

# Introduction

At the request of General John Shalikashvili (U.S. Army, ret.), Special Advisor to the President and the Secretary of State for the Comprehensive Test Ban Treaty (CTBT), our committee conducted, during the summer and fall of 2000, a review of the state of knowledge about the main technical concerns that were raised in the Senate debate of October 1999 on advice and consent to the ratification of the CTBT. The principal such concerns were:

- (1) the capacity of the United States to maintain confidence in the safety and reliability of its nuclear stockpile—and in its nuclear-weapon design and evaluation capability—in the absence of nuclear testing;
- (2) the capabilities of the international nuclear-test monitoring system (with and without augmentation by national technical means and by instrumentation in use for scientific purposes, and taking into account the possibilities for decoupling nuclear explosions from surrounding geologic media); and
- (3) the additions to their nuclear-weapon capabilities that other countries could achieve through nuclear testing at yield levels that might escape detection—as well as the additions they could achieve without nuclear testing at all—and the potential effect of such additions on the security of the United States.

Our committee's analysis of these issues is provided here in unclassified form and elaborated in a classified annex to our report. In arriving at these conclusions, under tight constraints of time and resources, we have benefited greatly from access to the large body of information and analysis on these topics developed through the efforts of the relevant U.S. government agencies, national laboratories, and various prior advisory committees. (Briefings provided to the committee are listed in Appendix B.)

An understanding of these largely technical issues is indispensable as the public and its representatives seek to arrive at a conclusion about the overarching policy question of whether the ratification and entry into force of the CTBT is in the national interest of the United States—that is, whether the United States would be better off with this treaty in force than without it. But that overarching policy conclusion cannot be arrived at on the basis of the technical aspects alone. What is ultimately required is a balancing of all of the benefits of the CTBT for the United States against all of its liabilities.

On the negative side, agreement by the United States to a CTBT implies that the nation will forego any redesign of the nuclear subsystems in its nuclear arsenal that could be undertaken with confidence only with nuclear testing. Of course, irrespective of a CTBT, the country might

decide that there are no military requirements for new designs that would justify the costs or other impacts of the changes. In any case, whether arising from a CTBT or not, such a constraint on the introduction of new designs would lead to aging of the stockpile, with possible impact on the safety or reliability of U.S. nuclear weapons unless effectively counteracted by programs of surveillance, repair, and remanufacture as needed. A further set of negative impacts that has been asserted concerning a constraint on new designs is the resulting inability to extend certain safety improvements to weapons not now so equipped and the inability to optimize nuclear weapons for additional specialized missions. Potential positives of U.S. commitment to a CTBT, on the other hand, include limiting further development of the nuclear-weapon capabilities of potential adversaries; reducing the competitive incentive for acquisition or improvement of nuclear weapons by such states; supplementing U.S. capabilities for the detection and attribution of nuclear explosions by others; and increasing the global credibility of U.S. non-proliferation policy and the strength of the non-proliferation regime. Weighing these pros and cons obviously entails political judgments as well as technical ones.

This committee was not asked to address the full range of issues—political as well as technical—germane to a “net assessment” of whether the United States would be better off with a CTBT in force than without it; and we have not tried to do so. But we believe that our analysis of some of the key technical issues in such a determination, as enumerated above, will be helpful to those who must make it. In what follows, we first summarize briefly what the CTBT says and requires, before turning to the three specific issues in our charge—U.S. nuclear-weapon capabilities under a CTBT, the verifiability of the treaty, and effects of a CTBT on the capabilities of countries of potential concern.

### **The Comprehensive Nuclear Test Ban Treaty**

The Comprehensive Nuclear Test Ban Treaty obligates all parties not to conduct “any nuclear weapon test explosion or any other nuclear explosion” in any environment (i.e., in the atmosphere, underwater, underground, or in space) and to refrain from encouraging or helping any other state to carry out such explosions (Article I). The treaty primarily affects the five treaty-designated Nuclear-Weapon States (China, France, Russia, the United Kingdom, and the United States) since the 180 Non-Nuclear-Weapon States Party to the Nuclear Non-Proliferation Treaty (NPT) are already prohibited from nuclear testing (and from developing and producing nuclear weapons, even if without testing) by the NPT. The four states that are not parties to the NPT (Cuba, India, Israel, and Pakistan) would not be able to test if they signed the CTBT but so far only Israel has signed.

Although “nuclear explosion” is not defined in the treaty, Senate testimony by the Secretary of State, the Under Secretary, and the U.S. CTBT negotiator states explicitly that the negotiating record makes clear that all explosions with nuclear yields greater than zero are prohibited.<sup>1</sup> The Nuclear-Weapon States agreed that, while tests with nuclear yields greater than zero (including “hydronuclear tests”) were prohibited, weapons-related experiments producing no nuclear yield, including subcritical experiments involving fissile materials and hydrodynamic tests of weapon assemblies without fissile materials, were not banned by the treaty. Similarly, it was understood that the treaty does not cover nuclear reactors, which obtain energy from controlled

---

<sup>1</sup> Testimony by Secretary of State Madeline Albright, Undersecretary John D. Holum, and Ambassador Setphen G. Ledogar, U.S. Senate. 1999. Committee on Foreign Relations. *Final Review of the Comprehensive Nuclear Test Ban Treaty (Treaty Doc. 105-28)*. 106<sup>th</sup> Congress, 1<sup>st</sup> session. October 7.

fission reactions, or inertial confinement fusion experiments directed at obtaining energy from nuclear fusion. The prohibition on “any other nuclear explosions” bans testing or use of nuclear explosions for peaceful purposes.

The treaty does not prohibit research or development of nuclear weapons provided no tests are conducted involving a nuclear yield. The non-binding preamble, however, recognizes that the treaty “by constraining the development and qualitative improvement of nuclear weapons and ending the development of advanced new types of nuclear weapons, constitutes an effective measure of nuclear disarmament and non-proliferation in all its aspects.”

The treaty is of unlimited duration (Article IX). Each party, however, has the right to withdraw on six months notice if it decides “extraordinary events relating to the subject matter of this treaty have jeopardized its supreme interests.”

The treaty will enter into force 180 days after it has been ratified by all of the 44 states listed in the treaty as IAEA-identified possessors of either nuclear weapons or nuclear reactors (Article XIV). The articles to the treaty cannot be subject to reservations by the parties (Article XV). As of July 1, 2002, 41 of the 44 required states have signed the treaty (holdouts are India, North Korea, and Pakistan) and 31 of the 44 have ratified the treaty, including France, Russia, and the United Kingdom.

After the treaty enters into force, it can be amended at a special Amendment Conference by a simple majority of the parties but any party can veto the amendment (Article VII). If accepted, the amendment will enter into force for all parties after ratification by all those voting for it. (A simpler process applies to changes of an “administrative or technical” nature to the protocols and annexes, provided there is no objection.) Every ten years after entry into force, the treaty may be reviewed at a conference of all parties taking into account any new scientific developments relevant to the treaty (Article VIII). A special provision permits any party to request after ten years that the Review Conference consider the possibility of permitting the conduct of underground tests for peaceful purposes. If the Conference decides without objection that such explosions may be permitted, appropriate amendments that will preclude any military benefits from such explosions will be dealt with by the formal amendment process. These provisions make it extremely unlikely that amendments permitting tests for peaceful uses or any other substantive changes will be approved.

The treaty establishes the Comprehensive Nuclear Test Ban Treaty Organization (CTBTO) to ensure implementation of its provisions, including those for international verification of compliance (Article III). The CTBTO—located in Vienna, Austria—consists of a Conference of all parties to the treaty, an Executive Council with 51 members, and a Technical Secretariat. The Conference, which is the formal governing body of the CTBTO, handles treaty-related policy issues and oversees the treaty’s implementation by the Executive Council and the Technical Secretariat. The Conference will meet annually and in special session at the request of the Executive Council or a majority of the parties. The Executive Council serves as the regular day-to-day decision-making body responsible for implementing the provision of and compliance with the treaty. The 51 members are elected by the Conference in a manner to assure regional representation and by criteria that will always assure U.S. representation. The Technical Secretariat is responsible for implementing the treaty’s verification activities. The CTBTO is already organized on a provisional basis but cannot be fully operational until the treaty enters into force.

The treaty establishes an extensive verification system (Article IV), which is elaborated on in great detail in a protocol. The foundation of the system is the International Monitoring System (IMS) consisting of a global network of seismic, radiological, infrasound, and hydroacoustic sensors that report their data to the International Data Centre (IDC). After initial

screening, the IDC makes all of the raw and processed data available to all parties for their own evaluation using in addition whatever information they may have from their own intelligence.

If suspicious events cannot be quickly resolved through consultations and clarification, any party can request an on-site inspection, based on information from the IMS and/or national technical means, such as satellites, in a manner consistent with international law, which would exclude espionage. The request would have to include a specific area not to exceed 1,000 square kilometers. Approval of the on-site inspection requires the positive vote of 30 of the 51 members of the Executive Council. The specific elements of the very intrusive on-site inspection procedures as well as the rights of both the inspectors and the state being inspected are set forth in great detail. If the Executive Council concludes on the basis of evidence before it, that a nuclear explosion has occurred (Article IV), the Conference (or “if the case is urgent” the Executive Council) may bring the issue, including relevant information and conclusions, to the attention of the United Nations (Article V).

As of July 1, 2002, 165 states had signed and 93 states had ratified the CTBT. The United States is a signatory but has not ratified. Under the Vienna Convention on the Law of Treaties, a state that signs a treaty is bound not to “defeat the object and purpose of the treaty”—in this case the prohibition of nuclear explosions—until such time as the state formally announces that it does not intend to ratify the treaty. Although the United States has never ratified the Vienna Convention, it has always accepted the substantive provisions of the Convention as reflecting international law binding on all states. When the Senate failed to give the necessary two-thirds vote of advice and consent to presidential ratification, President Clinton made clear that he would continue to seek approval. The treaty was returned to the Senate Foreign Relations Committee, where it will remain until it is brought up for another vote or is returned to the Executive by a majority vote of the Senate.

Secretary of State Powell indicated in his confirmation hearing in January 2001 that the Bush Administration would not ask the Senate to approve ratification of the CTBT in the current Congressional session, noting that the issue would be examined in the context of the Administration’s overall strategic review and that President Bush has indicated that he has no intention of resuming testing since “we do not see any need for such testing in the foreseeable future.”<sup>2</sup> While there has been some dispute as to the constitutional status of the issue in the past, it is now generally accepted that a President can announce without any further Congressional action that he will not ratify a treaty and is therefore no longer bound by the Vienna Convention rules. In that case, Congressional recourse would be limited to non-binding resolutions opposing the action and exercise of the power of the purse by refusing to fund testing activities.

### **U.S. Safeguards**

When President Clinton announced U.S. support for a “zero yield” CTBT on August 11, 1995, he established the following specific safeguards that were included in his formal transmittal of the treaty on September 22, 1997 to the Senate for its advice and consent to ratification:

- A) The conduct of a Science Based Stockpile Stewardship program to ensure a high level of confidence in the safety and reliability of nuclear weapons in the active stockpile, including the conduct of a broad range of effective and continuing experimental programs.

---

<sup>2</sup> Statement by Secretary of State Designate Colin Powell, U.S. Senate. 2001. Committee on Foreign Relations. *Nomination of Colin L. Powell to be Secretary of State*. 107<sup>th</sup> Congress, 1<sup>st</sup> session. January 17.

- B) The maintenance of modern nuclear laboratory facilities and programs in theoretical and exploratory nuclear technology that will attract, retain, and ensure the continued application of our human scientific resources to those programs on which continued progress in nuclear technology depends.
- C) The maintenance of the basic capability to resume nuclear test activities prohibited by the CTBT should the United States cease to be bound to adhere to this Treaty.
- D) The continuation of a comprehensive research and development program to improve our treaty monitoring capabilities and operations.
- E) The continuing development of a broad range of intelligence gathering and analytical capabilities and operations to ensure accurate and comprehensive information on worldwide nuclear arsenals, nuclear weapons development programs, and related nuclear programs.
- F) The understanding that if the President of the United States is informed by the Secretary of Defense and the Secretary of Energy (DOE)—advised by the Nuclear Weapons Council, the Directors of DOE's nuclear weapons laboratories, and the Commander of the U.S. Strategic Command—that a high level of confidence in the safety or reliability of a nuclear weapon type that the two Secretaries consider to be critical to our nuclear deterrent could no longer be certified, the President, in consultation with the 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.<sup>3</sup>

---

<sup>3</sup> White House, Office of the President, September 22, 1997.

