the United States and those countries for the transmission of various treaty-related notifications.

In a joint statement to the United Nations General Assembly in 2007, the United States and the Russian Federation called on all countries to join a global INF Treaty. The leadership of the Russian Federation has since renewed these calls, citing concerns that, without other countries joining the treaty, it may no longer prove useful.

F.9 Strategic Arms Reduction Treaty I

After nine years of negotiations, the *Treaty on the Reduction and Limitation of Strategic Offensive Arms*, or START I, was signed in Moscow on July 31, 1991. Five months later, the Soviet Union dissolved, and four independent states with strategic nuclear weapons on their territories came into existence: Belarus, Kazakhstan, Russia, and Ukraine.

Through the Lisbon Protocol to START I, signed on May 23, 1992, Belarus, Kazakhstan, Russia, and Ukraine became parties to START I as legal successors to the Soviet Union. In December 1994, the parties to START I exchanged instruments of ratification and START I entered into force. In parallel with the Lisbon Protocol, the three non-Russian

states agreed to send all nuclear weapons back to the Russian Federation and join the NPT as Non-Nuclear Weapon States.

START I required reductions in strategic offensive arms to equal aggregate levels, from a high of some 10,500 in each arsenal. The central limits include:

- 1,600 strategic nuclear delivery vehicles;
- 6,000 accountable warheads;
- 4,900 ballistic missile warheads;
- 1,540 warheads on 154 heavy ICBMs; and
- 1,100 warheads on mobile ICBMs.

While the treaty called for these reductions to be carried out over seven years, in practice, all the Lisbon Protocol signatories began deactivating and eliminating systems covered by the agreement prior to its entry into force. START I was negotiated with effective verification in mind. The basic structure of the treaty was designed to facilitate verification by National Technical Means (NTM), and the treaty contains detailed, mutually reinforcing verification provisions to supplement NTM.

On December 5, 2001, the United States and Russia announced that they had met final START I requirements. This completed the largest arms control reductions in history.

START I was intended to be a 15-year commitment with the option to extend it in 5-year increments. However, the United States and the Russian Federation allowed the treaty to expire on December 5, 2009. By that time, negotiations for the follow-on to START I were ongoing, and the agreement, called New START, was signed in Prague on April 8, 2010.

F.10 1991 Presidential Nuclear Initiatives

On September 17, 1991, President George H.W. Bush announced that the United States would eliminate its entire worldwide inventory of ground-launched tactical nuclear weapons and would remove tactical nuclear weapons from all U.S. Navy surface ships, attack submarines, and land-based naval aircraft bases. In addition, President Bush declared that U.S. strategic bombers would be taken off alert and that ICBMs, scheduled for deactivation under START I, would also be taken off alert. These unilateral arms reductions are known as the 1991 Presidential Nuclear Initiatives.

In October 1991, about one week after President Bush announced the U.S. initiatives, Soviet President Mikhail Gorbachev pledged to destroy all nuclear artillery ammunition and nuclear mines, to remove nuclear warheads from anti-aircraft missiles and all theater nuclear weapons on surface ships and multi-purpose submarines, to de-alert strategic bombers, and to abandon plans of developing mobile ICBMs and building new mobile launchers for existing ICBMs. He also pledged to eliminate an additional 1,000 nuclear warheads beyond the numbers required by START I and stated that the country would observe a 1-year moratorium on nuclear weapons testing. In January 1992, Russian President Boris Yeltsin asserted Russia's status as a legal successor to the Soviet Union in international obligations. President Yeltsin also made several pledges to reduce Russian nuclear capabilities.

F.11 START II

Negotiations to achieve a follow-on to START I began in June 1992. The United States and Russia agreed on the text of a *Joint Understanding on the Elimination of MIRVed ICBMs and Further Reductions in Strategic Offensive Arms*. The Joint Understanding called for both sides to promptly conclude a new treaty that would further reduce strategic offensive arms by eliminating all ICBMs containing Multiple Independently Targetable Reentry Vehicles (MIRVs), including all heavy ICBMs, limiting the number of SLBM warheads to no more than 1,750, and reducing the total number of warheads for each side to between 3,000 and 3,500.

On January 3, 1993, President George H.W. Bush and President Boris Yeltsin signed the *Treaty between the United States of America and the Russian Federation on Further Reduction and Limitation of Strategic Offensive Arms*. The treaty, often called START II, codifies the Joint Understanding signed by the two presidents at the Washington Summit on June 17, 1992.

The 1993 START II never entered into force because of the long delay in Russian ratification and because Russia conditioned its ratification of START II on preservation of the ABM Treaty.

F.12 Comprehensive Nuclear-Test-Ban Treaty

The *Comprehensive Nuclear-Test-Ban Treaty* (CTBT) was negotiated at the Geneva Conference on Disarmament between January 1994 and August 1996. The United Nations General Assembly voted on September 10, 1996 to adopt the treaty by a vote of

158 in favor, three opposed, and five abstentions. President William J. Clinton was the first world leader to sign the CTBT on September 24, 1996. The CTBT bans any nuclear weapon test explosion or any other nuclear explosion. The CTBT is of unlimited duration. Each state party has the right to withdraw from the CTBT under the standard “supreme national interest” clause. President Clinton submitted the treaty to the U.S. Senate for ratification in 1999, but the Senate failed to ratify the treaty by a vote of 51 to 48.

The treaty will enter into force following ratification by the United States and 43 other countries listed in Annex 2 of the treaty; these “Annex 2 States” are states that participated in CTBT negotiations between 1994 and 1996 and possessed nuclear power reactors or research reactors during that time. Eight of the Annex 2 States have not yet ratified the treaty, to include the United States. Therefore, the treaty has not entered into force. Nevertheless, the United States has observed a self-imposed moratorium on underground nuclear testing since 1992.

F.13 Strategic Offensive Reductions Treaty

On May 24, 2002, U.S. President George W. Bush and Russian President Vladimir Putin signed the *Moscow Treaty on Strategic Offensive Reductions*, also called SORT or the Moscow Treaty. Under the terms of this treaty, the United States and Russia pledged to reduce their strategic nuclear warheads to a level between 1,700 and 2,200 by December 31, 2012, nearly two-thirds below levels at the time. Each side was to determine for itself the composition and structure of its strategic forces consistent with this limit.

Both the United States and Russia pledged to reduce their strategic offensive forces to the lowest possible levels consistent with their national security requirements and alliance obligations. The United States considers operationally deployed strategic nuclear warheads to be: reentry vehicles on ICBMs in their launchers, reentry vehicles on SLBMs in their launchers onboard submarines, and nuclear armaments located at heavy bomber bases

The Moscow Treaty entered into force in 2003. When New START entered into force in 2011, the Moscow Treaty was terminated.

F.14 New START

Negotiations for a new follow-on agreement to START I began in May 2009. A *Joint Understanding for a Follow-on Agreement to START I* was signed by the presidents of the

United States and Russia in Moscow on July 6, 2009. The successor *Treaty on Measures for the Further Reduction and Limitation of Strategic Offensive Arms* was signed by President Barack Obama and President Vladimir Medvedev in Prague, Czech Republic, on April 8, 2010.

Under New START, the United States and Russia agreed to significantly reduce strategic arms within seven years from February 5, 2011, the date the treaty entered into force. According to the treaty, each party has the flexibility to determine the structure of its strategic forces within the aggregate limits of the treaty. The aggregate limits set by the treaty are:

- 1,550 warheads. Warheads on deployed ICBMs and deployed 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 non-deployed 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 has a verification regime that combines elements of START I with new elements tailored to the limitations of the New START. Measures under the treaty include 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. The treaty also provides for the exchange of telemetry to increase confidence and transparency.

The treaty's duration will be ten years unless it is superseded by a subsequent agreement, and parties may agree to extend the treaty for a period of no more than five years.

F.15 Nuclear Treaty Monitoring and Verification Technologies

To ensure confidence in the treaty regimes, a vast array of technical and non-technical verification technologies and procedures are utilized to guard against illicit nuclear activities. There are two main types of verification procedures: those designed to uncover and inhibit nuclear weapons development and/or nuclear weapons testing or

counterproliferation activities in addition to those designed to account for and monitor reductions in existing nuclear stockpiles, or stockpile monitoring activities. There are some technologies and procedures that apply to both counterproliferation activities and stockpile monitoring activities.

F.15.1 Counterproliferation Verification Technologies

Counterproliferation verification technologies are most commonly employed to support and ensure confidence in nuclear weapons treaties affecting non-nuclear weapons states, and/or those states not in compliance with either the NPT or International Atomic Energy Agency (IAEA) safeguards. These activities include: intrusive, short-notice inspections by the IAEA; a declaration of nuclear materials; satellite surveillance of suspected nuclear facilities; and, in the event of a confirmed or suspected nuclear detonation, international seismic monitoring, air and materials sampling, hydroacoustic and infrasound monitoring, and space-based nuclear energy detection resources.

Inspections of nuclear, or suspected nuclear, facilities, as well as reporting requirements are generally administered by the IAEA, under the auspices of the NPT and the Additional Protocols. During these inspections, trained IAEA inspectors collect environmental samples to scan for illicit nuclear substances, to verify facility design information, and to review the country's nuclear fuel cycle processes. Remote inspection activities can also be used to monitor movements of declared material in a facility and to evaluate information derived from a country's official declarations and open source information.

Satellite surveillance of suspected nuclear facilities is generally not proscribed by nonproliferation treaties and agreements with non-nuclear weapons states, but it is employed by domestic intelligence collection programs and can aid in counterproliferation verification. These activities, for instance, can remotely monitor and verify either the destruction or expansion of existing nuclear facilities.

International seismic monitoring is conducted by both the international community, through a network of CTBT Organization (CTBTO) monitoring stations, and the United States, through an independent network of monitoring stations. Both systems rely on strategically placed seismic monitors to detect nuclear detonations on or below the Earth's surface.

Air and materials sampling and hydroacoustic and infrasound monitoring are also recognized verification technologies that could be used to detect and/or confirm a nuclear detonation. Nuclear events produce very specific, and generally easily

recognizable, post-detonation characteristics, to include the dispersal of radioactive fallout, atmospheric pressure waves, and infrared radiation. These sampling and monitoring activities are generally considered to be national technical nuclear forensics activities. (For more information on national technical nuclear forensics, see *Chapter 8: Countering Nuclear Threats*.)

Lastly, space-based nuclear energy sensors are particularly adept at detecting surface and above surface nuclear detonations. These satellites use X-ray, neutron, electromagnetic pulse (EMP) and gamma-ray detectors, as well as detectors capable of distinguishing the characteristic “double flash” of a nuclear burst. Sub-surface bursts, however, would go largely undetected by this set of technologies.

F.15.2 Stockpile Monitoring Activities

Stockpile monitoring activities include those designed to ensure compliance with nuclear weapons reduction or stockpile monitoring treaties, for instance, the NPT (as it relates to declared and allowed nuclear weapons states) and New START. These activities include bilateral on-site inspections, unique identifiers for nuclear warheads, national technical means, data exchange and notifications, and telemetric information from intercontinental and submarine-launched ballistic missile (ICBM and SLBM) launches. These procedures are designed to balance the sovereignty and security interests of each participating nation against denuclearization goals.

Bilateral on-site inspections are conducted within the auspices of bilateral treaty organizations, which stipulate the number and type of inspections. For the United States, the only major nuclear treaty that allows for bilateral inspections is New START. New START allows for two different types of inspections, with a total of 18 possible inspections each year. The first type focuses on sites with deployed and non-deployed strategic systems; whereas the second focuses on sites with only non-deployed strategic systems. During the inspections, inspectors will be allowed to confirm the number of reentry vehicles on deployed ICBMs and SLBMs, numbers related to non-deployed launcher limits, weapons system conversions or eliminations, and facility eliminations. To aid in the inspection process, unique tamper-resistant identifiers will be assigned to each nuclear weapon and each nuclear weapons system. These are confirmed against data exchange and notification figures, which list the numbers, location, and technical characteristics of weapons systems and facilities.

National technical means, while largely similar to satellite surveillance activities covered in the counterproliferation section of this appendix, are further strengthened by New START in its prohibition of interference, to include concealment measures. Telemetric information is compiled during ICBM and SLBM flight tests. These measurements, which gauge missile performance, are shared under the auspices of the treaty to increase transparency and supplement verification provisions.

F.16 Nuclear Security Summits

In 2009, U.S. President Barak Obama delivered a speech in Prague in which he characterized nuclear terrorism as “the most immediate and extreme threat to global security”. He called for a “new international effort to secure vulnerable nuclear material around the world”, and just one year later, in April 2010, the United States hosted the first Nuclear Security Summit to address the issue of nuclear terrorism at an international level. Since President Obama’s 2009 speech, a total of four international organizations and 53 countries, including the P5 nations (nuclear weapons states) and states not party to the NPT, have convened through the Nuclear Security Summit held:

- April 12-13, 2010: Washington, DC, United States
- March 26-27, 2012: Seoul, South Korea
- March 24-25, 2014: The Hague, Netherlands
- March 31-April 1, 2016 (*anticipated*): Washington, DC, United States

The summit series addresses cooperative measures necessary for the international community to combat the threat of nuclear terrorism, protect nuclear materials and facilities, and prevent illicit trafficking of nuclear weapons. Each summit has addressed key nuclear security issues with the understanding that the threat of nuclear terrorism cannot be undertaken by any individual nation but must be confronted by the international community writ large.

F.16.1 Washington, DC (2010)

At the Nuclear Security Summit held April 12-13, 2010 in Washington, DC, leaders from 47 countries and three international organizations advanced a cooperative approach to strengthening nuclear security. Leaders expressed their commitment to ensure the security of all nuclear materials under their control, to consolidate or reduce employment of weapons-usable materials in civilian applications, and to work cooperatively as an

international community to advance nuclear security, requesting and providing assistance as necessary.

One significant outcome of the Summit was the issuance of the Washington Work Plan, which provides detailed guidance for concrete national and international actions to implement the pledges in the Washington Communiqué. The plan includes:

- ratifying and implementing treaties on nuclear security and nuclear terrorism;
- cooperating through the United Nations to implement and assist others in connection with Security Council resolutions;
- working with the International Atomic Energy Agency to update and implement security guidance and carry out advisory services;
- reviewing national regulatory and legal requirements related to nuclear security and nuclear trafficking;
- converting civilian facilities that use HEU to non-weapons-usable materials;
- research on new nuclear fuels, detection methods, and forensics techniques;
- development of corporate and institutional cultures that prioritize nuclear security;
- education and training to ensure that countries and facilities have the people they need to protect their materials; and,
- joint exercises among law enforcement and customs officials to enhance nuclear detection approaches.

In addition to the commitments made in the Communiqué and Work Plan, many participating countries presented national statements in which they pledged to take specific actions in support of the Summit's objectives; 32 countries made over 70 actionable commitments to enhance nuclear security. Reflecting the sense of urgency galvanized by the threat of nuclear terrorism and the occasion of the Summit, most of these commitments were implemented prior to the 2012 Summit, resulting in tangible improvements to global security.

Participants:

47 Countries: Algeria, Argentina, Armenia, Australia, Belgium, Brazil, Canada, Chile, China, the Czech Republic, Egypt, Finland, France, Georgia, Germany, India, Indonesia, Israel, Italy, Japan, Jordan, Kazakhstan, Malaysia, Mexico, Morocco, the Netherlands, New

Zealand, Nigeria, Norway, Pakistan, the Philippines, Poland, the Republic of Korea, the Russian Federation, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, Ukraine, the United Arab Emirates, the United Kingdom, the United States, and Vietnam.

3 International Organizations: The European Union, the International Atomic Energy Agency, and the United Nations.

F.16.2 Seoul (2012)

In addition to the 47 countries that participated in the Washington Summit, six new countries – Azerbaijan, Denmark, Gabon, Hungary, Lithuania, and Romania – joined the Seoul Summit held March 26-27, 2012. Expanding upon the 2010 Summit in Washington, the 2012 Summit directed efforts at three main issues: cooperative measures to combat the threat of nuclear terrorism; protection of nuclear materials and related facilities; and prevention of illicit trafficking of nuclear materials.

The Seoul Communiqué identified key priority areas for strengthening nuclear and expanded upon the Washington Communiqué and Work Plan by:

- encouraging participating countries to announce specific actions to minimize the use of HEU by the end of 2013;
- urging participating countries to ratify the 2005 Amendment to the Convention on the Physical Protection of Nuclear Material by 2014;
- recognizing a need to increase synergy between nuclear safety and nuclear security;
- emphasizing the need to improve the security of spent nuclear fuel and radioactive waste; and,
- establishing specific measures to ensure the protection of radioactive sources.

The 2012 Summit also introduced the concept of joint statements made by groups of participating countries. Such statements included pledges to take collective action towards advancing specific aspects of nuclear security, such as the security of radioactive materials, nuclear information security, transportation security, and the development of high-density LEU fuel. A total of thirteen joint statements were presented in Seoul, which, when combined with the commitments enshrined in the Communiqué and the respective national statements of many participating countries, resulted in over 100 new commitments made at the 2012 Summit.

Participants:

53 Countries: Algeria, Argentina, Armenia, Australia, Azerbaijan, Belgium, Brazil, Canada, Chile, China, the Czech Republic, Denmark, Egypt, Finland, France, Gabon, Georgia, Germany, Hungary, India, Indonesia, Israel, Italy, Japan, Jordan, Kazakhstan, Lithuania, Malaysia, Mexico, Morocco, the Netherlands, New Zealand, Nigeria, Norway, Pakistan, the Philippines, Poland, the Republic of Korea, Romania, the Russian Federation, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, Ukraine, the United Arab Emirates, the United Kingdom, the United States, and Vietnam.

4 International Organizations: The European Union, the International Atomic Energy Agency, Interpol, and the United Nations.

F.16.3 The Hague (2014)

The third Nuclear Security Summit held in The Hague from March 24-25, 2014 assembled leaders from 53 unique countries and four international organizations to discuss three key objectives:

- strengthening the global nuclear security architecture to bolster accountability measures imposed on states and to prevent nuclear procurement by terrorists;
- elevating the importance of cooperation between governments and nuclear industry; and
- developing a concrete and actionable plan for implementing objectives enunciated (but not yet enacted) through the Seoul Communiqué and Washington Work Plan.

As was the case with the two prior Summits, extensive preparations and consultations among senior-level experts from each participating country were held leading up to the 2014 Summit. These experts, known as sherpas and sous-sherpas, met to develop consensus on the priorities and specific actions that would form the basis for commitments made by world leaders in the Summit Communiqué. For the 2014 Summit, this process began in November 2012, with the first preparatory meeting held in Istanbul, and ended with a final meeting in The Hague just prior to the Summit in March.

Three official side events also took place on the margins of The Hague Summit in an effort to involve key actors from the nuclear industry, the scientific community, nongovernmental organizations, and the general public. The first, titled @tomic 2014, was a table-top exercise on decision-making in the event of an incident of nuclear terrorism. This exercise took place in Maastricht from February 18-20, 2014. Additional side events included

the Nuclear Knowledge Summit in The Hague on March 21-22 and the Nuclear Industry Summit in Amsterdam on March 23-24.

In addition, two thirds of summit participants agreed to join the “Strengthening Nuclear Security Implementation” initiative proposed by the United States, the Netherlands, and the Republic of Korea. Through this initiative, 35 countries pledged to conduct internal assessments and peer reviews to determine and the effectiveness of the country’s nuclear security mechanisms. Parties also agreed that their regulations would reflect or exceed the IAEA’s voluntary guidelines. Finally, participating countries committed to ensure that personnel responsible for nuclear security were competent, qualified, and professionally certified.

Participants:

53 Countries: Algeria, Argentina, Armenia, Australia, Azerbaijan, Belgium, Brazil, Canada, Chile, China, the Czech Republic, Denmark, Egypt, Finland, France, Gabon, Georgia, Germany, Hungary, India, Indonesia, Israel, Italy, Japan, Jordan, Kazakhstan, Lithuania, Malaysia, Mexico, Morocco, the Netherlands, New Zealand, Nigeria, Norway, Pakistan, the Philippines, Poland, the Republic of Korea, Romania, the Russian Federation, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, Ukraine, the United Arab Emirates, the United Kingdom, the United States, and Vietnam.

4 International Organizations: The European Union, the International Atomic Energy Agency, Interpol, and the United Nations.

F.16.4 Washington, DC (2016)

The fourth and final Nuclear Security Summit will be held in Washington, DC. March 31-April 1, 2016. Previous Summits have resulted in concrete improvements in the security of nuclear materials and stronger international institutions that support nuclear security. Recognizing that the international community cannot risk a nuclear terrorist attack, the final Nuclear Security Summit will continue discussion on the evolving threat and address steps that can be taken together to minimize the use of highly-enriched uranium, secure vulnerable materials, counter nuclear smuggling and deter, detect, and disrupt attempts at nuclear terrorism.

