Order Code IB92099

CRS Issue Brief for Congress
Received through the CRS Web

Nuclear Weapons: Comprehensive Test Ban Treaty

Updated December 17, 2004

Jonathan Medalia
Foreign Affairs, Defense, and Trade Division

CONTENTS

Nuclear Weapons: Comprehensive Test Ban Treaty

SUMMARY

A comprehensive test ban treaty, or CTBT, is the oldest item on the nuclear arms control agenda. Three treaties currently limit testing to underground only, with a maximum force equal to 150,000 tons of TNT. According to the Natural Resources Defense Council, the United States conducted 1,030 nuclear tests, the Soviet Union 715, the United Kingdom 45, France 210, and China 45. The last U.S. test was held in 1992; the last U.K. test, in 1991. Russia claims it has not conducted nuclear tests since 1991. An article of May 2002 reported "intelligence indicating that Russia is preparing to resume nuclear tests." Russia rejected the charge.

Since 1997, the United States has held 21 "subcritical experiments" at the Nevada Test Site, most recently on May 25, 2004, to study how plutonium behaves under pressures generated by explosives. It asserts these experiments do not violate the CTBT because they cannot produce a self-sustaining chain reaction. Russia has reportedly held some since 1998, including several in 2000.

In May 1998, India and Pakistan each announced several nuclear tests and declared themselves nuclear weapons states. Each declared a moratorium on further tests, but separately stated, in the summer of 2000, that the time was not right to sign the CTBT.

The U.N. General Assembly adopted the CTBT in September 1996. As of December 16, 2004, 174 states had signed it and 120, including Russia, had ratified. In 1997, President Clinton transmitted the CTBT to the Senate. On October 13, 1999, the Senate rejected the treaty, 48 for, 51 against, 1 present. It is now on the Senate Foreign Relations Committee's calendar. It would require a two-thirds Senate vote to send the treaty back to the President for disposal or to give advice and consent for ratification; few see either event as likely.

In January 2002, the Administration, in briefings on the Nuclear Posture Review, indicated that it continues to oppose the CTBT, continues to adhere to the test moratorium, plans to reduce the time between a decision to conduct a nuclear test and the test itself, is considering modifying existing warheads for use against hard and deeply-buried targets, has not ruled out resumed testing, and has no plans to test. Critics raised concerns about the implications of these policies for testing and new weapons. Congress addresses nuclear weapon issues in the annual National Defense Authorization Act and the Energy and Water Development Appropriations Act.

Congress continues to consider the Stockpile Stewardship Program, which seeks to maintain nuclear weapons without testing. The appropriation for the program (Weapons Activities) was $5.429 billion for FY2002, $5.954 billion for FY2003, and $6.273 billion for FY2004. The FY2005 Consolidated Appropriations Act provided $6.526 billion for Weapons Activities and $19.0 million to fund the U.S. contribution to a global system for monitoring events that might violate the treaty.

MOST RECENT DEVELOPMENTS

On December 3, the U.N. General Assembly adopted a resolution calling for early entry into force of the CTBT and calling on states that have signed but not ratified the treaty to "accelerate their ratification processes." Rwanda signed and ratified the CTBT on November 30. The Preparatory Commission of the Comprehensive Test Ban Treaty Organization had its 23rd meeting November 15-19. On September 24, foreign ministers from 42 nations issued a statement calling entry into force of the CTBT "more urgent today than ever before."

BACKGROUND AND ANALYSIS

History

A ban on nuclear testing is the oldest item on the arms control agenda. Efforts to curtail tests have been made since the 1940s. In the 1950s, the United States and Soviet Union conducted hundreds of hydrogen bomb tests. The radioactive fallout from these tests spurred worldwide protest. These pressures, plus a desire to reduce U.S.-Soviet confrontation after the Cuban Missile Crisis of 1962, led to the Limited Test Ban Treaty of 1963, which banned nuclear explosions in the atmosphere, in space, and under water. The Threshold Test Ban Treaty, signed in 1974, banned underground nuclear weapons tests having an explosive force of more than 150 kilotons, the equivalent of 150,000 tons of TNT, ten times the force of the Hiroshima bomb. The Peaceful Nuclear Explosions Treaty, signed in 1976, extended the 150-kiloton limit to nuclear explosions for peaceful purposes. President Carter did not pursue ratification of these treaties, preferring to negotiate a comprehensive test ban treaty, or CTBT, a ban on all nuclear explosions. When agreement seemed near, however, he pulled back, bowing to arguments that continued testing was needed to maintain reliability of existing weapons, to develop new weapons, and for other purposes. President Reagan raised concerns about U.S. ability to monitor the two unratified treaties and late in his term started negotiations on new verification protocols. These two treaties were ratified in 1990.

With the end of the Cold War, the need for improved warheads dropped and pressures for a CTBT grew. The U.S.S.R. and France began nuclear test moratoria in October 1990 and April 1992, respectively. In early 1992, many in Congress favored a one-year test moratorium. The effort led to the Hatfield amendment to the FY1993 Energy and Water Development Appropriations Bill, which banned testing before July 1, 1993, set conditions on a resumption of testing, and banned testing after September 1996 unless another nation tested. President Bush signed the bill into law (P.L. 102-377) October 2, 1992. The CTBT was negotiated in the Conference on Disarmament. It was adopted by the U.N. General Assembly on September 10, 1996, and was opened for signature on September 24, 1996. As of December 16, 2004, 174 states had signed it and 120, including Russia, had ratified.

National Positions on Testing and the CTBT

United States: Under the Hatfield amendment, President Clinton had to decide whether to ask Congress to resume testing. On July 3, 1993, he announced his decision. "A test ban can strengthen our efforts worldwide to halt the spread of nuclear technology in weapons,"

and "the nuclear weapons in the United States arsenal are safe and reliable." While testing offered advantages for safety, reliability, and test ban readiness, "the price we would pay in conducting those tests now by undercutting our own nonproliferation goals and ensuring that other nations would resume testing outweighs these benefits." Therefore, he (1) extended the moratorium at least through September 1994; (2) called on other nations to extend their moratoria; (3) said he would direct DOE to "prepare to conduct additional tests while seeking approval to do so from Congress" if another nation tested; (4) promised to "explore other means of maintaining our confidence in the safety, the reliability and the performance of our own weapons"; and (5) pledged to refocus the nuclear weapons laboratories toward technology for nuclear nonproliferation and arms control verification. He extended the moratorium twice more; on January 30, 1995, the Administration announced his decision to extend the moratorium until a CTBT entered into force, assuming a treaty was signed by September 30, 1996.

On September 22, 1997, President Clinton submitted the CTBT to the Senate. He asked the Senate to approve it in his State of the Union addresses of 1998 and 1999, but Senator Helms, Chairman of the Senate Foreign Relations Committee, rejected that request on grounds that the treaty "from a non-proliferation standpoint, is scarcely more than a sham" and was of low priority for the committee. In the summer of 1999, Senate Democrats pressed Senators Helms and Lott to permit consideration of the treaty. On September 30, 1999, Senator Lott offered a unanimous-consent request to discharge the Senate Foreign Relations Committee from considering the treaty and to have debate and a vote. The request, as modified, was agreed to. The Senate Armed Services Committee held hearings October 5-7; the Foreign Relations Committee held a hearing October 7. It quickly became clear that the treaty was far short of the votes for approval, leading many on both sides to seek to delay a vote. As the vote was scheduled by unanimous consent, and several Senators opposed a delay, the vote was held October 13, rejecting the treaty, 48 for, 51 against, and 1 present. At the end of the 106th Congress, pursuant to Senate Rule XXX, paragraph 2, the treaty moved to the Senate Foreign Relations Committee calendar, where it currently resides.

The Nuclear Posture Review and Nuclear Testing: In the FY2001 National Defense Authorization Act (P.L. 106-398, Sec. 1041), Congress directed the Secretary of Defense, in consultation with the Secretary of Energy, to review nuclear policy, strategy, arms control objectives, and the forces, stockpile, and nuclear weapons complex needed to implement U.S. strategy. Although the resulting Nuclear Posture Review is classified, J.D. Crouch, Assistant Secretary of Defense for International Security Policy, presented an unclassified briefing on it on January 9, 2002, dealing in part with the CTBT and nuclear testing. He stated there would be "no change in the Administration's policy at this point on nuclear testing. We continue to oppose CTBT ratification. We also continue to adhere to a testing moratorium." Further, "DOE is planning on accelerating its test-readiness program," referring to the time needed between a decision to test and the conduct of a test, currently 24 to 36 months. He discussed new weapons. "At this point, there are no recommendations in the report about developing new nuclear weapons. ... we are trying to look at a number of initiatives. One would be to modify an existing weapon, to give it greater capability against ... hard targets and deeply-buried targets. And we're also looking at non-nuclear ways that we might be able to deal with those problems." President Bush has left open the door to resumed nuclear testing. A *Washington Post* article of January 10, 2002, quoted White House Press Secretary Ari Fleischer as saying that the President has not ruled out testing "to

make sure the stockpile, particularly as it is reduced, is reliable and safe. So he has not ruled out testing in the future, but there are no plans to do so."

Critics expressed concern about the implications of these policies for testing and new weapons. Daryl Kimball, executive director of the Arms Control Association, said that since increasing funding for test readiness "would amount to giving prior approval for testing, the debate [in Congress] would be substantial." A statement by Physicians for Social Responsibility said, "The Administration's plan ... would streamline our nuclear arsenal into a war-fighting force, seek the opportunity to design and build new nuclear weapons, and abandon a ten-year-old moratorium on nuclear weapons testing."

The Nuclear Posture Review, if fully implemented, could add new tasks to the nuclear weapons complex and augment existing ones. Work would be needed at Nevada Test Site to accelerate test readiness. Indeed, a September 2002 report by DOE's Office of Inspector General found that while a Presidential Decision Directive requires DOE to be able to restart underground testing within three years, that ability is "at risk" due to staff losses, obsolete equipment, and fewer facilities dedicated to testing. Pantex Plant would see an increase in dismantlement or storage of weapons, and disposition of some components and materials from dismantled weapons. Other plants would be involved in dismantlement, disposition, or storage of components. The labs would design any new weapons or modify existing ones. Nuclear tests would draw mainly on the resources of the labs and Nevada Test Site. Production of new weapons or of components for modified ones would draw on the resources of the entire weapons complex.

Since January 2002, there has been increased interest in nuclear weapons and nuclear testing. DOE is studying earth penetrator weapons, which would detonate some tens of feet underground, coupling more of their energy to the ground. This would improve their ability to destroy hardened and deeply buried targets, which might house weapons of mass destruction in potentially hostile nations. While the weapons under study would be modifications of existing weapons and would not require testing, some fear that pursuing such weapons could lead to testing. Moreover, John Foster, Chairman of the Panel to Assess the Reliability, Safety, and Security of the United States Nuclear Stockpile, testified before a House Armed Services Committee panel that "prudence requires that every President have a realistic option to return to testing, should technical or political events make it necessary." The Foster panel recommended being able to return to testing within three months to a year, depending on the type of test, vs. the standard of 24-36 months set in the 1990s. (For congressional action on earth penetrators and test readiness, see Legislation, below.)

In July 2002, a National Academy of Sciences panel report on technical aspects of the CTBT concluded, in the words of an Academy press release, "that verification capabilities for the treaty are better than generally supposed, U.S. adversaries could not significantly advance their nuclear weapons capabilities through tests below the threshold of detection, and the United States has the technical capabilities to maintain confidence in the safety and reliability of its existing weapons stockpile without periodic nuclear tests."

United Kingdom: The United Kingdom cannot test because it has conducted all its nuclear tests for several decades at the Nevada Test Site and does not have its own test site. Its last test was held in 1991. Britain and France became the first of the original five nuclear weapon states to ratify the CTBT, depositing instruments of ratification with the United

Nations on April 6, 1998. On February 14, 2002, the United Kingdom conducted its first subcritical experiment jointly with the United States at the Nevada Test Site.

France: On June 13, 1995, President Jacques Chirac announced that France would conduct eight nuclear tests at its test site at Mururoa Atoll in the South Pacific, finishing by the end of May 1996. The armed services had reportedly wanted the tests to check existing warheads, validate a new warhead, and develop a computer system to simulate warheads to render further testing unneeded. Many nations criticized the decision. On August 10, 1995, France indicated it would halt all nuclear tests once the test series was finished and favored a CTBT that "prohibit(ed) any nuclear weapon test explosion or any other nuclear explosion." France conducted six tests from September 5, 1995, to January 27, 1996. On January 29, 1996, Chirac announced the end to French testing. On April 6, 1998, France and Britain deposited instruments of ratification of the CTBT with the United Nations.

Russia: Several press reports between 1996 and 1999 claimed that Russia may have conducted low-yield nuclear tests at its Arctic test site at Novaya Zemlya; other reports stated that U.S. reviews of the data determined that these events were earthquakes. Several reports between 1998 and 2000 stated that Russia had conducted "subcritical" nuclear experiments, discussed below, which the CTBT does not bar.

Russia has urged the United States to ratify the treaty. In late February 2001, President Vladimir Putin of Russia and President Kim Dae Jung of the Republic of Korea issued a joint communique that said in part that they "appealed to other countries to ratify the treaty without any delays and they also appealed to those countries whose ratification is needed for it to come into effect."

China: China did not participate in the moratorium. It conducted a nuclear test on October 5, 1993, that many nations condemned. It countered that it had conducted 39 tests, vs. 1,054 for the United States, and needed a few more for safety and reliability. The Chinese government reportedly wrote to U.N. Secretary General Boutros Boutros-Ghali after its test that "after a comprehensive test ban treaty is concluded and comes into effect, China will abide by it and carry out no more nuclear tests." It conducted other tests on June 10 and October 7, 1994, May 15 and August 17, 1995, and June 8 and July 29, 1996. It announced that the July 1996 test would be its last, as it would begin a moratorium on July 30, 1996. In a speech of January 1999, Chinese Ambassador Sha Zukang said China was "accelerating its preparatory work" and would submit the CTBT for ratification in the first part of 1999. On February 29, 2000, the Chinese government submitted the CTBT to the National People's Congress for ratification. As of December 2004, China had not ratified the treaty.

India: On May 11, 1998, Prime Minister Atal Behari Vajpayee announced that India had conducted three nuclear tests. A government statement said, "The tests conducted today were with a fission device, a low yield device and a thermonuclear device. ... These tests have established that India has a proven capability for a weaponised nuclear programme. They also provide a valuable database which is useful in the design of nuclear weapons of different yields for different applications and for different delivery systems." It announced two more sub-kiloton tests on May 13. A September 1998 study by Terry Wallace, a University of Arizona seismologist, concluded based on seismic data that India and Pakistan overstated the number and (by a factor of four) the yields of their tests. India has conducted no tests since May 1998. In a September 1998 address to the U.N., Vajpayee said that India

had a test moratorium and is "prepared to bring [certain] discussions to a successful conclusion, so that the entry into force of the CTBT is not delayed beyond September 1999." The collapse of his government in April 1999 delayed Indian consideration of the treaty until after elections held in September. Vajpayee's party won, and the government reaffirmed that it would maintain a moratorium while trying to build a consensus on the CTBT. However, Senator Spector, who visited India and Pakistan in January 2001, stated, "In my discussions with officials, it became evident that securing compliance with the CTBT by these two nations without U.S. ratification would be problematic." (*Congressional Record*, January 24, 2001: S514.) Lalit Mansingh, India's Foreign Secretary, "expressed his sentiment that the U.S. should not expect India to sign a Treaty that the U.S. itself perceives as flawed." (Ibid.: S513) As of December 2004, India had not signed the CTBT. In a joint statement of June 20, 2004, following Expert-Level Talks on Nuclear Confidence Building Measures held in New Delhi, "Each side reaffirmed its unilateral moratorium on conducting further nuclear test explosions" barring "extraordinary events." Further, the sides agreed, "A dedicated and secure hotline would be established between the two Foreign Secretaries ..."

Pakistan: Pakistan announced on May 28, 1998, that it had conducted five nuclear tests, and announced a sixth on May 30. Reports placed the yields of the smallest devices between zero and a few kilotons, and between two and 45 kilotons for the largest. The number of tests is uncertain; seismic evidence points clearly to only two tests on May 28, though signals of smaller simultaneous tests might have been lost in the signals of larger tests. Pakistan made no claims of testing fusion devices. By all accounts, Pakistan's weapons program relies extensively on foreign, especially Chinese, technology. Pakistan claimed that it tested "ready-to-fire warheads," not experimental devices, and included a warhead for the Ghauri, a missile with a range of 900 miles, and low-yield tactical weapons. It appears that Pakistan will conduct no further tests. In an address to the U.N. of September 23, 1998, Pakistan's Prime Minister Nawaz Sharif stated that his country had a moratorium on testing and was "prepared to accede to the CTBT" by September 1999, with the implicit condition that sanctions are lifted and the explicit condition that India does not resume testing. The United States has been lifting various sanctions on India and Pakistan, such as on agricultural, economic, and military-assistance programs. On November 8, 1999, Abdul Sattar, the foreign minister of the military government that took power in October 1999, said that his nation would not sign the CTBT unless economic sanctions were lifted, but that "[w]e will not be the first to conduct further nuclear tests." In August 2000, General Pervez Musharraf, the nation's military ruler, said the time was not ripe to sign the CTBT because so doing could destabilize Pakistan. As of December 2004, Pakistan had not signed the CTBT.

North Korea: Negotiations to halt North Korea's nuclear program have been underway for years, most recently between that nation, the United States, China, Japan, South Korea, and Russia. A CIA report of late 2004 stated that during talks in April 2003, "North Korea privately threatened to 'transfer' or 'demonstrate' its nuclear weapons." As of December 2004, North Korea had not signed the CTBT, and no North Korean nuclear tests had been reported. (See CRS Issue Brief IB91141, *North Korea's Nuclear Weapons Program.*)

The CTBT: Negotiations and Key Provisions

The Conference on Disarmament, or CD, calls itself "the sole multilateral disarmament negotiating forum of the international community." It is affiliated with, funded by, yet

autonomous from the United Nations. It operates by consensus; each member state can block a decision. On August 10, 1993, the CD gave its Ad Hoc Committee on a Nuclear Test Ban "a mandate to negotiate a CTB." On November 19, 1993, the United Nations General Assembly unanimously approved a resolution calling for negotiation of a CTBT. The CD's 1994 session opened in Geneva on January 25, with negotiation of a CTBT its top priority.

The priority had to do with extension of the Nuclear Non-Proliferation Treaty (NPT). That treaty entered into force in 1970. It divided the world into nuclear "haves" — the United States, Soviet Union, Britain, France, and China, the five declared nuclear powers, which are also the permanent five ("P5") members of the U.N. Security Council — and nuclear "have-nots." The P5 would be the only States Party to the NPT to have nuclear weapons, but they (and others) would negotiate in good faith on halting the nuclear arms race soon, on nuclear disarmament, and on general and complete disarmament. Nonnuclear weapon states saw attainment of a CTBT as the touchstone of good faith on these matters. The NPT provided for reviews every five years; a review in 1995, 25 years after it entered into force, would determine whether to extend the treaty indefinitely or for one or more fixed periods. The Review and Extension Conference of April-May 1995 extended the treaty indefinitely. Extension was accompanied by certain non-binding measures, including a Decision on Principles and Objectives for Nuclear Non- Proliferation and Disarmament that set forth goals on universality of the NPT, nuclear weapon free zones, etc., and stressed the importance of completing "the negotiations on a universal and internationally and effectively verifiable Comprehensive Nuclear-Test-Ban Treaty no later than 1996."

The extension decision, binding on States Party to the NPT, was contentious. Nonnuclear States Party argued that the P5 failed to meet their NPT obligations by not concluding a CTBT. They saw progress on winding down the arms race as inadequate. They assailed the NPT as discriminatory because it divides the world into nuclear and nonnuclear states, and argued for a regime in which no nation has nuclear weapons. The CTBT, in their view, symbolized this regime because, unlike the NPT, the P5 would give up something tangible, the ability to develop new sophisticated warheads. Some nonnuclear states saw NPT extension as their last source of leverage for a CTBT. Other nonnuclear states felt that the NPT was in the interests of all but would-be proliferators, that anything less than indefinite extension would undermine the security of most nations, and that the NPT was too important to put at risk as a means of pressuring the P5 for a CTBT. The explicit linkage finally drawn between CTBT and NPT lent urgency to negotiations on the former.

The CD reached a draft treaty in August 1996. India argued that the CTBT "should be securely anchored in the global disarmament context and be linked through treaty language to the elimination of all nuclear weapons in a time-bound framework." India also wanted a treaty to bar weapons research not involving nuclear tests. The draft treaty did not meet these conditions, which the nuclear weapon states rejected, so India vetoed it at the CD on August 20, barring it from going to the U.N. General Assembly as a CD document. As an alternate way to open the treaty for signing, Australia on August 23 asked the General Assembly to consider a resolution to adopt the draft CTBT text and for the Secretary-General to open it for signing so it could be adopted by a simple majority, or by the two-thirds majority that India sought, avoiding the need for consensus. A potential pitfall was that the resolution (the treaty text) was subject to amendment, yet the nuclear weapon states viewed amendments as unacceptable. India did not raise obstacles to the vote, which was held September 10, with 158 nations in favor, 3 against (India, Bhutan, and Libya), 5 abstentions, and 19 not voting.

A sixth five-year NPT review conference was held April 24 to May 19, 2000, in New York. U.S. rejection of the CTBT, lack of Chinese ratification, U.S. efforts to seek renegotiation of the ABM Treaty, and efforts to ban nuclear weapons in the Middle East led some to fear dire outcomes from the conference. However, some contentious issues were ironed out, some were avoided, and concessions were made. For example, a joint statement by the P5 to the conference on May 1 said, "No effort should be spared to make sure that the CTBT is a universal and internationally and effectively verifiable treaty and to secure its earliest entry into force." As a result of effort by many nations, the final document of the conference was adopted by consensus. Regarding the CTBT, that document reaffirmed that a halt to all nuclear explosions will contribute to nuclear nonproliferation and nuclear disarmament; called on all States, especially the 16 that must ratify the CTBT for it to enter into force, "to continue their efforts to ensure the early entry into force of the Treaty"; and agreed, as a practical step toward disarmament, "An unequivocal undertaking by the nuclear-weapon States to accomplish the total elimination of their nuclear arsenals leading to nuclear disarmament to which all States parties are committed under Article VI" of the NPT.

The Preparatory Committee for the 2005 NPT Review Conference met in April 2002. According to a press report, the committee called for more nations to ratify the CTBT and issued a report that concluded the treaty must enter into force as soon as possible. Other Preparatory Committee meetings were held April-May, 2003, and April-May, 2004. The Review Conference will be held from May 2 to 28, 2005.

The balance of this section summarizes key CTBT provisions. See "*Comprehensive Nuclear Test-Ban Treaty: Message from the President ...,*" cited below, for details.

Scope (Article I): The heart of the treaty is the obligation "not to carry out any nuclear weapon test explosion or any other nuclear explosion." This formulation bars even very low yield tests, as some in the nuclear weapon states had wanted, and bars peaceful nuclear explosions, as China had wanted, but rejects India's concern that a CTBT should "leave no loophole for activity, either explosive-based or non-explosive based, aimed at the continued development and refinement of nuclear weapons."

Organization (Article II): The treaty establishes a Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), composed of all member states, to implement the treaty. Three groups are under this Organization. The Conference of States Parties, composed of a representative from each member state, shall meet in annual and special sessions to consider and decide issues within the scope of the treaty and oversee the work of the other groups. An Executive Council with 51 member States shall, among other things, take action on requests for on-site inspection, and may request a special session of the Conference. A Technical Secretariat shall carry out verification functions, including operating an International Data Center, processing and reporting on data from an International Monitoring System, and receiving and processing requests for on-site inspections.

Verification (Article IV): The treaty establishes a verification regime. It provides for collection and dissemination of information, permits States Party to use national technical means of verification, and specifies verification responsibilities of the Technical Secretariat. It establishes an International Monitoring System (IMS) with 321 stations in 90 countries, provides for consultation on "possible non-compliance," and provides for on-site inspections. As of December 2003, surveys had been completed for 91 percent of the 321 sites, 50 percent

of the sites had been installed or upgraded, and 30 percent of the sites had been certified and were bringing in data.

Review of the Treaty (Article VIII): The treaty provides for a conference ten years after entry into force (unless a majority of States Party decide not to hold such a conference) to review the treaty's operation and effectiveness. Further review conferences may be held at subsequent intervals of ten years or less.

Duration and Withdrawal (Article IX): "This treaty shall be of unlimited duration." However, "Each State Party shall, in exercising its national sovereignty, have the right to withdraw from this Treaty if it decides that extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests." President Clinton indicated his possible willingness to withdraw from the Treaty using this withdrawal provision, which is common to many arms control agreements, in his speech of August 11, 1995, discussed below, as one of several conditions under which the United States would enter the CTBT.

Entry into force (Article XIV): The treaty shall enter into force 180 days after 44 states named in Annex 2 have deposited instruments of ratification, but not less than two years after the treaty is opened for signature. If the treaty has not entered into force three years after being opened for signature, and if a majority of states that have deposited instruments of ratification so desire, a conference of these states shall be held to decide how to accelerate ratification. Unless otherwise decided, subsequent conferences of this type shall be held annually until entry into force occurs. The 44 states are the ones with nuclear reactors that participated in the work of the CD's 1996 session and were CD members as of June 18, 1996. This formulation includes nuclear-capable states, includes nuclear threshold states (in particular Israel, which, along with other States, joined the CD on June 17, 1996), and excludes Yugoslavia, which did not participate in the CD's work of 1996. India, North Korea, and Pakistan are on the list of 44 but had not signed the treaty as of December 2004.

Protocol: The Protocol provides details on the International Monitoring System and on functions of the International Data Center (Part I); spells out on-site inspection procedures in great detail (Part II); and provides for certain confidence-building measures (Part III). Annex 1 to the Protocol lists International Monitoring System facilities: seismic stations, radionuclide stations and laboratories, hydroacoustic stations, and infrasound stations. Annex 2 provides a list of variables that, among others, may be used in analyzing data from these stations to screen for possible explosions.

Preparing for Entry into Force

States that had signed the CTBT established the Preparatory Commission (PrepCom) for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) to prepare for entry into force of the treaty, such as by creating the structures and instruments of the CTBT. The PrepCom states that its main task "is to establish the global verification regime foreseen in the Treaty so that it will be operational by the time the Treaty enters into force." Its first meeting was in November 1996. There have been 23 such meetings, the next is scheduled for June 27-30, 2005. Eight meetings of CTBTO working groups and advisory groups are scheduled for 2005. CTBTO also holds training sessions, workshops, etc.

The only funding the United States provides to the PrepCom is as follows (budget authority): FY2002 actual, $16.6 million; FY2003 actual, $18.2 million; FY2004 appropriation, $19.0 million; and FY2005 appropriation, $19.0 million. These funds are in the International Affairs Function 150 budget in Nonproliferation, Antiterrorism, Demining, and Related Programs (NADR). The FY2005 budget justification states that these funds "pay the U.S. share for the ongoing development and implementation of the international monitoring system (IMS), which supplements U.S. capabilities to detect nuclear explosions. Since the United States does not seek ratification and entry-into-force of the CTBT, none of the funds will support Preparatory Commission activities that are not related to the IMS."

Entry-into-force conferences under Article XIV were held in October 1999, November 2001, and September 2003. In September 2002, 18 foreign ministers, including those of Britain, France, and Russia, issued a statement calling for early entry into force. On November 22, 2002, the U.N. General Assembly adopted resolution 57/100 (164 for, 1 against (U.S.A.), and 5 abstentions) urging states to maintain their nuclear test moratoria and urging states that had not signed and ratified the CTBT to do so as soon as possible and to avoid actions that would defeat its object and purpose. In a message to the 2003 entry-into-force conference, U.N. Secretary-General Kofi Annan urged the 12 remaining nations that must ratify the treaty for it to enter into force, and especially North Korea, to ratify, and urged continuing the moratorium: "No nuclear testing must be tolerated under any circumstances." The Non-Aligned Movement, with 116 member states, ended a conference on February 25, 2003. The conference's Final Document stated that the heads of state or government "stressed the significance of achieving universal adherence to the Comprehensive Nuclear-Test-Ban Treaty (CTBT), including by all the Nuclear Weapons States." On September 23, 2004, foreign ministers from 42 nations called for prompt ratification of the CTBT, especially by those nations whose ratification is required for entry into force.

Stockpile Stewardship

P5 states want to maintain their nuclear warheads under a CTBT and assert that they need computers and scientific facilities to do so. They also want to retain the ability to resume testing if other nations leave a CTBT, or if high confidence in key weapons cannot be maintained with testing. Nonnuclear nations fear that the P5 will continue to design new warheads under a CTBT, with computation and nonnuclear experiments replacing testing. Maintaining nuclear weapons, especially without testing, is termed "stockpile stewardship." This is a contentious issue. This section focuses on the U.S. debate

Stewardship bears on Senate advice and consent to CTBT ratification. Beginning with the Nuclear Test Ban Treaty of 1963, the United States has implemented "safeguards," or unilateral steps to maintain its nuclear weapons capability consistent with treaty limitations. President Kennedy's agreement to safeguards was critical for obtaining Senate approval of the 1963 treaty. The safeguards were modified most recently by President Clinton. In his August 11, 1995, speech announcing a zero-yield CTBT as a goal, he stated:

> As a central part of this decision, I am establishing concrete, specific safeguards that define the conditions under which the United States will enter into a comprehensive test ban. These safeguards will strengthen our commitments in the areas of intelligence, monitoring and verification, stockpile stewardship, maintenance of our nuclear laboratories, and test readiness.

These safeguards are: Safeguard A: "conduct of a Science Based Stockpile Stewardship program to insure a high level of confidence in the safety and reliability of nuclear weapons in the active stockpile"; Safeguard B: "maintenance of modern nuclear laboratory facilities and programs"; Safeguard C: "maintenance of the basic capability to resume nuclear test activities prohibited by the CTBT"; Safeguard D: "a comprehensive research and development program to improve our treaty monitoring"; Safeguard E: intelligence programs for "information on worldwide nuclear arsenals, nuclear weapons development programs, and related nuclear programs"; and Safeguard F: the understanding that if the Secretaries of Defense and Energy inform the President "that a high level of confidence in the safety or reliability of a nuclear weapon type which the two Secretaries consider to be critical to our nuclear deterrent could no longer be certified, the President, in consultation with Congress, would be prepared to withdraw from the CTBT under the standard 'supreme national interests' clause in order to conduct whatever testing might be required."

Regarding the stewardship program, President Clinton said that the Secretary of Energy and the directors of the nuclear weapons laboratories had assured him that the United States could maintain its nuclear deterrent under a CTBT through a program of science-based stockpile stewardship. "In order for this program to succeed," he said, "both the administration and the Congress must provide sustained bipartisan support for the stockpile stewardship program over the next decade and beyond."

The ability of the stewardship program to maintain nuclear weapons without testing was a crucial issue in the Senate debate on the CTBT. The treaty's opponents claimed that stewardship offered no guarantee of maintaining weapons, and that experiments, computer models, and other techniques might offer no clue to some problems that develop over time. They further argued that it could be perhaps a decade before the tools for the program were fully in place, and by that time many weapon designers with test experience would have retired. Supporters held that the program was highly likely to work, having already certified the stockpile three times, and that safeguard "F" provided for U.S. withdrawal from the treaty in the event high confidence in a key weapon type could not be maintained without testing. (Secretary of Energy Spencer Abraham testified in March 2003 that the Secretaries of Energy and Defense had certified the stockpile for the last seven years.)

The Weapons Activities account in the National Nuclear Security Administration (NNSA) budget funds stewardship. (Congress established NNSA in 1999 as a semiautonomous agency in DOE to manage stockpile stewardship and related programs.) The main elements of this account are Directed Stockpile Work, activities directly supporting weapons in the stockpile; Campaigns, technical efforts to develop and maintain capabilities to certify the stockpile for the long term; and Readiness in Technical Base and Facilities, mainly infrastructure and operations for the weapons complex. Appropriations for Weapons Activities were: FY2001, $5.006 billion; FY2002, $5.429 billion; FY2003, $5.954 billion; FY2004, $6.339 billion (adjusted); and FY2005, $6.526 billion. For details, see CRS Report RL32307, *Appropriations for FY2005: Energy and Water Development.*

Subcritical experiments (SCEs): As part of the stockpile stewardship program, NNSA is conducting SCEs. CRS offers the following definition based on documents and on discussions with DOE and laboratory staff: "Subcritical experiments at Nevada Test Site involve chemical high explosives and fissile materials in configurations and quantities such that no self-sustaining nuclear fission chain reaction can result. In these experiments, the

chemical high explosives are used to generate high pressures that are applied to the fissile materials." The only fissile material that has been used in SCEs is plutonium-239. SCEs are held in a tunnel complex, about 1,000 feet underground at Nevada Test Site. The complex could contain explosions up to 500 pounds of explosive and associated plutonium. These experiments try to determine if radioactive decay of aged plutonium would degrade weapon performance. They have been used to support certification of the W88 pit. In 1998, Secretary of Energy Bill Richardson called SCEs "a key part of our scientific program to provide new tools and data that assess age-related complications and maintain the reliability and safety of the nation's nuclear deterrent." As they produce no chain reaction, the Clinton Administration saw them as consistent with the CTBT. Critics counter that they would help design new weapons without testing; are unnecessary; may look like nuclear tests if not monitored intrusively; and are inconsistent with the spirit of a CTBT, which, critics believe, is aimed at halting nuclear weapons development, not just testing. NNSA states that most subcritical experiments cost between $15 million and $25 million, with some costing as little as $5 million or as much as $60 million. (For further information on subcritical experiments and test readiness, see CRS Report RL32130, *Nuclear Weapon Initiatives: Low-Yield R&D, Advanced Concepts, Earth Penetrators, Test Readiness.*)

The 21 SCEs held so far are: *1997:* Rebound, July 2; Holog, September 18; *1998:* Stagecoach, March 25; Bagpipe, September 26; Cimarron, December 11; *1999:* Clarinet, February 9; Oboe, September 30; Oboe 2, November 9; *2000:* Oboe 3, February 3; Thoroughbred, March 22; Oboe 4, April 6; Oboe 5, August 18; Oboe 6, December 14; *2001:* Oboe 8, September 26; Oboe 7 (held after Oboe 8), December 13; *2002:* Vito (jointly with U.K.), February 14; Oboe 9, June 7; Mario, August 29; Rocco, September 26; *2003:* Piano, September 19; *2004:* Armando, May 25. NNSA plans several SCEs for FY2005. One, "Unicorn," is to be conducted in a vertical shaft, unlike the other experiments. NNSA states it "will appear visually similar" to site preparation used in pre-moratorium nuclear tests and "will exercise key [Nevada Test Site] capabilities" not exercised in prior SCEs.

Test Readiness: President Clinton directed DOE to be prepared to conduct a nuclear test within three years of a decision to do so. Yet a September 2002 report by DOE's Office of Inspector General found this ability "at risk." In January 2002, the Nuclear Posture Review briefing called for an unspecified acceleration of nuclear test readiness, and in March 2002 the Panel to Assess the Reliability, Safety, and Security of the United States Nuclear Stockpile assessed that "test readiness should be no more than three months to a year." The FY2003 National Defense Authorization Act, P.L. 107-314, sec. 3142, required the Secretary of Energy to report on alternative test readiness postures and recommend the optimal readiness posture. The resulting report argued that the three-year posture was increasingly at risk, "[a]t the time of an active underground test program, 18 months was a minimal time to design and prepare most tests," and readiness times shorter than 18 months had "additional costs and impacts to other stockpile stewardship missions." Accordingly, it recommended moving to an 18-month readiness posture by the end of FY2005. The FY2004 Weapons Activities request includes $24.9 million to reduce from three years to 18 months the time needed to resume testing. While the National Defense Authorization Act and the Energy and Water Development Appropriations Act provided the funds requested, conferees on the latter expected NNSA to focus on a program that can meet the current 24-month requirement "before requesting significant additional funds to pursue a more aggressive goal of an 18-month readiness posture." Yet in testimony before the Senate Armed Services Committee on March 24, 2004, NNSA Administrator Linton Brooks said that the goal of test readiness

"is to achieve an 18-month test readiness posture as directed by the Defense Authorization Act." In the FY2005 energy and water bill, The House Appropriations Committee recommended reducing the Primary Assessment Technologies campaign request of $81.5 million, which includes $30.0 million for test readiness, by $15.0 million "to limit the enhanced test readiness initiative to the goal of achieving a 24-month test readiness posture. The Committee continues to oppose the 18-month test readiness posture." The House passed this bill without amending the Weapons Activities section. The FY2005 Consolidated Appropriations Act reduced this campaign by $7.5 million.

Other relevant provisions: The Administration also requested FY2004 funds to continue a study of a Robust Nuclear Earth Penetrator (RNEP) weapon and to study advanced weapons concepts in the Advanced Concepts Initiative (ACI), and sought to rescind a provision barring R&D that could lead to U.S. production of a sub-5-kiloton nuclear weapon. Critics argued that these provisions indicated a renewed interest by the Administration in developing, testing, producing, and perhaps using nuclear weapons. They feared that low-yield nuclear weapons were more usable — making their use more likely — because they would produce less unintended damage, and that earth penetrators were more usable because they were tailored to missions of potential military interest in the post-Cold War world. They feared that this emphasis on nuclear weapons would undercut U.S. efforts to halt nuclear proliferation and could lead other nations to develop such weapons to deter U.S. attack. Further, they held that U.S. conventional military capabilities were sufficient to defeat the full range of potential targets. Supporters countered that new types of nuclear weapons were needed. Weapons designed decades ago to be part of a massive U.S. strike on the Soviet Union were not appropriate for some current types of targets. They favored lower-yield nuclear weapons to reduce unintended damage, to make the weapons more usable, and to increase their deterrent value. They held that hard and deeply buried targets posed a particular threat to the United States because they could shelter leadership and weapons of mass destruction of rogue states, that conventional forces could not destroy some such targets, and that it was appropriate to develop nuclear weapons — such as earth penetrators or weapons to incinerate biological munitions — tailored to destroy these targets. Finally, supporters said, these provisions merely called for studies; engineering development or production would require congressional approval. For RNEP, the FY2004 appropriation was $7.5 million and the FY2005 request is $27.6 million. For ACI, the FY2004 appropriation was $6.0 million and the FY2005 request is $9.0 million. While the House eliminated funds for RNEP and ACI in the energy and water bill, the Senate did not report an energy and water bill. A compromise worked out in the FY2005 Consolidated Appropriations Act eliminated funds for RNEP and transferred $9.0 million from ACI to the Reliable Replacement Warhead program "to improve the reliability, longevity, and certifiability of existing weapons and their components." For details, see "Legislation," below, and CRS Report RL32347, *Robust Nuclear Earth Penetrator Budget Request and Plan, FY2005-FY2009.*

U.S. Nuclear Tests by Calendar Year

1945-49	6	1960-64	202	1980-84	92
1950-54	43	1965-69	231	1985-89	75
1955-59	145	1970-74	137	1990-92	23
		1975-79	100	Total	1054

Source: U.S. Department of Energy.

Note: These figures include all U.S. nuclear tests, of which 24 were U.K. tests conducted at the Nevada Test Site between 1962 and 1991. They reflect data on unannounced tests that DOE declassified on December 7, 1993. They exclude the two atomic bombs that the United States dropped on Japan in 1945. On June 27, 1994, Secretary O'Leary announced that DOE had redefined three nuclear detonations (one each in 1968, 1970, and 1972) as separate nuclear tests. This table reflects these figures. She also declassified the fact that 63 tests, conducted from 1963 through 1992, involved more than one nuclear explosive device.

CTBT Pros and Cons

A CTBT is contentious. Supporters argue it would fulfill disarmament commitments the nuclear weapon states made in the Nuclear Nonproliferation Treaty and its 1995 Review and Extension Conference; end a discriminatory regime in which nuclear weapon states can test while others cannot; and aid nonproliferation by preventing nonnuclear weapon states from developing nuclear weapons of advanced design. Some supporters hold a CTBT would freeze a U.S. advantage in nuclear weaponry and that this Nation could maintain its weapons without testing through a program of science and production. A CTBT, it is argued, would also prevent the development of weapons of advanced design by the P5, reducing future threats to the United States, and impede India's ability to develop a thermonuclear weapon. Some hold the treaty would bar China from incorporating any lessons learned from espionage into new warheads.

Critics counter that testing is the only sure way to maintain confidence in the safety and reliability of U.S. nuclear weapons. They contend that if friends and allies doubt U.S. nuclear capability, they might feel compelled to develop their own nuclear weapons to protect their security. Some opponents believe that a CTBT, by undercutting confidence in the U.S. deterrent, could lead to nuclear disarmament, thereby exposing the United States and the world to blackmail by a nation or group possessing a few weapons. Critics also charge that nations wanting to develop nuclear weapons would likely not sign a CTBT and in any event could develop fairly sophisticated weapons without testing; that verification would be difficult; and that the United States might need to develop new weapons to meet new threats. If other nations become nuclear powers or if existing ones develop new weapons, the proper response, in this view, is ballistic missile defense. (For a more detailed discussion, see CRS Report RS20351, *Comprehensive Test Ban Treaty: Pro and Con.*)

LEGISLATION

H.R. 3921 (Matheson). Safety for Americans from Nuclear Weapons Testing Act. Introduced March 9, 2004. Referred to the Committees on Armed Services, Energy and Commerce, and Resources. The stated purpose is, "To protect public health and safety, should the testing of nuclear weapons by the United States be resumed." Measure would require an environmental impact statement for any action having as a purpose the resumption of nuclear tests, would require congressional authorization for a resumption of testing, would require public notice of each test and further notice in the event a test resulted in the leakage of radiation beyond Nevada Test Site, would provide for monitoring of radiation by government agencies and by independent organizations, would establish a Center for the Study of Radiation and Human Health, and would require a study of individuals exposed to nuclear weapon tests.

P.L. 108-375/H.R. 4200 (Hunter). National Defense Authorization Act, FY2005. Reported (H.Rept. 108-491) May 14, 2004, by the House Armed Services Committee. Measure as reported provides the amount requested for test readiness ($30.0 million), Robust Nuclear Earth Penetrator (RNEP) ($27.6 million), and Advanced Concepts Initiative (ACI) ($9.0 million). On May 20, the House rejected, 204-214, an amendment by Representative Tauscher and others to eliminate RNEP and ACI funds and transfer them to Air Force conventional munition programs. There were no amendments on test readiness. Measure passed House, as amended, 391-34, on May 20. Measure reported from Committee of Conference (H.Rept. 108-767) October 8. The conference bill contained the full amounts requested for RNEP, ACI, and the Primary Assessment Technologies campaign, which includes test readiness funds. On October 9, both Houses agreed to the conference report, the Senate by unanimous consent and the House by 359-14. Measure signed into law October 28.

H.R. 4614 (Hobson). Energy and Water Development Appropriations Bill, 2005. Reported (H.Rept. 108-554) June 18, 2004, by the House Appropriations Committee. The committee bill eliminated RNEP and Advanced Concepts Initiative funds for FY2005. It saw them as a "diversion of resources ... from the most serious issues that confront the management of the nation's nuclear deterrent" and "remain[ed] unconvinced" by DOE's assurances that RNEP is only a study. The committee also reduced the Primary Assessment Technology Campaign by $15.0 million "to limit the enhanced test readiness initiative to the goal of achieving a 24-month test readiness posture. The Committee continues to oppose the 18-month test readiness posture ..." Measure passed, as amended, 370-16, on June 25. There were no amendments regarding RNEP, Advanced Concepts Initiative, or test readiness.

S. 2400 (Warner). National Defense Authorization Act, FY2005. Reported (S.Rept. 108-260) May 11, 2004. Measure as reported provides the amount requested for test readiness ($30.0 million), RNEP ($27.6 million), and ACI ($9.0 million). On June 15, the Senate rejected, 55-42, an amendment by Senators Kennedy and Feinstein to bar the use of FY2005 funds for RNEP or the Advanced Concepts Initiative. On June 7, Senator Bennett submitted amendment 3403 to the bill to require congressional authorization for an underground nuclear test of RNEP. On June 23, Senator Bennett withdrew the amendment. Measure passed Senate, as amended, 97-0, on June 23. After passage, the Senate incorporated S. 2400 into H.R. 4200 as a substitute amendment.

S. 2777 (Bennett, Hatch). Safety for Americans from Nuclear Weapons Testing Act. Introduced in the Senate September 7, 2004. According to a press release by Senator Bennett, S. 2777 is similar to H.R. 3921 but also requires DOE to install radiation monitoring equipment in any Utah county asking for it, ensures that Utah citizens sit on certain boards concerned with nuclear testing at the Nevada Test Site, and requires the National Academy of Sciences to study NNSA's health and safety precautions at the Nevada Test Site.

P.L. 108-447/H.R. 4818 (C. Young). Consolidated Appropriations Act, 2005. This omnibus bill incorporated nine regular appropriations bills, including energy and water. On November 20, 2004, the conference bill was reported from conference (H.Rept. 108-792); passed the House, 344-51; and passed the Senate, 65-30. Measure signed into law December 8. The Senate Appropriations Committee had been unable to report an energy and water bill, reportedly because of disagreements over funding Yucca Mountain, a civilian nuclear waste repository, and there was speculation that energy and water would be funded by a continuing

resolution for FY2005. However, a compromise was worked out that, among other things, provided funding for Yucca Mountain out of appropriated funds (rather than a trust fund), provided added funds for several projects at Los Alamos and Sandia National Laboratories, eliminated funds for RNEP and ACI, transferred the $9.0 million requested for ACI into the Reliable Replacement Warhead program, and reduced funds for the Primary Assessment Technologies campaign, which includes funds for test readiness, by $7.5 million, rather than the $15.0 million reduction included in H.R. 4614.

CHRONOLOGY

12/03/04 — The U.N. General Assembly adopted, 177-2, with 4 abstentions, a resolution, "Comprehensive Nuclear-Test-Ban Treaty." (See "Entry into Force," above.)

11/30/04 — Rwanda became the 120th nation to ratify the CTBT and the 174th to sign it.

11/00/04 — The 23rd meeting of the CTBTO Preparatory Commission was held November 15-19 in Vienna, Austria.

09/24/04 — Foreign ministers from 42 nations issue a statement calling entry into force of the CTBT "more urgent today than ever before."

09/23/04 — The last U.S. nuclear test, "Divider," was held 12 years ago.

06/20/04 — In a joint statement, India and Pakistan agreed to reaffirm their unilateral moratoria on nuclear testing, barring extraordinary events, and to establish a dedicated and secure hotline between the two foreign secretaries.

05/25/04 — NNSA held the 21st U.S. subcritical experiment, "Armando."

01/06/04 — Libya became the 109th nation to ratify the CTBT.

For earlier chronology, see CRS Report 97-1007, *Nuclear Testing and Comprehensive Test Ban: Chronology Starting September 1992.*

FOR ADDITIONAL READING

Bailey, Kathleen, and Robert Barker. "Why the United States Should Unsign the Comprehensive Test Ban Treaty and Resume Nuclear Testing." *Comparative Strategy*. April-June 2003: 131-138.

Butler, Rhett, et al., "The Global Seismographic Network Surpasses Its Design Goal," *Eos*, June 8, 2004: 225, 229.

Federation of American Scientists. Nuclear Weapons/Nuclear Testing site. [http://www.fas.org/main/content.jsp?formAction=315&projectId=7&projectName=Nuclear+Weapons&contentTypeId=42&contentTypeDesc=Nuclear+Testing].

India, Ministry of External Affairs. *Joint Statement, India-Pakistan Expert-Level Talks on Nuclear CBMs [Confidence-Building Measures]*. June 20, 2004. At [http://meaindia.nic.in], click on "Joint Declarations and Statements," then on "Joint Statements," then on the entry for June 20.

Kimball, Daryl, *Prospects for the Comprehensive Test Ban Treaty,* June 1, 2004. Available at [http://www.armscontrol.org/subject/ctbt/Daryl'sRemarks_Bunn_04.asp].

National Academy of Sciences. Committee on Technical Issues Related to Ratification of the Comprehensive Nuclear Test Ban Treaty. *Technical Issues Related to the Comprehensive Nuclear Test Ban Treaty.* Washington, National Academy Press, 2002. Available at [http://www.nap.edu/html/ctbt/].

Sykes, Lynn, "Four Decades of Progress in Seismic Identification Help Verify the CTBT," *Eos* (a publication of the American Geophysical Union), October 29, 2002: 497, 500.

U.N. General Assembly. "General Assembly Adopts 55 Texts Recommended by First Committee on a Wide Range of Disarmament, Security Matters," 59th General Assembly, Plenary, 66th Meeting, Press Release GA/10310, December 3, 2004.

U.N. Press Briefing. "Press Conference by Foreign Ministers of Australia, Netherlands and Japan," September 14, 2002. [Deals with effort to urge more nations to sign and ratify the CTBT.] [http://www.un.org/News/briefings/docs/2002/CTBTPressCfc.doc.htm]

U.S. Congress. House. Bipartisan Congressional Task Force on Nonproliferation. Letter to President Bush on nuclear testing. February 5, 2003. 5 p. [http://www.house.gov/markey/Issues/iss_nonproliferation_ltr030205.pdf]

U.S. Congress. House. Policy Committee. Subcommittee on National Security and Foreign Affairs. *Differentiation and Defense: An Agenda for the Nuclear Weapons Program.* February 2003. 16 p. [http://wilson.house.gov/Media/Photos/NuclearReport.pdf].

U.S. Congress. Senate. *Comprehensive Nuclear Test-Ban Treaty: Message from the President of the United States Transmitting Comprehensive Nuclear Test-Ban Treaty...,* Treaty Doc. 105-28, September 23, 1997. Washington:GPO, 1997, xvi + 230 p.

U.S. Department of Energy. *FY2005 Budget Request.* [http://www.mbe.doe.gov/budget/05budget/index.htm]

U.S. Department of Energy. *United States Nuclear Tests: July 1945 through September 1992*. DOE/NV-209 (Rev. 14), December 1994: viii + 97 p.

U.S. Department of Energy. National Nuclear Security Administration. *Report to Congress: Nuclear Test Readiness.* April 2003, 15 p.

U.S. Department of Energy. Office of Inspector General. Office of Audit Services. *Audit Report: National Nuclear Security Administration's Test Readiness Program.* DOE/IG-0566, September 2002, 15 p. [http://www.ig.doe.gov/pdf/ig-0566.pdf].