An Arms Control Association Conference Report

CTBT at 15: Status and Prospects

Vienna Center for Disarmament and Non-Proliferation
Vienna, Austria

October 2012

Organized by the Arms Control Association in partnership with the Vienna Center for Disarmament and Non-Proliferation with financial support from the Government of the United Kingdom

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Acknowledgements

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Cover Photo

CTBTO Executive Secretary Tibor Toth addresses foreign ministers and diplomats representing CTBT member states at an event marking the 15th anniversary of the establishment of the organization at the Vienna International Center on February 17, 2012. Photo courtesy of the CTBTO.

Preface

Fifteen years after the opening for signature of the Comprehensive Test Ban Treaty (CTBT) and the establishment of the Preparatory Commission for the CTBT Organization in Vienna, the CTBT has helped reinforce a global norm against nuclear testing, contributed to progress on nuclear disarmament and nonproliferation, and established a robust global monitoring system that can help detect and deter nuclear explosions and contribute to disaster response and preparedness.

The CTBT and the CTBTO can already be considered a success, but their full potential has not yet been realized.

To date, 183 states have signed and 157 have ratified the treaty. Indonesia's 2012 ratification of the CTBT provides new energy to win even broader support and secure the eight remaining ratifications necessary to bring the treaty into force. Key states, including the United States and China, continue to express their support for prompt entry into force, although the ratification process in those countries remains delayed.

The February 17, 2012 ACA-sponsored roundtable conference brought together leading governmental and nongovernmental experts to evaluate the CTBT's contributions for future nuclear nonproliferation and disarmament efforts, the status and capabilities of the international monitoring and verification system, and the views of the key Annex 2 states regarding the test moratorium, the CTBT, and developments that could help lead to signature/ratification.

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Welcome to "CTBT at 15: Status and Prospects"

Elena K. Sokova

Executive Director, Vienna Center for Disarmament and Non-Proliferation

Welcome. Let me first tell you about our organization here in Vienna. We are motivated to form a platform for results oriented discussion and in partnership with other organizations active in this field, such as ACA. The initiative for the Center comes from the Austrian minister of foreign affairs to establish an international think tank. The James Martin Center for Nonproliferation Studies (CNS) applied to manage the center to conduct work—including seminars and training activities—relevant to arms control and disarmament. We look forward to continuing this work with you and others.

Daryl G. Kimball

Executive Director, Arms Control Association

Thank you Elena and thank you to the Vienna Center for Disarmament and Nonproliferation for teaming up with the Arms Control Association to organize today's roundtable conference, which has been made possible through a generous grant from the United Kingdom's Foreign and Commonwealth Office.

We are gathered here today some fifteen years after the opening for signature of the Comprehensive Test Ban Treaty (CTBT) and on the anniversary of the establishment of the Preparatory Commission for the CTBT Organization, which many of us celebrated this morning at the CTBTO headquarters at the Vienna International Center with Secretary General Ban Ki-moon, Ambassador Toth and his team, and other distinguished guests.

The CTBT and the CTBTO can already be considered a success but their full potential has not yet been realized.

Over the past few months, we have seen new momentum for the treaty with the important decision by Indonesia, as well as Guatemala, to ratify, the ongoing contributions of the CTBTO's impressive monitoring systems, and the show of support at the Article XIV Conference and August 29 Day Against Nuclear Testing.

But the CTBT remains a work in progress. We've organized this meeting and invited all of you here to:

- review and discuss CTBT's contributions for future nuclear nonproliferation and disarmament efforts;
- examine the status and capabilities of the international monitoring and verification system; and
- explore the considerations of key Annex 2 states regarding the test moratorium and the CTBT and

developments that could help lead to signature/ratification by other states.

Our aim is to promote a serious, civil conversation involving governmental and nongovernmental experts from around the world. I'm so pleased that we have such a high-level group here, which includes several old friends and new colleagues.

As you can see from the agenda, our program is divided into three sessions, with a pair of keynote addresses over our luncheon. Unfortunately, Ms. Emily Landau has informed us that she will not be here due to a family emergency, but her remarks will be included in our report on our roundtable conference here today.

I would like to remind everyone that the meeting will be held under Chatham House rules, which means that with the exception of the opening remarks of our presenters, no comments will be attributed to specific participants or speakers.

To allow as many of you as possible the opportunity to join the conversation, we've asked our opening presenters to keep their remarks brief—to about 7 to 10 minutes—and interventions should also be brief as well as there are over forty of us here today.

Let me now turn to the United States' government's representative to the CTBTO, Mr. Robert Wood, for some his opening remarks.

Robert Wood

Charge d'Affaires and the Acting Permanent Representative to the CTBTO, U.S. Mission in Vienna

Remarks as prepared for delivery.

Good morning. Thank you, Daryl, for that introduction. Thank you, also, to the Arms Control Association, VCDNP, and our friends in the UK government for bringing us together today for the opportunity to discuss the Comprehensive Nuclear-Test-Ban Treaty.

It is a pleasure to see so many diplomatic and government colleagues, officials from the CTBTO, and prominent scholars and NGO representatives here this morning. The level of participation in this seminar, not to mention in the anniversary event earlier this morning, is indicative of the continued high-level support for the treaty and the organization.

The CTBT remains central to leading us toward a world of diminished reliance on nuclear weapons, reduced nuclear competition, and eventual nuclear disarmament. The legal ramifications of its entry into force, and the practical effects of its verification provisions, remain vital to achieving our ambition of a world without nuclear weapons. With a global ban on nuclear explosive tests, states interested in pursuing nuclear weapons programs would have to either risk deploying weapons uncertain of their effectiveness, or face international condemnation for conducting nuclear tests. And with the immense progress that the Preparatory Commission has made in the last decade toward establishing the CTBT's verification regime, the International Monitoring System is well on its way to providing States Signatories with an effective system for monitoring nuclear explosions anywhere in the world.

In addition to the primary value of the treaty, in the 15 years since the Provisional Technical Secretariat began its work here in Vienna, we've learned of the related benefits that the treaty and the CTBTO bring to bear. The CTBT provides a ready mechanism to ensure the integrity of regional nuclear-weapons-free zones such as those in Africa, Central Asia, Latin America, Southeast Asia, and the South Pacific. It serves as an important confidence building measure, contributing to regional peace and security by limiting the extent to which nuclear testing can be used as a political lever in regional conflicts. And with the recent Fukushima nuclear crisis, we saw dramatic proof of the capabilities of the CTBTO's International Monitoring System for non-verification related purposes, such as providing early tsunami warnings and tracking the dispersal of radioactivity from reactor accidents.

As a representative of the United States, I'm not oblivious to the obvious question: in the face of all the benefits I've just listed, why hasn't the United States ratified the treaty?

You all know that, while the United States abides by the core prohibition of the CTBT through the nuclear testing moratorium we voluntarily undertook in 1992, the principal benefit of the treaty—that of legally constraining all states from testing—still eludes us since it has not yet entered into force. And the United States remains one of the Annex 2 states that have not yet ratified the treaty.

Here I can only reinforce what you—as experts—already know well. President Obama remains committed to seeking the treaty's ratification. Our senior officials continue to engage with members of the United States Senate and their staff. The Administration commissioned a number of classified and unclassified reports, including an updated National

Intelligence Estimate and an independent National Academy of Sciences report, to assess the ability of the United States to monitor compliance with the treaty and the ability of the United States to maintain, in the absence of nuclear explosive testing, a safe, secure and effective nuclear arsenal so long as these weapons exist. Those reports and meetings with Senators and their expert staff will give the U.S. Senate a wealth of information to assist them in making a determination on the merits of ratification of the CTBT.

The key question the reports and briefings will attempt to answer is whether the CTBT can be effectively verified. As many of you are well aware, the U.S. Senate declined to provide its consent to ratification of the CTBT in 1999, in large part because of concerns about effective verification. With the advances in technology and the build out of the IMS that have taken place since then, we have a much stronger case today.

It is thanks to the hard work of the CTBTO Preparatory Commission, the CTBT's States Signatories, and the staff of the PTS that the treaty's verification regime has made such tremendous progress in the last decade. The expansion of the IMS network, together with significant advances in the technologies of the verification regime, mean that the CTBTO can reliably detect even relatively small nuclear explosions, a capability that was regrettably put to the test in 2006 and 2009 in the DPRK.

Which doesn't mean that U.S. ratification will be quick or easy. Getting advice and consent from the Senate for New START taught us to prepare for an equally robust debate over the CTBT. We have been careful to note that we have no specific date in mind for a ratification vote. There is a good reason for that: rushing to a vote before the important process of engagement and explanation has run its course increases the risk of an unfavorable outcome, which is the last thing those of us who support the CTBT want. So we will continue working to engage members of the Senate on the national security rationale behind our support for the CTBT, and will keep a close eye on that dialogue to judge when the time is right to bring the CTBT to the floor of the U.S. Senate for a formal debate.

And even as we engage the Senate, we have increased our participation in all of the Preparatory Commission's activities. We have increased our budget request over the past three years in order to reduce and eliminate our past arrears. Earlier this week, we transferred $33 million to the PTS to pay our dues and retire an additional tranche of arrears. As Secretary Clinton noted in her remarks to the Article 14 Conference in September 2009, the United States is prepared to pay our share of the Preparatory Commission's budget. In fact, we've since demonstrated that we're prepared to do a good deal more than that. In addition to our annual assessment, the United States provided a voluntary, in-kind contribution of $8.9 million in 2011. Those monies will underwrite a series of multi-year projects to accelerate the development of the verification system and to improve its capabilities.

We also concluded with the Provisional Technical Secretariat a Memorandum of Understanding for the United States to provide a contribution of up to $25.5 million to rebuild a hydroacoustic monitoring station in the southern Indian Ocean. That station, on Crozet Island, will complete the International Monitoring System's important hydro acoustic network. Those contributions are all the more significant given how tough the budget climate is in Washington—they reflect the importance the United States attaches to the CTBT and to the completion of its verification system.

In addition to our financial support, U.S. technical experts are working closely with their counterparts from the Provisional Technical Secretariat and with other experts from many States Signatories in collaborative efforts to improve the capabilities of the global International Monitoring System and the International Data Centre. After a long absence, U.S. experts have since 2009 again been fully engaged in further developing the On-Site Inspection element of the verification regime, both from policy and technical perspectives. Assistant Secretary of State for Arms Control, Disarmament, and Verification Rose Gottemoeller led the U.S. delegation at the CTBTO's Preparatory Commission meeting last June. Her participation in that meeting—as the most senior U.S. representative to date—underscored the depth of our commitment to preparing a fully operational verification regime for the entry into force of this treaty.

President Obama remains committed to seeking the treaty's ratification. Our senior officials continue to engage with members of the United States Senate and their staff.

And while the United States moves forward with the ratification process, we continue to call on all governments to declare or reaffirm their commitment not to conduct explosive nuclear tests, and encourage

all States that have not done so to sign and ratify the treaty. We enthusiastically welcomed Indonesia's ratification of the treaty, which is particularly significant given that it is the first Annex 2 state to ratify the CTBT since Colombia did so in 2008. We were also very pleased that Guatemala ratified the treaty a bit earlier this year, bringing Central and South America closer still to region-wide ratification of the CTBT. The United States is working to join Indonesia, Guatemala, and the many other states that have ratified the treaty, and in the meantime, we intend to continue to provide robust technical expertise and political and financial support to the CTBTO and to this important treaty.

Thank you very much for allowing me to speak with you today.

SESSION 1

The CTBT's Role in Curbing Horizontal and Vertical Proliferation

Key Points

- The CTBT contributes to efforts to curb horizontal and vertical proliferation;
- Without the option of nuclear explosive testing, newer nuclear nations cannot perfect smaller, two-stage thermonuclear warheads, which are more easily deliverable via ballistic missiles;
- With the CTBT in force, the established nuclear-weapon states cannot proof-test new, more sophisticated nuclear warhead designs;
- The CTBT also can provide confidence about the peaceful intentions of non-nuclear weapon states;
- Ratification of the CTBT is a tangible way for states, including Israel, Egypt, and Iran, to contribute to the realization of a Middle East Zone Free of Weapons of Mass Destruction and help de-escalate tensions in the region;
- Despite not yet having entered into force, the CTBT has reinforced the de facto global test moratorium.
- Entry into force would, however, increase the international security value of the treaty.
- The CTBT entry into force will reinforce the nuclear Nonproliferation Treaty.
- The United States is the most important hold-out of the remaining eight Annex 2 states, many of which will likely follow suit once the United States ratifies.
- The scope of the treaty is not an issue of debate. All states acknowledge that the treaty establishes a "zero-yield" prohibition on nuclear explosive testing.

National Nuclear Security Administration / Nevada Site Office

Diagnostic cables snake their way across the desert landscape towards the Icecap nuclear testing tower. Icecap was a planned Los Alamos National Laboratory underground nuclear test, scheduled for the spring of 1993, however, all operations ceased with the announcement of the testing moratorium.

Amb. Juan José Gómez Camacho

Permanent Representative of Mexico to the United Nations Office and International Organizations in Geneva

Summary of remarks.

"The CTBT's Role in Curbing Vertical and Horizontal Proliferation"

It is a pleasure to be here. We value this opportunity, where we can discuss the successes of our endeavors. The problem with like-minded discussions is that we reinforce our own views. With this discussion we have the opportunity to be critical and honest. I will make three brief points:

1) The success of the CTBT. Very clearly the CTBT has had an impact on horizontal proliferation. This is clearly the case and it has served its purpose.

2) The validity of the legal purpose. Whether the content of the CTBT already constitutes international law, and to what extent its entry into force will make that even more binding, is a grayish area. In our view however, the CTBT already constitutes international law. The success of efforts to prevent horizontal proliferation and end testing indicates the success of the treaty and the non-testing norm. The vast majority of countries have acknowledged the binding nature of these norms and their moral weight.

3) Vertical proliferation. This is a more complex point. It is more difficult to assess the impact of the CTBT on vertical proliferation. There appears to be less success here. Was it the intention of the CTBT to stop vertical proliferation? Or not? Some technological developments may have overtaken the CTBT's desired impact in preventing qualitative improvements in nuclear arsenals. Nuclear-armed countries, even if they have not ratified, are bound by CTBT rules and will not test new explosions. But advanced technology allows them to "modernize" their arsenals. In any case, the CTBT does help maintain the status quo.

4) We can state that the CTBT has been successful in setting the norms necessary to underpin the nonproliferation regime, the NPT in its three pillars, but not entirely preventing the qualitative improvement of nuclear weapons, nor has it fostered the elimination of those nuclear weapons that already exist.

5) Neither the CTBT nor the fissile material cut-off treaty, nor the reductions in nuclear stockpile numbers have addressed the issue of the policies regarding the threat and use of nuclear weapons and the maintenance of the nuclear capacity necessary to realize those threats.

6) A comprehensive approach to nuclear weapons abolition and nonproliferation is therefore required, and that view has been expressed by many influential bodies and people around the world, including prominent politicians, the International Court of Justice, and the United Nations General Assembly. Mexico's commitment is to total nuclear disarmament. We need to strengthen the norm beyond the current status of the CTBT. We need to strengthen its legitimacy and advance its entry into force.

Amb. Thomas Graham, Jr.

former U.S. Special Representative for Arms Control, Nonproliferation, and Disarmament

Remarks as prepared for delivery.

"The CTBT's Role in Curbing Vertical and Horizontal Proliferation"

President John F. Kennedy truly believed that there was a serious risk that nuclear weapons were destined to sweep all over the world. In March of 1963 in response to a reporter's question at a news conference, he said, "Personally, I am haunted by the feeling that by 1970 … there may be 10 nuclear powers instead of 4 and by 1975, 15 or 20.… I would regard that as the greatest possible danger and hazard." He spent much of his presidency pursuing the cause of nonproliferation.

In 1965 the UN General Assembly took up the subject. A resolution was passed which over the next few years proved to be the blueprint of the Nuclear Nonproliferation Treaty, the NPT. Among other things this resolution called for "balanced obligations" between nuclear weapon and non-nuclear weapon states in the treaty to be negotiated. The NPT was signed in 1968 and entered into force in 1970. It came to be recognized as the principal reason—along with the parallel extended deterrence policies of the United States and the Soviet Union—that President Kennedy's darkest fears have thus far not been realized.

But the success of the NPT was no accident. It was based on a carefully crafted central bargain, which incorporated the "balanced obligations" concept. In exchange for a commitment from the non-nuclear weapon states (today more than 180 nations, most of the world) not to acquire nuclear weapons and to submit to international safeguards to verify compliance with this commitment, the NPT nuclear weapon states (now the United States, the U.K., France, Russia and China) pledged unfettered access to peaceful nuclear technologies and undertook to engage in nuclear disarmament negotiations aimed at the ultimate elimination of their nuclear arsenals. It is this basic bargain that for the last four decades has formed the central underpinnings of the international nonproliferation regime.

The most important element of the NPT basic bargain was and is the test ban. It was understood at the time of the signing of the NPT that the elimination of the nuclear weapon arsenals of the nuclear weapon states was far in the future. Thus, if they were going to give up the possession of this ultimate weapon, at least, they agreed, the nuclear weapon states could in the nearer future take the step of no longer conducting nuclear weapon tests.

From the earliest of days the non-nuclear weapon states saw the test ban as the litmus test of nuclear weapon state compliance with this basic bargain of the treaty. Therefore without a comprehensive test ban treaty, the NPT is seen by many NPT non-nuclear weapon states, as not being a treaty of balanced obligations. A one-sided NPT will not survive forever.

The NPT is the central international agreement underlying international peace and security in today's world. The principal quid for the quo of most nations of the world to never acquire nuclear weapons under this Treaty is the test ban. It is the only arms control agreement explicitly mentioned in the NPT (preambular paragraph 10) and the CTBT is the most significant commitment made by the nuclear weapon states to bring the necessary political balance to the NPT. The 1995 Statement of Principles, which was the political price for the indefinite extension of the NPT in 1995, explicitly called for the negotiation of a comprehensive test ban treaty in one year, that is, by the end of 1996.

This deadline was met and the Comprehensive Test Ban Treaty (the CTBT) was signed in September 1996 with the United States as the first signatory. The Treaty provides by its terms that it will enter into force upon ratification by the 44 states that had nuclear facilities on their territory and were members of the Conference on Disarmament in 1996. With the recent welcome action by Indonesia, thirty-six of those states have now ratified the CTBT. The most important hold-outs are the United States and China, with China waiting for the United States When the United States ratifies, Israel will likely soon follow suit with Egypt acting thereafter.

The CTBT is the most significant commitment made by the nuclear weapon states to bring the necessary political balance to the NPT.

India at one point reportedly privately promised ratification to the United States in 1998 but was let off the hook by the U.S. Senate's vote in 1999 denying CTBT ratification. Perhaps India will return to this position should the United States ratify and if so it is likely that Pakistan would follow suit.

Iran is one of two NPT non-nuclear weapon states that has not ratified (the other is Egypt). Iran's failure to do so raises questions whether Iran's program is not in reality a military program. Then there is the problematic case of North Korea.

The NPT is currently under stress as a result of diverse problems; the North Korean nuclear weapon and missile programs; the Iranian uranium enrichment program; Pakistan's A.Q. Kahn's nuclear Wal-Mart; the Indian and Pakistani nuclear weapon programs and tests; the Israeli nuclear arsenal outside the treaty; the nuclear flirtations by Syria and others; and the concern that proliferation might cascade in the view of states living in troubled neighborhoods.

The NPT doesn't solve everything; it cannot constrain the potential misuse of nuclear fuel cycles for energy production, but without the NPT this issue cannot even be addressed.

It has been over 40 years since the entry into force of the NPT and it has been over 40 years since the promise of the NPT nuclear weapon states to deliver a

comprehensive test ban and it still has not happened. Since the NPT over time may not survive without it, the bringing into force of the CTBT is a non-proliferation objective of the highest order.

There are some who question whether the CTBT should be approved who have argued that it is not clear that all the NPT nuclear weapon states are committed to the CTBT's zero-yield prohibition and who therefore argue that the scope of the treaty should be reaffirmed before action is taken on it. But this issue has no legal basis whatever.

The language or scope in the CTBT was fashioned by Australia and was first tabled at the Geneva negotiations in March 1995. It prohibits "any nuclear weapon test explosion or any other nuclear explosion" and was later characterized as a "zero-yield" limitation.

On August 9, 1995 the French government announced that it would support this text and confirmed that it meant zero. This was entered into the negotiating record in Geneva by French Ambassador Errera the next day. The day after this, August 11, 1995, President Clinton in Washington, DC committed the United States to a "true zero-yield ban," confirming that the Australian text excluded low yield and hydronuclear testing.

On September 14, my colleague here and before Ambassador Michael Weston, the U.K. Ambassador, placed on the record in Geneva the U.K. position that the CTBT should not "permit any nuclear weapon test explosion involving any release of nuclear energy, no matter how small."

On April 21, 1996 President Yeltsin at a meeting with President Clinton, announced the Russian position that the treaty prohibited … " any size of test forever", this position was formalized in the negotiating record by Russian Ambassador Berdennikov on May 14, 1996.

Lastly, on the 28th of March 1996, Chinese Ambassador Sha Zukang declared in Geneva that there was a common understanding that the Australian scope formulation should be interpreted as meaning zero-yield.

Thus, there is no real issue about the scope of the treaty. The CTBT negotiating record unquestionably reflects that the treaty scope is a zero-yield prohibition. Whatever one or the other NPT nuclear weapon state may or may not do or have done after the signature of the treaty, once the CTBT enters into force all will be legally bound to a zero-yield, comprehensive nuclear test ban.

This Treaty simply must be brought into force as soon as possible. Strategic stability in the world, the viability of the NPT and peace and security in the international community depend upon it.

Amb. Michael Weston

former U.K. Representative to the Conference on Disarmament

Remarks as prepared for delivery.

"The CTBT's Role in Curbing Vertical and Horizontal Proliferation"

In my statement in the Conference on Disarmament (CD) in January 1994, when the CTBT negotiations opened, I said that for the UK a successful outcome of the negotiations would be the conclusion of a treaty which made a real contribution to non-proliferation, by interposing a substantial obstacle in the process of developing nuclear weapons. I went on to say that we believed that two elements were essential for the success of the negotiations. First, the treaty should have as large a number of parties as possible and, secondly, it should have an effective, credible and efficient verification system.

I also made clear in my statement that the UK continued to attach importance to the role of nuclear weapons for the preservation of our security both then and for the foreseeable future. Although I did not spell it out, the corollary of this last point was clear: while we could accept constraints on our ability to develop new weapons, the treaty should not prohibit activities necessary to maintain the safety and reliability of our existing weapons. This view was shared by the other Nuclear Weapon States (NWS), although the precise requirements of each of us were slightly different.

This issue, that is to say the scope of the treaty, was the main focus of discussion for many months, both in the CD and in the parallel talks between the NWS. I do not think it would be appropriate to go into the details of these parallel discussions here, even if I could recall them at this distance in time. Suffice it to say that, at the end of the day, all the NWS were forced to accept that neither very small explosive tests, nor Peaceful Nuclear Explosions (PNEs), nor safety tests were acceptable to the international

community and that "zero yield" it had to be. Ways had to be found to ensure the safety and reliability of our nuclear weapons without resorting to nuclear explosive tests.

Apart from scope, the two other most difficult aspects of the negotiations were verification and entry into force (EIF). Through Peter Marshall, the Friend of the Chair for Technical Verification and Chairman of the IMS Expert Group, the UK made an important and positive contribution to the discussions on verification. We also made an important contribution to the discussions on EIF, although not all would agree that our contribution in this case was entirely positive. Some blamed us for insisting on such a "difficult" EIF provision.

We believed, however, that it made no sense at all to have a treaty that did not bind all the NWS and the three nuclear-capable or threshold states not already bound by their commitments under the Non Proliferation Treaty (NPT). Despite subsequent developments, or the lack of them, I continue to believe that we were right.

When the negotiations concluded, it was clear that the Treaty would not enter into force for some time, because of the attitude of India. Nevertheless, it was my view at the time that the negotiations had been successful. Certainly the UK's essential requirements had been met. But we had achieved more than that. I believed that the treaty that we had negotiated was a good treaty and would make a real contribution to non-proliferation, as well as to the achievement of the vision of a world free of nuclear weapons.

It was my assumption, and I think the assumption of most other people in the CD at the time, that all the NWS would ratify the Treaty as soon as their legislative processes permitted and that they would then join with other ratifiers to encourage others, in particular the Annex 2 states whose ratification was necessary for EIF, to ratify the Treaty.

It frankly never occurred to me that the United States would not ratify. After all, it had been the United States that had been the most enthusiastic of the NWS about the treaty and it had been President Clinton who had launched the negotiations and, by a series of initiatives, largely determined their course, sometimes to the discomfort of the other NWS, and their outcome. But clearly we were all forgetting the checks and balances of the American constitution.

While it is, of course, disappointing that the Treaty has not yet entered into force, the fifteen years that have passed since the Treaty was opened for signature have not been wasted. Support for the Treaty has continued to grow.

Last time I looked, 182 States had signed and of these all but 26 had also ratified the Treaty. As a result, the provisions of the Treaty have been established as the international norm. At the same time, great progress has been made in putting in place the International Monitoring System (IMS), which is now nearing completion and has already demonstrated its effectiveness by its detection of the DPRK tests. Progress has also been made towards establishing an On Site Inspection (OSI) capability. No nuclear test can now be conducted without the virtual certainty that it will be detected and condemned by the international community as if the Treaty had already entered into force.

The fifteen years that have passed since the Treaty was opened for signature have not been wasted. Support for the Treaty has continued to grow.

But this is no more a satisfactory substitute for EIF than provisional application of the Treaty would be. The CTBT has a key role to play in the international non-proliferation regime. U.S. ratification of the CTBT would demonstrate continued support for the Treaty and pave the way for ratification by the few remaining Annex 2 states that have not yet ratified. EIF of the CTBT would greatly strengthen the NPT, at a time when the world is facing major proliferation challenges, due to the re-emergence of civil nuclear power as a goal of many states' energy policies and also to the ambitions of some countries to develop an indigenous nuclear capacity. The need for the United States to ratify the Treaty has never been greater.

Pierce Corden

former Director of Administration, CTBTO, and Visiting Scholar, Center for Science, Technology and Security Policy, American Association for the Advancement of Science

Remarks as prepared for delivery.

"The Comprehensive Nuclear-Test-Ban Treaty as a Technical Barrier to Advanced Weapons"

The Preamble of the Comprehensive Nuclear-Test-Ban Treaty recognizes "that the cessation of all nuclear weapon test explosions and all other nuclear explosions, 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,…."

Thus the Treaty links the cessation of nuclear testing both to nuclear disarmament and to non-proliferation "in all its aspects."

Terminology in the field of international security is often complex. Non-proliferation "in all its aspects" surely includes technology development for nuclear weapons beyond what might be feasible without nuclear testing. "Vertical" proliferation can relate to a state building additional numbers of nuclear weapons, even of a primitive, untested type. But it can also refer to the development of weapons advanced in their technology, technologies not possible without the information acquired from testing.

Bearing these observations in mind, these remarks focus on the role of testing in the development of advanced weapons, and thus relate the Treaty to proliferation along the "vertical" axis. The relation of the Treaty to nuclear disarmament will become apparent below.

Suppose that a state has acquired a rudimentary nuclear weapon, and tested once, so that it has clearly proliferated "horizontally." Then what? Stopping with a single nuclear explosion is evidently not good enough. The state seeks to expand—to proliferate—its military capabilities, to acquire advanced nuclear weapons. Doing so has involved carrying out more nuclear explosions, in some cases many more

We begin with the use of fissile materials in weapons. The Hiroshima gun-type bomb used about 60 kg of highly enriched uranium (HEU). An implosion-type weapon using HEU, developed with nuclear testing, requires less than half that amount.

The Nagasaki bomb used about 6 kg of plutonium. The plutonium first stage of a modern nuclear weapon might use, say, about 4 kg of plutonium. Again, the advancement is clear.

The less the amount of fissile material used per weapon, other things being equal, the greater the number of nuclear weapons a state can build. The state is moving in the direction *opposite* to the direction of nuclear disarmament.

What about weight? Contrast the 4080 kilograms of the Hiroshima bomb, with an explosive yield of about 13 kilotons, to the some 300 kilograms of a modern ICBM reentry vehicle warhead, with a yield of some 300 kilotons. The less the weight, the easier the weapon is to deliver; and the greater the number that can be deployed on a given aircraft or missile. Again, the wrong direction for nuclear disarmament.

What about yield? Again consider the Hiroshima bomb, at 13,000 tons of high-explosive yield equivalent. And then consider the yield of a nuclear explosive, as tested in the South Pacific in the early 1970s, 915,000 tons. The advanced weapon that could utilize the data provided by this test is obvious. Another wrong direction for nuclear disarmament.

Other advances that have involved testing for their development or confirmation include:

- Increasing the yield of a weapon at a given weight, or maintaining yield with less weight.
- Decreasing the volume of a weapon.
- Changing the shape of a weapon.
- Altering more than one of the yield, weight, volume and shape parameters at one time.
- Developing the technology to permit the yield of a weapon to be selected, providing more flexibility in targeting.
- Reducing the amount of high explosive that is required to assemble the critical mass of the HEU or plutonium, or making other modifications to the non-nuclear components of a weapon.

Some of the specifically nuclear weapon technologies involved in developing advanced weapons include:

- Introducing the technology of "boosting" a fission explosion by fusions in the center of the imploding fission material to increase the yield by producing more fissions.
- Adding a second component, or stage, to a weapon, using fusion to increase the yield (thus a fission-fusion-fission explosion).

- Adding fission to the second, fusion stage to produce a fission-fusion-fission—fusion-fission weapon.
- Developing higher and higher yield weapons, historically, up to 100,000 kilotons, with a test of the weapon at 50,000 kilotons.
- Developing lower and lower yield weapons, historically, down to hundredths of a kiloton.
- Developing and building weapons that alter the energy partition between the material explosive output and the radiation output. An enhanced-radiation weapon, the so-called "neutron bomb," was such a development. Or developing other special features, such as optimizing the weapon to generate an electro-magnetic pulse, or to provide the x-ray energy input to "pump" an x-ray laser, for example for use against a ballistic missile.

What about advanced weapons with respect to type? As testing progresses, states have developed different types of weapons, optimized for specific military uses. In so doing, they have been compelled to test the developments, or advances, needed to produce the specific weapon. And thus the variety of nuclear weapon types over time: from the earliest large and heavy bombs to modern lighter and higher-yield bombs. From the single warheads deployed on cruise missiles, and on ballistic missiles of various ranges based on land or at sea on submarines, to warheads housed in multiple independently targeted reentry vehicles, up to fourteen on a single ballistic missile. From nuclear artillery shells to land and sea mines, torpedoes, anti-aircraft and anti-ballistic missile warheads. Other developments relate to the need to withstand high acceleration upon launch, as for an artillery shell, or to be subjected to the radiation from a nuclear explosion, and remain functional.

This description of ways in which a state may seek to increase its nuclear weapon capabilities illustrates pretty well why the CTBT presents a strong technical barrier to advanced weapons and contributes to nuclear disarmament.

In other words, were nuclear testing now to resume, or to begin, in any state, it is reasonable to conclude that the test, or series of tests, will result in an advance in the nuclear weapon capabilities of that state, that is, "vertical" proliferation, a move in the direction opposite the direction of nuclear disarmament.

The United States conducted some 1030 nuclear explosion tests between 1945 and 1992. From that point forward it has not developed any new type of nuclear weapon. Less is known about what the other nuclear powers have sought to do, if anything, by way of deploying a new type of nuclear weapon after their nuclear testing has ceased. But the numbers of tests carried out by the United States, Russia, the UK, France and China, point to the considerable barrier embodied in the CTBT, and even now in the test moratoriums, to further "vertical" proliferation.

Perhaps it might be argued that states that have tested have satisfied their military "requirements" for the indefinite future, so that the test ban has little value. It seems to me that in light of the global experience with testing during the past half century, this conclusion is unwarranted. What might be termed the "design space" for nuclear weapons is large. Yield that can range from zero to tens of millions of tons of high explosive equivalent—to a scientist a range of over seven orders of magnitude—is an enormous dimension of this "design space" for exploration. Weight ranging from tens to hundreds of kilograms is another such dimension. The parameters discussed above such as size and volume are other dimensions of this "design space."

Not all states have likely explored all the dimensions of this space or a given dimension to the same degree. The inventiveness of humans is not to be underestimated. There is good reason to agree to impose limits, such as the CTBT, on it.

The CTBT presents a strong technical barrier to advanced weapons and contributes to nuclear disarmament.

And for a state that has never tested? It goes without saying that testing beyond a first one would not only provide the state with an assured nuclear weapon capability but would also lead to advanced nuclear capabilities in that state.

There is good news for global security and stability in the decreasing numbers of nuclear weapons. But it would be bad news for global stability and security were nuclear testing to resume or to begin, in one or in many states. The CTBT, particularly as it moves toward entry into force, by providing a strong barrier against the emergence of advanced weapons and their contribution to vertical proliferation, constitutes a continuing and effective tool for nuclear disarmament and nonproliferation.

Summary of Discussion

The discussion began with several questions and points regarding the issues that have held up approval of U.S. ratification of the CTBT. These points include: concerns over on-site inspections; the ability of the IMS to detect covert nuclear tests; lingering concerns about the ability of the United States to maintain the effectiveness of its arsenal in the absence of nuclear explosive testing; and the failure of other Annex 2 states to ratify the treaty. Several participants expressed the view that the United States' failure to ratify the treaty in 1999 was the result of proponents not being sufficiently prepared to win these arguments.

Some participants noted that advances in the U.S. stockpile stewardship program and the IMS should resolve some of the earlier concerns about U.S. ratification of the treaty, and that the Barack Obama administration is already preparing a plan to move forward on ratification. This plan includes meetings with members of Congress to present the latest information on stockpile stewardship in order to prevent any misconceptions about the verification ability of the IMS and the United States' ability to maintain a safe and reliable arsenal without further nuclear explosive testing.

The view was also expressed that India and Pakistan did not suffer the same consequences from engaging in nuclear testing. While the point was made that both tested for strategic interests, India did not pay the same price for testing that Pakistan did, especially since India was granted an exemption from Nuclear Supplier Group rules barring civil nuclear commerce with states that do not allow comprehensive nuclear safeguards.

The role of the CTBT as a barrier to vertical proliferation was also discussed. Some noted that if the CTBT did not exist and there was not a global consensus against nuclear explosive testing, the United States, for one, would still be developing new weapons. Others expressed concerns that advances in technology have allowed the established nuclear weapon states to continue to develop nuclear weapons without nuclear explosive testing. Participants generally agreed that the CTBT has prevented proliferation along the horizontal axis.

The relationship between CTBT entry into force and the broader nuclear disarmament agenda was also discussed. Several participants voiced the opinion that the CTBT entry into force is a step toward incremental disarmament because it limits the options of nuclear-armed states and helps prevent the emergence of new nuclear-armed states. Participants also noted that moving toward a nuclear weapons free world also requires progress toward a global fissile material cut-off treaty, further verifiable nuclear reductions involving all nuclear-armed states, and a balanced approach to preventing the spread of sensitive nuclear fuel cycle technologies.

Keynote Lunch Address

Amb. Tibor Tóth

Executive Secretary, CTBTO

Remarks as prepared for delivery.

"Arms Control Association Roundtable: CTBT at 15: Status and Prospects"

Excellencies, Ladies and Gentlemen, it is a pleasure to be here with you today. My appreciation to the Arms Control Association and the Vienna Center for Disarmament and Non-Proliferation for organizing this conference to coincide with the CTBTO 15th anniversary.

Judging by the remarks made by the UNSG and other high officials during this morning's anniversary event, nuclear disarmament and non-proliferation remain one of the most defining issues of our time.

Looking back to the 20 years after the new beginning of arms control and disarmament, one cannot but note the many successes, and many more failures. The end of the cold war ushered in a new era of restraint in weapons deployments, weapons transfers, and military operations. The hopes of the new era were codified in several treaties between 1991 and 1996, such as START I and START II, the CWC and the CTBT.

However, these agreements were mired with slow-paced ratification and implementation. START I did not enter into force until late 1994; START II never entered into force and was replaced by SORT in 2002. The CTBT, in spite of widespread support, is yet to enter into force. India, Pakistan and the DPRK raised new questions about the viability of the NPT. In addition, the United States declined to sign the landmines treaty, withdrew from the ABM Treaty in 2002, and rejected the verification protocol for the BWC. Up to 2009, the United States seemed to give preference the arrangements that sought to prevent proliferation to parties that were considered a threat to U.S. or international security. In other words, non-proliferation became a tool of anti-terrorism policy.

The past decade, in particular, witnessed the erosion of the multilateralism. Perhaps I need to underline here that I am talking about that form of multilateralism that is all encompassing, rather than the selective multilateralism of the willing, or sometimes, the coerced. Pervious commitments on nuclear disarmament were retracted. Disillusionment with our collective ability to face common problems led to a more and more confrontational atmosphere in arms control fora. Confidence in the multilateral treaty-regime reached a low-point. The CTBT, the NPT, the IAEA Additional Protocol and its safeguards system, the BWC and the CD were among the victims.

The Obama Administration still views non-proliferation as a tool of anti terrorism policy. Nevertheless, it has returned to the more general goal of establishing and supporting international norms and regimes. The last three years have witnessed the resurging belief in multilateralism as an essential framework to deal with common problems. Whether in the field of disarmament and nonproliferation, climate change, terrorism or drug trafficking, multilateralism is back. The multilateral response to the promise and possible threats of nuclear energy, whether in the areas of physical security, safety, or proliferation, has been reconfirmed as the only plausible way forward.

There is widespread consensus on the steps that need to be taken to strengthen the arms control, non-proliferation, and disarmament legal architecture. The entry into force of the CTBT is a fundamental requirement for strengthening the regime. Norms need to be established and, where they already exist, they need to be strengthened. However, control systems can only function through the acceptance by all actors of the need, the effectiveness, and the fairness of the rule-based system.

The CTBT is a joint international venture of its stakeholders. It is an all inclusive, multilateral, and

democratic legally bind framework. It is a prohibition regime of equal obligations. It has a verification regime that relies on its parties, and serves all of them in an equal and transparent manner. It represents what I call "disarmament and non-proliferation 2.0."

I have just returned a few days ago from New York where Indonesia deposited its instrument of ratification of the CTBT. An Annex 2 state, Indonesia's ratification brings us closer to the entry into force of the Treaty. It is a vote of confidence in the CTBT and its continued relevance as a pillar of the regime. Indonesia's ratification, together with the other 104 ratifications that the CTBT has fathered in the last 10 years must not go unnoticed. Ratifying states have reaffirmed that the CTBT has a key role to play in today's security environment. The CTBT provides the last and clearly visible barrier between the peaceful and military uses of nuclear energy. The overwhelming majority of states have resolved that this legal line needs to be drawn clearly and irrevocably.

Maintaining the status quo is not an option. As long as any state has nuclear weapons others will want them. We cannot be complacent to the threats and risks of the failure to disarm existing nuclear states, the prevention of new states acquiring nuclear weapons, stopping terrorist actors from gaining access to such weapons, and properly managing the rapid expansion in civil nuclear energy. The CTBT verifies the silence of nuclear weapons—for the existing possessors and for the newcomers. It is an essential element along the road to zero. It should be in place to move forward. We at CTBTO are trying to do our part.

During the past 15 years, we have been able to more than triple the number of state signatories. The Commission has built up a one billion dollar verification system. Almost 80% of the International Monitoring System's global monitoring stations are already sending operational-standard data to the headquarters in Vienna. The volume of the data transmitted from the station to the data centre in Vienna has tripled during the last five years. A new global communications infrastructure for relaying that data has been installed. Important advances have been made in processing methods and software in all the verification technologies. The system has been tried and tested. Tried by the two DPRK test explosions in 2006 and 2009. These tests are deplorable, but they proved the reliability of the system.

Reaching zero nuclear weapons will require "over the horizon action," which is based on three main pillars: the creation of new systems; the mastering of state of the art technology; and the education/training of human resources.

As stockpiles are reduced, verification becomes more salient. It is necessary to strengthen CTBT monitoring technologies and ensure that it remains at the cutting edge of scientific discovery. Our technology foresight program aims to keep an eye on the emerging technologies to ensure that we are in front of the pack.

We continue to invest in the future of disarmament and non-proliferation. We invest not just in verification technologies, but more importantly, we invest in the training and capacity building of the human resources needed to reach our goals. It was with this belief that the CTBTO launched its Capacity Development Initiative (CDI). The Initiative aims to build and maintain the necessary human resource capacity required to deal with the technical, scientific and political complexities of the multilateral non-proliferation and disarmament regime. There is a clear urgency to strengthen the political underpinnings and the verification capacities across the whole range of multilateral arrangements.

The broadest possible range of stakeholders is invited to join in a network of global partnerships. These include States, disarmament and non-proliferation organizations and arrangements, universities, research institutes, non-governmental organizations, as well as individuals with expertise and interest in CTBT science and technology areas. The scope for potential cooperation could vary from exchange of and access to limited electronic resources to developing fully-fledged joint and mutually recognized training programs.

The CDI is building synergies between the Preparatory Commission, NGOs like the ACA and the Vienna Center for Disarmament and Nonproliferation, universities and international organizations in order to build and sustain the human capital that will become more and more essential as we travel down the road to zero. The road to "Zero" requires the widest possible coalitions and that's where the NWS, NNWS, IGOs, NGOs and broader academic community and civil society need to cooperate.

But, the international community needs to decide on the direction it wants to take. Are we serious about our calls for nuclear disarmament and non-proliferation? Are we willing to work on realizing the vision of a world free of all nuclear weapons? I believe we are at a crossroads. There are quite a few steps to take down the road leading to entry into force. But remember. Entry into force is only the beginning. It is not an end in itself. Entry into force shall open the door for new horizons of security and clear the way for other pressing issues on the international disarmament and no-proliferation agenda.

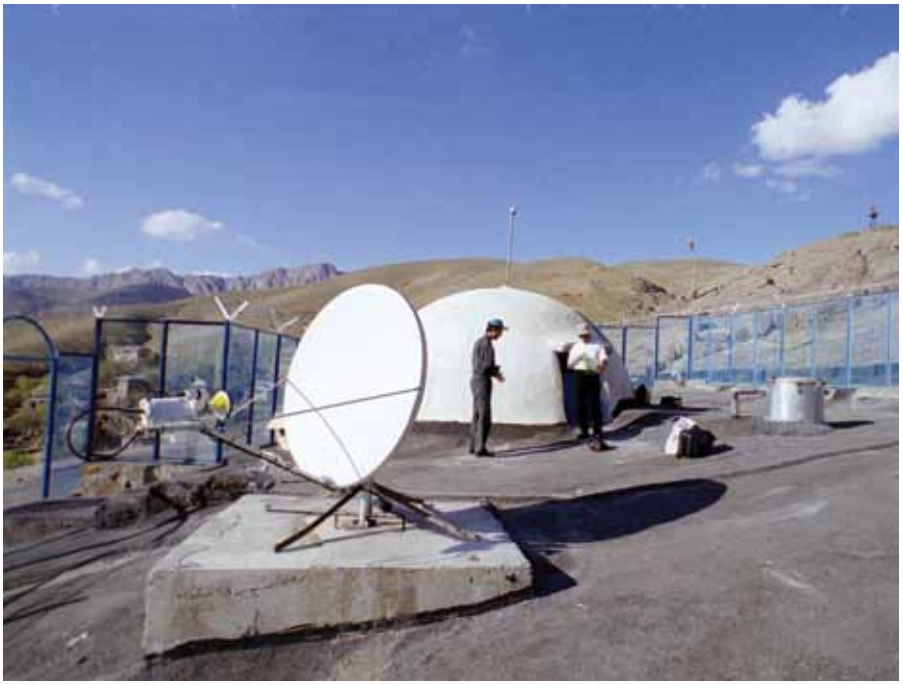
Thank you.

SESSION 2

Progress to Date with the International Monitoring System

Key Points

- The International Monitoring System (IMS) is 85% complete—to date 287 of the 337 stations have been built and are operational;
- The IMS is composed of four types of technologies, seismology, hydroacoustic, infrasound and radionuclide;
- Work on the system has largely transitioned from development mechanics to maintenances of the system;
- Building human capacity and experience with the system will increase verification ability;
- The On-Site Inspection (OSI) infrastructure is being developed and tested; currently it is not at the same level of readiness as the IMS but is on track;
- Verification is a cooperative effort between the technical secretariat and states;
- The technical secretariat is responsible for delivering data and not data analysis, which increases the legitimacy of the organization and the data provided to the states;
- States are ultimately responsible for making conclusions regarding data provided by the IDC, not the CTBTO, and nations need to develop strategies for verification.



CTBTO Preparatory Commission

Primary seismic station PS21, in Tehran, Iran, is not yet sending data.

Lassina Zerbo

Director, International Data Center, CTBTO

Remarks as prepared for delivery.

"Progress to Date with the International Monitoring System"

It is my pleasure to be here addressing you on the progress achieved and the capabilities of the test ban monitoring and verification system since the CTBT opened for signature some 15 years ago.

The Preparatory Commission is responsible for developing the Treaty's verification regime, whose primary purpose is to ensure that any nuclear explosion is detected, located, and described sufficiently well for it to be identified.

The verification regime includes the global network of 337 stations and radionuclide laboratories of the International Monitoring System (IMS); the International Data Centre (IDC) where data are received, forwarded to States Signatories, processed, analysed and archived; the Global Communications Infrastructure (GCI) for transmitting IMS data and IDC products; and the infrastructure and methodology required to conduct On-Site Inspections (OSIs).

The past 15 years have been quite fruitful for the build-up of the verification regime. 287 of the 337 IMS facilities have been installed, most of which have been incorporated into the IDC processing and are contributing to the products generated by the IDC. The GCI has been developed and has reached a satisfactory level of operational maturity. The IDC is restricted to operating in a provisional mode, but except for interactively reviewed products, generates and distributes products according to post-EIF requirements. And the OSI infrastructure is being developed and tested through large-scale field exercises.

The PTS is working diligently to build-up and exercise these capabilities and the remainder of this presentation will reflect on some of the expectations of the envisioned verification regime and the reality that we see today.

A decade ago, the US National Academy of Sciences evaluated the technical issues related to the CTBT. A model of the completed IMS primary seismic network's detection capability showed a projected capability at the magnitude anticipated during negotiations (mb = 3.5). At this time, many of the stations had not been installed and their capabilities had to be estimated. Based on the modelling, the NAS study concluded that "Taking all factors into account and assuming a fully functional IMS, we judge that an underground nuclear explosion cannot be confidently hidden if its yield is larger than 1 or 2 kilotons."

Since the 2002 NAS report 80% (all but eight) of the IMS primary seismic stations have been installed and certified. With the amount of data at the IDC we can use actual station capabilities rather than estimated capabilities to improve the model of IMS primary seismic detection capabilities.

One decade later the model (now using real noise estimates) predicts a slightly better performance than the 2002 estimate, but the original estimate is fairly consistent with this updated model.

How accurate are these models? To understand this, we must examine the measured capabilities of the network and compare them to models of what we would predict for the same network. The Reviewed Event Bulletin (REB) is one of the main products of the IDC and it was used to measure the IMS seismic network capability. The average global capability was computed for the years from 2003 to 2011.

A steady decrease in the 90% probability of detection is observed over the period, which is attributed to the gradual build-up of the IMS seismic network. In 2011, the average global threshold for detecting a seismic event with three or more seismic stations of the IMS was between 3.4 and 3.5 magnitude units. As this is a global average computed over a three-month period, in some areas the actual threshold will be lower and in some areas the actual threshold will be higher depending on a number of factors that include station noise levels and propagation effects that are influenced by geology, weather, cultural activity, etc.

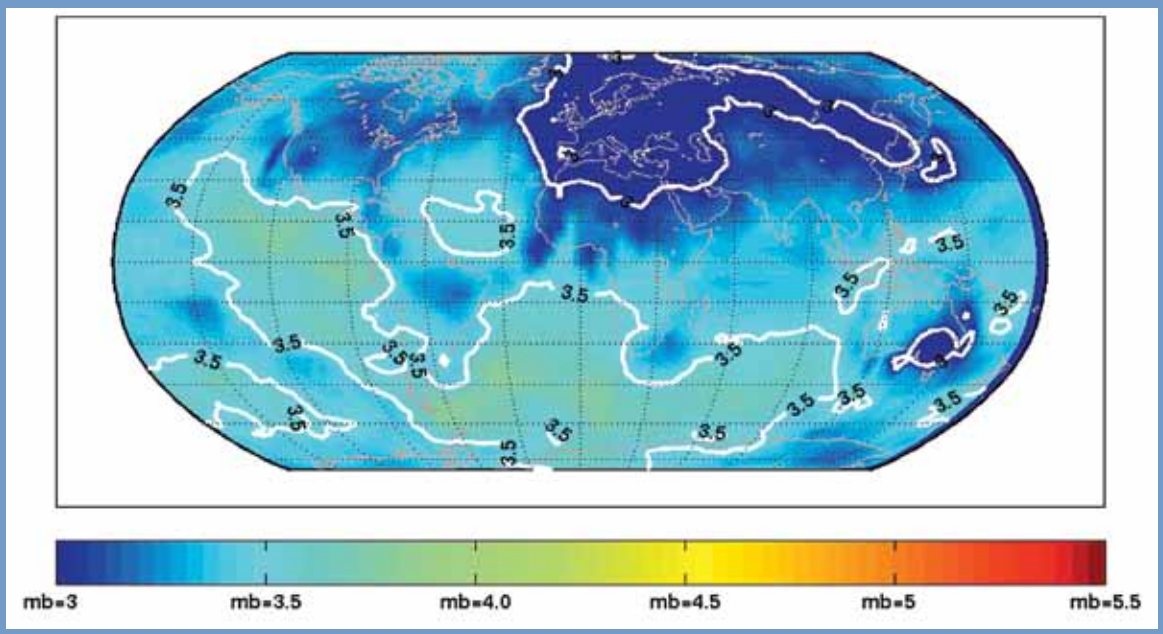
Model predictions for the network performance are similar to the REB measurements, which gives us confidence in our global average modelling capability. Validating results by region is an area of active investigation for the IDC.

What of the IMS hydroacoustic network capability? Energy propagation in the oceans is highly efficient, which is why the IMS hydroacoustic network was designed with only eleven stations (10 of which have been installed). The main obstacles to detection are not the size of the event, but rather the seafloor topography. For example, islands can block propagation of hydroacoustic energy. Models of 90% detection capability for events in the oceans are well below a kiloton of explosion yield.

IMS Primary Seismic Network (2012)

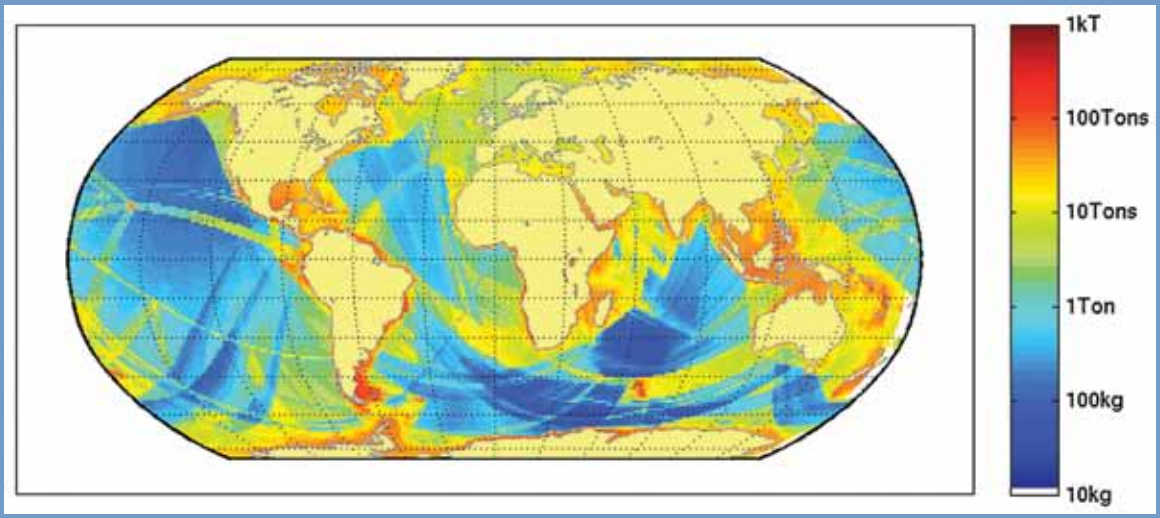
Source: CTBTO.Note: The yellow stations remain to built and/or certified. The red station was removed during negotiations and has not been re-located.

Model of Primary IMS Seismic Network Capabilities



Predicted magnitude at which there is a 90% probability of detecting at least 3 P phases with the full IMS primary seismic network (using empirical station noise values where possible)

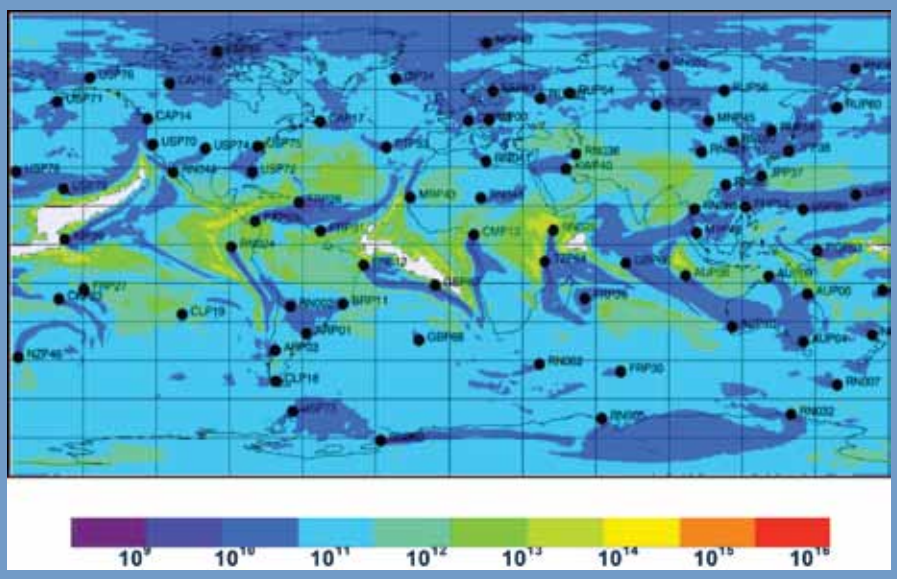
Predicted Capability of the IMS Seismic & Hydro Networks for the Oceans



In the case of an atmospheric event the picture is far more complicated due to the dynamic nature of the atmosphere, although the modelled capability of the IMS infrasound network of 60 stations is rather satisfactory (as shown during ISS09 by UK, France and Germany). Wind dramatically affects acoustic propagation, and wind conditions change on short time and small space scales. To predict the detection capability of the IMS infrasound network (45 of the 60 stations have been certified) global weather measurements are employed. Maps produced by modelling at three-hour intervals show the dynamic nature of this problem. The two-station detection threshold models for the minimum yield in tons with real-time station noise and based on LANL (Whitaker 2003) yield relations are well below one kiloton.

As with the infrasound network, the particulate and noble gas radionuclide networks are also dependent on the weather for their detection capability—wind transports the nuclides from their source to the IMS network stations. The detection capability is further complicated by the decay of the nuclides themselves (each isotope having a different decay rate) and the time between their creation and their arrival at the stations. Although the probability of detection could be calculated for any of the nuclides associated with a nuclear explosion, Barium 140 is used as the standard for the IMS particulate network detectability calculations. The calculations produce a map of the minimum detectable activity (Bq) of BA-140 that could be detected by at least one station of the IMS particulate network within 14 days of a nuclear explosion with 90% probability. Averaging several of these maps reduces the effects of the atmospheric variability and gives an estimate of the average network capability. At the

Model of Radionuclide Network Detection Capability



beginning of 2012, 61 of the 80 particulate stations and 21 of the 40 noble gas stations were under IDC operational responsibilities.

This figure shows the projected network capability for the completed particulate network. The blue color represents better detection capability than green and the upper level of green is in the level of a small fission explosion.

Even as we build up the IMS and show the capabilities of its various networks, the PTS is also developing On-Site Inspection capabilities. Integrated Field Exercises (IFEs) and associated build-up exercises progressively test the PTS capabilities to deploy an inspection team and its associated equipment, inspect large areas under hostile environmental and political conditions, and produce unbiased reports on its findings. The IFE in 2008 used 50 inspectors and core inspection equipment; the 2014 IFE will involve 100 inspectors and a full set of equipment. The target for full OSI readiness is to be able to conduct two inspections simultaneously.

The roots of the unique verification regime of the Comprehensive Nuclear-Test-Ban Treaty reach down to the decades-long work of the Group of Scientific Experts, who began working on test-ban verification in the 1970s—long before the Treaty's negotiations actually started. After thousands of man-hours of work by dedicated scientists, the verification regime has thrived and developed in a range of disciplines: geophysics (seismology, meteorology and acoustics), nuclear sciences, computer sciences, system engineering and maintenance, and information and communication technology. Scientists have helped to make this state-of-the-art system ever more capable. With 287 of the 337 facilities of the International Monitoring System already installed, we have absolute confidence that adherence to a comprehensive ban on nuclear explosions can be effectively monitored in the atmosphere, in the oceans and underground.

Wolfgang Weiss

German Radiation Protection Agency

Remarks as prepared for delivery.

"Progress to Date with the International Monitoring System"

To begin, allow me to acknowledge the remarkable technical and technological developments initiated and applied by the CTBTO to establish the IMS and the IDC as a state of the art verification regime during the past 15 years. I consider this development as a major success. The CTBTO has based its developments on state of the art in science and technology. This is documented by the performance standards of the IMS and the IDC. The interaction with the scientific community was exercised during the International Scientific Study Conference organized by the CTBTO in 2009 and by many follow-up activities.

During the negotiations of the Test Ban Treaty several of the now standard verification technologies have not been state of the art—one example being noble gas detection. Innovation, technical development and standardization have since been key aspects of the work of the CTBTO. This was and is a prerequisite to arrive at solutions, which are nowadays considered to fit for purpose to verify the nuclear test ban. Maintaining the high technical and scientific standards is not a trivial issue. The management of the CTBTO and its staff members are strongly encouraged to continue their efforts to utilize new technological and scientific developments for the optimization of the verification capabilities of the nuclear Test Ban Treaty.

Timeliness and technical quality both of the measurement results of the IMS and the analyses of the data products are indispensable features of the verification regime. The CTBTO has implemented and is further developing a thoughtful system of QA both for the operation of the IMS stations and the analyses of the data products in the IDC with the aim to guarantee reliable and high-quality outcomes of its work. The global IMS system and in particular the RN network has reached a technical standard which is unique. Standardized applications of quality performance indicators for the different verification technologies are indispensable features of a verification system, which operates monitoring stations under extreme conditions world wide.

The IMS detection capabilities are optimized to detect, identify, and locate minute signals related to nuclear weapons tests. The detection capability of the IMS is in many cases limited by the "noise" of these signals due to natural events like volcanic or seismic activities or man-made events such as the radionuclide production for medical purposes or the accident in Fukushima in March 2011. Based on operational experience of the IMS and the

analytical capabilities of the IDC the operational procedures of the stations are subject to continuous optimization. In order to achieve optimal results for the verification system as a whole the simultaneous use of different verification technologies as well as the application of sophisticated analytical techniques is required. These techniques have been and are being developed by the CTBTO.

Many of the results of the IMS and the IDC can and should be utilized for the advancement of science in the relevant scientific disciplines, e.g., geophysics, atmospheric physics and climate change. The cooperation between the CTBTO staff and members of these scientific disciplines and data sharing with expert organization is strongly encouraged. As chair of UNSCEAR, I am grateful to the CTBTO that the global data set of the RN network has been made available to the Committee for the purpose of the scientific assessment of radiation exposures to populations inside and outside of Japan resulting from the nuclear accident after the 2011 Great East-Japan earthquake and tsunami.

In addition to these valuable contributions to improve the scientific understanding of global processes on and in the earth, in the ocean and in the atmosphere, particularly in relation to disaster mitigation. One of these benefits is already in place—the contribution of data to tsunami warning efforts. In 2006, Member States mandated the CTBTO to provide seismic and hydroacoustic monitoring data to a number of tsunami warning centers in the Indo-Pacific region.

Data were also made available to Japan when it was hit by the massive earthquake on 11 March. After the nuclear accident in Japan on March the IMS radionuclide data were made available to international organizations like IAEA and to member states as an important input to public communication of health related risks. Data sharing of this kind is in the interest of societies world-wide and should be organized in a structured way in the future.

CTBTO Preparatory Commission

Winter at radionuclide station RN16 at Yellowknife, Canada.

Hein Haak

Royal Netherlands Meteorological Institute

Summary of remarks.

"CTBT at 15: Status and Prospects, Session 2: Progress to Date with the International Monitoring System"

Through the work of the CTBTO over the past decade and a half, we have built a robust global system for nuclear explosive test monitoring. We originally concentrated our efforts on the mechanics of the system, but now we have moved to maintenance of a working system.

I would like to emphasize—from my national perspective—that one of the key remaining tasks to gain greater experience with the system. This depends in large part on the work of the CTBT states parties themselves, for they are responsible for the making the best use of the information and tools the monitoring system provides.

For example, states parties must consider how the use the IMS data to analyze and clarify a typical sequence of events. Indeed there are people who are already trained to do this but they also must be brought together to work effectively as an organization.

Similarly, while we have trained inspectors for OSIs and will again have a training exercise in 2014, we—the member states—must train our people and have the organizations in place to make the right judgments about the OSI reports. We must train ourselves—at the state level—to make those judgments.

The bottom line is that that we have built a good system with further improvements very likely. We need to continue to provide the training and expertise at the national level to make the judgments and assessments necessary to verify compliance with the CTBT.

Questions and Answers

Some participants raised concerns about enforcement mechanisms for the CTBT (and other multilateral nonproliferation instruments). It was noted that monitoring for nuclear weapon test events requires judgment calls, not just the monitoring system itself, and enforcement of compliance depends on the action and leadership of CTBT states parties. Referral to the U.N. Security Council is not by itself always an effective means of enforcement. States need to think through the other measures that may be necessary to ensure compliance with the treaty.

The discussion of verification and monitoring led several participants to comment on the need for capacity-building in relation to the IMS. It was suggested that additional mechanisms and exercises designed to improve member states practical experience with the system and to improve communication to evaluate collected data should be explored. In addition, several participants suggested that further clarification of the division of responsibilities between the organization and states would be useful. Some participants noted that there is a tendency to task the CTBT Organization with responsibilities of the states, such as data analysis and characterization of events identified by the IMS.

Regarding the further technological development and future operation of the IMS, several participants expressed concern that a "zero growth" budget may inhibit future progress and maintenance of the system, despite the diminishing cost of monitoring technology and hardware.

Also, some participants suggested that states that have not yet signed or ratified the treaty could demonstrate their support for the treaty by allowing work to go forward on as-yet uncompleted monitoring stations on their territory. Some participants suggested that the IMS and greater understanding about its capabilities could also be used as a means of persuading policymakers of the value of the treaty and to encourage progress toward entry into force.

Some participants noted that it is not only important to underscore the success of the IMS, but it is also important to underscore that the CTBT monitoring system as a whole, by vastly increasing the probability of detection of illicit nuclear testing, creates a strong deterrent against noncompliance. Taken together, the combined capabilities of the primary and auxiliary IMS stations, national technical means of verification, the tens of thousands of civilian seismic monitoring stations, along with the option of short-notice on-site inspections mean that no potential CTBT violator could be confident that a nuclear explosion of military utility would escape detection.

SESSION 3

Pathways Toward Entry Into Force

Key Points

- **Failure to ratify the CTBT is not a question of commitment to the Treaty, but a problem of political will;**
- **Annex 2 states that have not yet ratified continue to hold out to make a political statement or use ratification for future leverage;**
- **U.S. ratification will likely spur other Annex 2 holdouts to sign and/or ratify;**
- **Unique political and strategic situations in hold out states will require different approaches and confidence building measures to encourage ratification;**
- **In India there is no real lobby in favor of continued testing, even amongst the ultra nationalists; the lack of movement on the Treaty is the result of waiting for the United States and China to ratify and paralysis of the Indian political system;**
- **Egypt will likely ratify after Israel; leaders in Cairo are hesitant to move first given their NPT ratification experience;**
- **Countries that have ratified and especially those that have recently ratified, such as Indonesia, can help speed along entry into force by actively encouraging "hold out" states to consider and complete ratification;**
- **Any progress made toward CTBT entry into force will reinforce security and other arms control related measures;**
- **The CTBT must stay on the political agenda at the global level to maintain progress toward entry into force;**
- **Intergovernmental contact and nongovernmental organization-led public education efforts are essential to efforts to encourage Annex 2 states to reconsider and ratify the CTBT.**

Amb. Mohamed Shaker

Chairman, Egyptian Council on Foreign Affairs

Summary of remarks.

"Pathways Toward Entry Into Force"

The Comprehensive Test Ban Treaty (CTBT) is the body and soul of all efforts exerted to liberate our world form Nuclear Weapons and all other Weapons of Mass Destruction. It is the yardstick by which we measure progress achieved and progress expected. My experience shows that a CTBT could break or make an NPT Review Conference. The CTBT and the NPT are closely linked.

It is important to recall that the NPT includes, apart from it's Article VI disarmament provision, a key preambular paragraph that recalls: "the determination expressed by the Parties to the

U.S. Department of State

U.S. Secretary of State Hillary Rodham Clinton delivers remarks at the Comprehensive Nuclear-Test-Ban Treaty (CTBT) Article XIV Conference at the United Nations headquarters during the 64th Session of the UN General Assembly in New York City, New York September 24, 2009.

1963 Treaty banning nuclear weapon tests in the atmosphere, in outer space and underwater in its Preamble to seek to achieve the discontinuance of all test explosions of nuclear weapons for all times, to continue negotiations to this end."

The CTBT has been a measure and a catalyst for progress. It is important to recall that following the conclusion of CTBT talks and opening for signature in 1996, the Chemical Weapons Convention (CWC) entered into force in 1997. These two agreements were the last major achievements of the Conference on Disarmament (CD) in Geneva. Both treaties established organizations, the CTBTO and the OPCW, that oversee the implementation of each international instrument. What is more remarkable about the CTBTO is the existence of a Preparatory Commission. It is functioning and developing progressively in the absence of the entry into force of the treaty itself.

When it comes to nuclear testing, we must recognize there is no way back. Action by the eight remaining CTBT Annex 2 states is now necessary in order to bring the treaty fully into force and to realize the full potential of the CTBTO, which has already established an impressive set of accomplishments. This is a great success story.

As we celebrate the 15th anniversary of the CTBT and consider how long it will take for entry into force, we ought to look back and recall that progress toward the CTBT has been slow but steady. It took years to achieve the Moscow Partial Test Ban Treaty of 1963, which was followed by the Treaty on the Limitation of Underground Weapon Tests, the so-called Threshold Test Ban of 1974, and the Treaty on the Underground Nuclear Explosions for Peaceful Purposes of 1976 (both entered into force only in December 1990).

Thus, the ratifications of the CTBT by the eight states, though essential and badly needed, may be characterized a belated adherence to a full-fledged operating international mechanism growing in membership and activity.

Egypt and the CTBT

I take this opportunity as a representative of an Egyptian non-governmental organization to call for universal adherence not only to the CTBT, but also to the NPT itself. Egypt has signed the NPT on the first day it was opened for signature, which was on July 1st 1968, and ratified it in February 1981. Egypt signed the CTBT on the first day it was opened for

signature in 1996, demonstrating its sincere and serious commitment to the treaty.

When we ratified the NPT in 1981, the government put two arguments before the people of Egypt in favor of ratification:

1) Egypt wanted the option to produce nuclear energy and needed to ratify the NPT to get there;

2) In 1980, for the first time Israel and Egypt joined the consensus at the UN on a zone free of nuclear weapons.

But of course, the concept of a zone free of nuclear weapons has not yet been realized and other states in our region still remain outside the NPT, which, in turn, impacts Egypt's decision on whether to ratify the CTBT. Progress towards the MEWMDFZ and positive action by Israel on the CTBT would allow Egypt to move toward CTBT ratification as well.

The road is now open for all countries of the Middle East region to work towards the establishment of a zone free of nuclear weapons and all other weapons of mass destruction in the region. This year is the year in which a conference should be held to embark on a process for achieving a WMD free zone in the Middle East. The venue and the facilitator have been agreed upon.

The newly named convener, Ambassador Lajava of Finland, was in Cairo a few weeks ago. We were privileged at the Egyptian Council for Foreign Affairs to receive him and engage in a fruitful dialogue. Once a date is fixed for the 2012 Conference, we promise to organize an NGO pre-conference meeting with our partners and friends in the civil society, as a prelude to the Conference and in the presence of the facilitator. He greatly welcomed the idea.

2012 is also a year in which we shall embark on preparing for the NPT Review Conference of 2015. It is here in Vienna that the first session of the Preparatory Committee of the Review Conference will meet this spring.

Let me conclude with congratulations to the able team that is managing the CTBT Preparatory Commission under the leadership of the tireless Ambassador Tibor Toth.

Lastly, a word of remembrance on this very special occasion for all those who lost their lives or were handicapped for life as a result of nuclear weapon tests. God bless their souls.

Amb. I Gusti Puja

Permanent Representative of Indonesia to the United Nations (Vienna), UNIDO and CTBTO, Resident Representative to IAEA

Remarks prepared for delivery.

"Pathways to Entry into Force: Indonesian Perspective"

Why did Indonesia ratify the CTBT?

Our support for a comprehensive nuclear-test-ban treaty had been formally expressed long before the initial formal negotiations were started. Our former Minister of Foreign Affairs, Mr. Ali Alatas, was the President of the PTBT Amendment Conference in 1991, which paved the way for the CTBT negotiations. Since then, our commitment to an operative CTBT has never wavered. We signed the Treaty on the same day it was opened for signature on 24 September 1996.

However, as an Annex 2 country, Indonesia chose in the past to withhold ratification. The withholding of our ratification did not in any way represent a degraded commitment to a comprehensive nuclear-test-ban, because as a founding party of the Southeast Asian Nuclear-Weapon-Free Zone Treaty (SEANWFZ), we were already legally bound to ban any kind of nuclear weapon test since the SEANWFZ entry into force in 1997. The withholding was more of an open political message to the nuclear-weapon states and other states claiming possession of nuclear weapons that it was they, above all, who must first and foremost commit to the CTBT. Ever since, this principle position has been our benchmark for ratifying the CTBT.

However, in 2010, we decided that it was the right time for us to enhance our contribution to increasing the momentum for disarmament by initiating our own ratification process. There were three main reasons for that:

First, since 2008 we observed that the disarmament agenda had gained new momentum by the reaffirmation of commitment by the remaining nuclear weapon states in Annex 2 to ratify the CTBT. With that promising development, we believed that our position had served its purpose.

Second, we hope that by demonstrating our enhanced contribution to improving the chances for the entry into force of the CTBT, we will encourage other countries, especially remaining Annex 2 countries, to do the same.

Third, between 1996, when it signed the CTBT, and 2010, much has changed in Indonesia. It has been successfully and peacefully transformed from an authoritarian state to a vibrant and dynamic democracy, the third-largest in the world. We have to fulfill our constitutional mandate to contribute to the creation of a peaceful and orderly world. We have to listen more to the aspirations of the people who seek an everlasting peace. That was why endorsement of the ratification of the CTBT by our parliament on 6 December 2011 was strongly supported by all political parties, including the opposition. In short, democracy has become an enabler for our ratification.

Why Indonesia is calling for other states to sign and ratify the CTBT

Let me first be clear on my point of departure in discussing the pathway to entry into force of the CTBT. No country is substantially against the vision of a nuclear-weapon-free world, especially among the non-nuclear weapon states, and no country objects to the view that for the total abolition of nuclear weapons to be achieved, all weapon testing must be halted.

Having said that, I believe that all countries, be they Annex 2 or non-Annex 2, have a commitment to the entry into force of the CTBT. Even most of remaining Annex 2 countries, especially the United States, China, Iran, Egypt, India and Pakistan, before or during the formal negotiations, have contributed to the completion of CTBT negotiations in one way or another. Having said that, it is not an issue of commitment that we are facing here, it is more of an issue of how far one wants to contribute to the universalization of the long-awaited and long-sought Comprehensive Nuclear-Test Ban Treaty.

We believe that none of the remaining Annex 2 countries withholds the signing and ratification of the Treaty to preserve its ability or option to test a nuclear weapon. It is just a matter of leadership. However, we also believe that, while U.S. and Chinese leadership are urgently needed to trigger the domino effect, each Annex 2 country has the chance to exercise their leadership by making progress toward ratification.

We are aware of the unique strategic and political situation in different regions. It would indeed require significant confidence-building measures before progress can be made by the countries in those regions. However, we also believe that confidence should be built, not be waited for. This again demonstrates that leadership is needed to build confidence.

We strongly believe that the time has come for countries to encourage one another to do the right thing, and to extend their contribution to the greatest extent possible to promote the CTBT entry into force, since we are now truly at a crucial junction in creating new momentum and new possibilities for a world free of nuclear weapons.

Since we initiated our ratification process in 2010, we consider our ratification as an intermediate goal. The goal itself is an operational CTBT, which requires the entry into force of the Treaty. Therefore, as has been stated many times by our Foreign Minister, our Government and Parliament will go beyond ratification by promoting accession to and ratification of the CTBT by our friends. In doing that, we shall rely on cooperation with other ratifying countries.

I thank you.

Pramit Pal Chaudhuri

Foreign Editor, The Hindustan Times

Summary of remarks.

I will make the argument, more as a journalist than as a member of India's National Security Advisory Board, that in India there is no real lobby left in favor of nuclear testing. The indications of the political leadership are that they will eventually sign and ratify. Parliament does not have to ratify. Signature and ratification are the same thing for India.

For domestic political reasons that have nothing to with CTBT, it will be difficult. India will, however, follow the United States and China. Since the negotiations on the CTBT were concluded in 1996, we had the Indian and Pakistani nuclear tests in 1998, we had the NSG exemption for India, we had vigorous domestic debate about whether there was any technical need for further nuclear testing, and the Indian nuclear test moratorium after 1998 has been incorporated into every Indian civil nuclear agreement. We are now working on one with Japan that will further strengthen the moratorium.

India's Prime Minister has said in public and private, let the United States and China ratify and the

situation will change as far as India is concerned. If you talk to others in the senior political leadership they will all agree.

There are four schools of foreign policy in India: the ultra nationalists who have at times said they want more tests; the cautious pragmatists who say we should ratify after the United States and China; the left wing who favor global disarmament and say that the CTBT is not enough; and the neo-liberals, for whom this is about increasing India's leverage, technology and status, and who believe the CTBT does not matter.

In 1996, all four groups were opposed the CTBT, and after the 1998 tests, three of these groups supported the nuclear test moratorium. In 2009, the ultra nationalists said that the 1998 Indian nuclear tests failed. The Indian Nuclear Commission, however, came out to say that the test did not fail, and India accomplished all it needed to accomplish from a technical standpoint. The ultra nationalists then had to backtrack.

Now, the ultra nationalists have been silenced; the left and those who support the Rajiv Gandhi vision of global disarmament still want to go beyond the CTBT and pursue global disarmament. But the left is weakened and lost almost all of its seats in recent state elections. The neoliberals say we now have access to the global civil nuclear market, so we don't need to or want to resume nuclear testing, otherwise we would lose much of what we have gained in prestige and access to nuclear technology; as for the pragmatists, they have no problems, but United States and China must ratify first.

In 1998, India's Prime Minister Atal Bihari Vajpayee told the 53rd UN General Assembly that India would not be among the last states standing in the way of the treaty's entry into force. Recall that Vajpayee was the leader of the BJP, the right wing nationalist party that believed that the Indian arsenal should be equivalent to China's.

But, of course, the United States failed to ratify in 1999. So I would argue that institutionally and ideologically in India there is no argument against ratifying CTBT other than waiting for the United States and China, which is of particular importance.

With respect to India, it is also important to note the paralysis affecting the Indian political system over the past couple of years, which is not related to CTBT at all. There has been a break up of parties, an economic downturn, and anti-incumbency that prevents most politicians from doing anything that appears to be politically sensitive. If there are an insufficient number of votes they put the issue aside. There are 180 pieces of legislation stuck in the Indian parliament. It is a very unproductive time now for the Indian political system.

As a consequence, if the United States and China do ratify the CTBT, it would not be opposition that prevents India, but lack of prioritization of the CTBT.

I would also observe that for the most part the value of the CTBT for nuclear nonproliferation and disarmament is not well understood within India today. But that can change through greater public awareness, often through high-profile journalism, which can, in turn, lead the politicians to respond.

Amb. Nils Daag

Permanent Representative of Sweden to the International Organizations in Vienna

Remarks as prepared for delivery.

"Pathways to Entry into Force: how to make progress on CTBT entry into force over the next few years?"

Dear Friends, Colleagues, Ladies and Gentlemen, first, let me thank the Arms Control Association for organizing this timely seminar in partnership with the Vienna Center for Disarmament and Non-Proliferation.

I am glad to address this seminar as a representative of Sweden, one of the two Article XIV coordinators together with Mexico. Seminars such as this serve as important reminders of the crucial importance of the CTBT. As does the festive celebration of the 15th anniversary of the CTBTO this morning, attended by among others the UN Secretary General Ban and the Swedish Foreign Minister Carl Bildt. Its entry into force is not only a political and moral imperative. It would also increase and strengthen international peace and security.

Some twenty years after the end of the cold war most of us would consider the era of nuclear testing as something for the history books. Yet its specter might still come back to haunt us. Nuclear testing is not yet completely banned under international treaty law.

Short of having entered into force, the CTBT is nevertheless already a success story. Since its adoption, nuclear testing has virtually stopped. All of the State Signatories have refrained from testing. The countries that have tested have faced universal condemnation and unanimous UN Security Council action.

While all existing moratoria on nuclear weapon test explosions need to be maintained, one must remember that these measures do not have the same permanent and legally binding effect as the entry into force of the Treaty.

As you all know, there is an Article XIV process to promote the entry into force of the CTBT. Since the seventh Article XIV Conference in September last year, Mexico and Sweden coordinate the process for the coming two years. Taking on the task of Article XIV co-coordinator is a further sign of Sweden's resolute support for the CTBT, as well as our wider interest to strengthen the international security architecture.

The final declaration adopted at the Article XIV Conference in New York last September emphasized the importance of an early entry into force of the treaty and called the ending of nuclear weapons testing "a meaningful step in the realization of the goal of eliminating nuclear weapons globally." It also set forth ten concrete steps towards early entry into force.

This includes creating broader public awareness and a deeper understanding of the role of the CTBT and its verification regime in international peace and security.

Our common task is the entry into force of the treaty. This requires two things: the necessary remaining eight Annex 2 ratifications, and the completion of the build up of the international monitoring system and its verification technologies. In few other international contexts are science and technology and high politics so inseparably intertwined.

Of course, we had hoped in the 1990's that the Treaty would have entered into force earlier. Prospects for an early entry into force indeed looked gloomier in the first decade of this millennium. However, when President Obama clearly committed himself to American ratification in Prague 2009 a new, welcome political momentum was created.

And just recently Indonesia, another Annex 2 state, took the historic step of ratifying the treaty, reducing the number of outstanding necessary ratifications to eight. This political leadership sets an example for the remaining eight to endorse the CTBT, enabling it to come into full legal effect.

We all know which the remaining states are: China, Egypt, India, Iran, Israel, Pakistan, North Korea, and the United States. These countries have a

CTBTO Preparatory Commission

Inspection team member using ground-penetrating radar to detect changes in underground structures during CTBO field exercise.

responsibility to make the legal ban on nuclear testing a reality. We strongly urge them to show leadership and political will to put the legal ban into place.

It is my hope and belief that this will happen. It is becoming increasingly clear what the alternative might be: a world where nuclear testing would again risk inflaming international relations. The stakes are high—disarmament and non-proliferation cannot be taken for granted.

Further ratifications, in particular by key nuclear weapons states, could pave the way for all the remaining necessary ratifications. That's the positive scenario. Indonesia's ratification is also important in the regional perspective.

Progress with the CTBT has a strong potential to reinforce other security and arms control measures. CTBT and nuclear weapons free zones can be seen as mutually reinforcing positive security elements.

Building on the leadership shown by Indonesia, progress currently underway with the South Asian Nuclear Weapons Free Zone could be strengthened by CTBT ratification by remaining states in the region. The positive political developments in Burma could hopefully open up possibilities for ratification.

One of the more prominent up-coming disarmament and nonproliferation events include the International Conference to establish a Zone free of Weapons of Mass destruction in the Middle East, envisaged to be held this year in Finland. Establishing such a zone would be no easy task, but hopefully the beginning of a phased process, comprising of broad and mutually reinforcing confidence-building measures. Ratification of the CTBT by all States in the region could be part of security-enhancing measures that would advance the WMD free zone process.

We applaud the fact that all of the nuclear-capable countries in Europe and Latin America and many in other regions in the world have ratified the CTBT.

The Treaty thus provides an important and powerful confidence-building tool for the maintenance of global security. It offers a transparent and democratic system, with equal access for every Signatory state to all data and products of the CTBTO.

Conclusion

First, it is important to make sure that the issue stays on the political agenda and to keep the spotlight on the remaining necessary ratifications. This is our role as Article XIV coordinators, this is the role of all ratifying states, having unanimously adopted the final declaration of the article XIV-conference. This is also the role of civil society groups—NGOs, media, universities, and youth organizations—including those in the remaining eight states which could urge their decision-makers to ratify the CTBT. Meetings and conferences at every level of decision-making make sure that the CTBT stays on the political radar screen.

Second, it is important to complete the CTBTO's verification regime, which all states should support as a powerful deterrent to any would-be nuclear testers.

There are many reasons for the Treaty; there are no valid arguments against the it.

Thank you for your attention.

Michael Krepon

Co-founder, The Henry L. Stimson Center

Remarks as prepared for delivery.

"The CTBTO and the CTBT: Securing Their Valuable Global Services"

September 24th marks the fifteenth anniversary of the Comprehensive Test Ban Treaty's celebratory signing ceremony at the United Nations. That's fifteen years in which the treaty has remained in limbo, due to the worst entry-into-force provision ever negotiated. A much longer wait is in store, as long as entry into force depends on the United States, China, Egypt, Iran, Israel and Indonesia depositing their instruments of ratification, and India, Pakistan and North Korea deciding to sign and ratify the treaty.

The treaty's tortured entry-into-force provision was the handiwork of China, Russia, and France, whose leaders felt obligated to sign, but remained reluctant to end nuclear testing permanently. They resolved this conundrum by giving other recalcitrant states vetoes over the treaty's entry into force.

The fifteen year-long wait for the CTBT has been put to good use. A Preparatory Commission and a Provisional Technical Secretariat have worked diligently in Vienna setting up a global monitoring system and dispensing data that have undeniable value. This network, which is 80–85% complete, currently consists of ten laboratories and over 250 monitoring stations. I'm told by the CTBTO that seventeen of the remaining facilities have already

been built and are in the process of calibration and certification. Twenty-seven more are under construction. Twenty-three stations and six laboratories remain to be built for a variety of political, administrative, technical or financial reasons.

The capabilities of the CTBTO's global monitoring network were on display after North Korea tested a nuclear device in October, 2006. This test fizzled, producing a small fraction-of-a kiloton yield. Nonetheless, the test was immediately detected by seismic stations connected to the CTBTO's grid in Bolivia, the United States, Canada, Australia, Mongolia, Kazakhstan, Finland, Ukraine, Germany and Norway. All told, thirteen primary and nine auxiliary seismic stations linked to the CTBTO immediately picked up this test.

The United States also possesses a world-class monitoring system, but even Washington can make good use of the CTBTO's data. Parts of the world don't take Washington's word as gospel when it comes to nuclear weapon-related developments in other states. The CTBTO's data can help remove potential error in judgment as well as veils of artifice and deceit, all helpful in deterring covert nuclear tests.

The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization and its Provisional Technical Secretariat help produce global services in other areas, as well. In 2006, treaty members mandated the CTBTO to provide data directly to national tsunami warning centers. The prompt transmission of the CTBTO's data can save lives and help mitigate disasters. The CTBTO also has the capacity to serve public safety by tracking radiation released after nuclear plant accidents and venting from underground tests by outlier states.

The treaty has generated valuable global services, but its monitoring system can atrophy as long as the treaty remains in limbo. While awaiting the entry into force of the CTBT, it makes good sense to ensure that these essential global services are permanent rather than provisional.

The most symbolic and effective way to do so is to remove the words "preparatory" and "provisional" from the letterheads of the Preparatory Commission and Provisional Technical Secretariat. This step could be accomplished by a UN Security Council resolution or a collective decision by treaty signatories.

In doing so, states would demonstrate renewed commitment to the CTBT while providing impetus to complete, maintain and upgrade the treaty's monitoring network. Even countries that have yet to sign and ratify the CTBT could, at a minimum, demonstrate responsible nuclear stewardship by helping to provide facilities and data for the CTBTO. The Government of India, for example, has yet to contribute a single seismic, infrasound and radionuclide station to the treaty's International Monitoring System. New Delhi does not even connect to the CTBTO's tsunami warning system.

Other states that matter, including Pakistan, Brazil, Egypt, China, France, Israel, Iran, Great Britain, South Africa, Russia, and the United States, could do more to demonstrate their commitment to end (or, in the case of Pakistan and India, to suspend) nuclear tests. These states have yet to fulfill all of their pledges to the International Monitoring System's network. Beijing, for example, does not share its monitoring data with the CTBTO, unlike Washington and Moscow.

After fifteen years of waiting, the time has come to reaffirm the treaty's objectives and purposes in more than a rhetorical way.

It will take a very long time before all of the states named above consent to ratify this treaty. After fifteen years of waiting, the time has come to reaffirm the treaty's objectives and purposes in more than a rhetorical way. Reaffirmation and recommitment can take many forms: by completing and upgrading monitoring stations, sharing data, making test sites more transparent, and by participating in joint monitoring experiments. Above all, the CTBT can be reaffirmed by making the treaty organization's essential global services permanent rather than provisional.

Some treaty supporters will argue that these steps are insufficient and poor substitutes for the treaty's entry into force. They are correct. But they are also unable to persuade enough Republican Senators in the United States to vote for the Treaty, or to convince states like Egypt, Iran, India, Pakistan and North Korea to come on board.

It took France and China 22 years to join the Nonproliferation Treaty. It is likely to take even longer for all of the holdouts to relinquish their vetoes over the CTBT's formal entry into force. In the mean time, states that matter can reaffirm their commitment to end nuclear testing by making the treaty organization's essential global services permanent rather than provisional.

Emily B. Landau, Ph.D.

Director, Arms Control and Regional Security Program,
Institute for National Security Studies, Tel Aviv University

Remarks as prepared for delivery.

Note: Dr. Landau was unable to attend the conference in person, but submitted her remarks for the conference report.

"Israel and the CTBT"

The fact that Israel signed the CTBT is testimony to the importance that Israel attributes to international arms control treaties, and its general desire to cooperate with the global regime within the margins of its security interests and concerns. Israel supports the CTBT and has been very open about its position since signing the treaty in 1996.

Not only does Israel support the treaty, but it has been very active in the preparatory commissions of the CTBTO, and has established a CTBT-related infrastructure on its territory. Israel has lent active support to the establishment of the verification regime of the treaty out of concern for the poor coverage of the IMS mechanism in the Middle East. In this context, it constructed two auxiliary seismic monitoring stations in Meron and Eilat, per the treaty's requirements, with data continuously transmitted to the IDC. Israel also operates a radionuclide laboratory.

One might ask if support for the treaty is strong, and Israel takes an active part in the deliberations of the organization and has implemented decisions, what is preventing it from ratifying. It is clearly not the treaty provisions per se that deter Israel from doing so, because in addition to its cooperation with the CTBTO, Israel supports a moratorium on nuclear testing until entry into force of the treaty. Rather, additional considerations come into play for Israel, that are a function of the way Israel is often treated in different international forums and in the context of international organizations, and especially the ongoing hostility that it faces from many states in the Middle East.

Israel has three major concerns with regard to ratification: completion of the inspections system and verification regime, especially the rules governing on-site inspections, in order to ensure that they are immune to abuse by other states; Israel's sovereign equality status in the policymaking organs of the treaty—those related to the geographical region of the Middle East and South Asia and in the executive council of the future CTBTO; and adherence to and compliance with the CTBT by states in the Middle East.

As to the possible misuse of on-site inspections, Israel's concern is that the surveillance system could expose sensitive security information in adjacent facilities, or serve as a platform for false accusations and political pressure on Israel if it sought to limit the access of inspectors for this reason. Israel's experience of being singled out for humiliation in many international frameworks is what explains its concern, especially when Arab and Muslim states readily come together to isolate Israel with blatant anti-Israel positions. Israel's involvement in formulating the procedures could help. The issue of equal treatment relates to the geographical divisions in the CTBTO, and the fact that the Middle East and South Asia group is non-operational because of Iran's refusal to participate in a group that includes Israel.

Beyond Israel's position on the CTBT, attention to this treaty must be put into broader perspective, with an eye to the overall global arms control picture. With all of the importance attributed to ratification of new global disarmament treaties, the greatest concern today in the nuclear realm goes to the nuclear proliferation that is occurring in states that are (or were) parties to the NPT.

North Korea, Iran, and possibly still Syria are dangerous proliferators acting in contradiction to the obligation they took upon themselves to remain non-nuclear. North Korea has conducted two nuclear tests, and might go for a third, and Iran could do so as well. These real-world and urgent threats are the primary nuclear challenges that the international community should be directing its energies to. Unfortunately, in the case of Iran, some of the international actors that should be taking action to ensure that this determined proliferator is prevented from developing a military nuclear capability are not shouldering their responsibility. And if Iran—a member of the NPT—becomes a nuclear state, the implications for the NPT and other global treaties will be dire.

Summary of Discussion

Several participants concluded that the opening presentations suggested that progress toward ratification by the remaining Annex 2 states is possible, especially with action by the United States and/or China. Several participants commented that the shift of views within India on nuclear testing and the CTBT suggest that if Washington and Beijing move forward, there could be a "chain reaction" of ratifications, including India, as well as Pakistan, which would very likely ratify if India did so.

Specific obstacles to U.S. ratification were also discussed. It was noted that while the current United States government remains strongly committed to the CTBT and the 2010 Senate approval of ratification of New START shows that it is possible for Washington to approve politically controversial nuclear arms control treaties, the necessary "high-level" effort for the CTBT has not yet begun and that it will remain difficult to assess the prospects for U.S. ratification until such time as that effort begins. Several participants noted that the March 2012 release of the U.S. National Academy of Science report on "Technical Issues Related to the Comprehensive Test Ban Treaty" should help address many of the concerns that led many Senators to withhold their support for the CTBT in 1999.

Participants welcomed Indonesia's commitment to assist in efforts to encourage other Annex 2 states to ratify, but some participants noted that its influence with certain Annex 2 states may be limited. Some participants suggested that it would be useful for those nuclear weapon states that have ratified the treaty to more actively speak up about why and how they made the decision to ratify the treaty and forego any further nuclear explosive testing.

The provisional entry into force option was also discussed. Several participants noted that given the current state of the treaty, the pursuit of provisional entry into force would raise legal questions that may impact the IMS and require amendments to the treaty. Some of the practical problems raised were: determining continued payment for the IMS; ownership of monitoring stations; and decisions on how to pursue an OSI. The point was raised that provisional entry into force may be an option in the future if a single country is holding up entry into force.

In response to the proposal for dropping the words "preparatory" and "provisional" when referencing the CTBT as a symbolic move toward entry into force, some participants were skeptical about the practicality of the concept. Others expressed concern that official discussion of options for provisional entry into force of the CTBT might result in a loss of support from some states and from some key actors in key states.

Participants also noted that further progress toward CTBT entry into force will require greater civil society/non-governmental organizations and intergovernmental contact with states that have yet to ratify the treaty. Specific suggestions included: better use of the International Day Against Nuclear Tests to raise awareness about the CTBT; greater involvement of victims of past nuclear testing to illustrate the dangers of a return to nuclear testing; and providing up-to-date technical information on the international security value of the treaty to political leaders in key Annex 2 states.

Concluding Remarks

Daryl Kimball

Executive Director, Arms Control Association

I want to thank Vienna International Center and the staff once again for your hospitality and advice. This center is an excellent idea. Thank you Elena. Allow me to underscore a few key points from the course of the day.

Earlier we discussed in great detail the value of the CTBT going forward in relation to disarmament and impact on the development of new nuclear weapons. Clarification was provided on the Article 1 provisions, that "zero-yield" means "zero-yield." We heard about the importance of leadership from individual countries and statesmen, and we heard about the importance of prompt action on the CTBT the United States and China.

We also heard interesting perspectives and insights regarding the concerns of other so-called "hold out" states, particularly from Pramit Pal Chaudhuri regarding India. We also heard very detailed and powerful presentations on the enduring contributions of a global, legally-binding prohibition on nuclear test explosions on preventing both horizontal and vertical nuclear proliferation. We also received a very impressive and up-to-date report on the technical progress regarding test ban monitoring and verification. It is clear that the IMS and IDC have fulfilled and exceeded the earlier expectations.

And of course throughout the past couple of days, I hope you have made some new contacts and connections and learned more from our roundtable discussions. To the CTBTO—congratulations on your 15th anniversary. We are constantly impressed by your work and by your dedicated team of professionals.

And as a final admonition to all of you, I would like to note that throughout the history of the work on the test ban, nations have been the driving forces behind the negotiation and implementation of treaties, but the efforts of those governments are catalytic individuals, both inside and outside government, who provide the energy and ideas that drive progress. Further progress on the CTBT will require persistence and your participation in the effort. Please consider yourself an important group that has a responsibility to help advance the CTBT beyond this meeting.

Elena Sokova

Executive Director, Center for Disarmament and Non-Proliferation

Thank you all. There is much value in keeping the discussion on the CTBT open. That is exactly what we are striving here to do. We are very grateful to have you all here to discuss this. We hope this is the future of a great collaboration. Thank you very much.

APPENDIX A

Speaker Biographies and Conference Participants

Speakers

Ambassador Juan Jose GOMEZ CAMACHO

Ambassador, Permanent Representative of Mexico to the United Nations Office and International Organizations in Geneva

Pramit PAL CHAUDHURI

Foreign Editor, Hindustan Times

Pramit Pal Chaudhuri is the foreign editor of *The Hindustan Times*. Mr. Pal Chaudhuri has served as the South Asia fellow at the Stimson Center in Washington, D.C. and has been awarded fellowships at Cornell University and the University of Maryland.

Pierce CORDEN

Visiting Scholar, Center for Science, Technology, and Security Policy, The American Association for the Advancement of Science

Pierce Corden is a visiting scholar at the American Association for the Advancement of Science's Center for Science Technology and Security Policy. From 2002–2007, he served as the Director of Administration for the Comprehensive Test Ban Treaty Organization's Preparatory Commission. Prior to that Dr. Corden directed offices responsible for CTBT negotiations and the preparatory commission at the U.S. Arms Control and Disarmament Agency and then the Department of State.

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Ambassador Thomas GRAHAM Jr.

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Hein HAAK

Director, Department of Climate and Seismology, The Royal Netherlands Meteorological Institute; Chair, Working Group for Verification, CTBTO

Hein Haak heads the Division of Seismology at the Royal Netherlands Meteorological Institute. In 1987 he joined the Group of Scientific Experts that worked on laying out the scientific basis for the CTBT and assisted the Dutch chair during the final year of CTBT negotiations. He also chairs the CTBTO's Working Group on Verification.

Daryl G. KIMBALL

Executive Director, Arms Control Association

Daryl Kimball is the executive director of the Arms Control Association (ACA). Before joining ACA in 2001, he served as the executive director of the Coalition to Reduce Nuclear Dangers (1997–2001) and the director of Security Programs at Physicians for Social Responsibility (1990–1997).

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Michael Krepon is the co-founder of the Henry L. Stimson Center and directs its South Asia and Space Security programs. Prior to co-founding the Stimson Center, he worked at the Carnegie Endowment for International Peace and the U.S. Arms Control and Disarmament Agency.

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Ambassador, Permanent Representative of Indonesia to the United Nations in Vienna, UNIDO and CTBTO, Resident Representative to IAEA

Ambassador Mohamed SHAKER

Ambassador, Egypt; Chairman of the Egyptian Council for Foreign Affairs

Among his many diplomatic posts, Ambassador Shaker served as President of the 1985 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), Ambassador of Egypt to the United Kingdom, and is a former member of the UN Secretary-General's Advisory Board on Disarmament Matters.

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Elena Sokova is the executive director of the Vienna Center for Disarmament and Non-Proliferation. She previously served as the assistant director of the James Martin Center for Nonproliferation Studies at the Monterey Institute of International Studies.

Ambassador Tibor TOTH

Executive Secretary, CTBTO

Ambassador Tibor Tóth has been the Executive Secretary of the Preparatory Commission for the CTBTO since 2005. He has previously served as the Ambassador and Permanent Representative of Hungary to the United Nations in Geneva and Vienna. In these capacities he represented Hungary at the Conference on Disarmament, the International Atomic Energy Agency and its Board of Governors, as well as the CTBTO.

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Head, Department of Radiation Protection and Health of the Federal Office for Radiation Protection, Germany

Wolfgang Weiss is head of the Department of Radiation Protection and Health of the Federal Office for Radiation Protection in Munich, Germany. He served as an advisor to the German government during negotiations on the CTBT.

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Lassina Zerbo is the director of the International Data Centre Division of the Preparatory Commission for the CTBTO. He served previously as divisional principal geophysicist for Africa, Johannesburg, South Africa and divisional geophysicist for Central and East Africa.

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APPENDIX B

Statement of UN Secretary General Ban Ki-moon, February 17, 2012

Ban Ki-moon

U.N. Secretary General
Vienna International Center

"On the Fifteenth Anniversary of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization"

It is a great pleasure to meet you this morning. This anniversary is an important event for the world. And it also carries great personal meaning for me. Visiting this Preparatory Commission, which I used to chair in 1999, is like a homecoming.

I look around this room and see very familiar faces. Many of us have been working together on these issues for many years, at least for 15 years. We are honoured by the presence of our very distinguished colleague Executive Secretary Tibor Toth.

As a diplomat, I tried to move the international community to act against nuclear testing.

As Ambassador Tibor Toth introduced, when I took over as chairman of CTBTO, I said: My name is pronounced "Bahn." But many people called me, "Ban." I said, that is fine, I will ban nuclear tests. So since then my nickname has become "Nuclear-Test-Ban."

My name and my commitment have continued all my life-time. In fact I also served as Vice-Chairman of JNCC, a Joint Nuclear Control Commission between South and North Korea. So I have been negotiating with North Korea on nuclear issues.

As Secretary-General, I am committed to the goal of a world free of nuclear tests and nuclear weapons. During the last five years I have visited Semipalatinsk, Hiroshima and Nagasaki. Nobody can visit such places and return home the same person.

Nuclear tests poison the environment and they also poison the political climate. They breed mistrust, isolation and fear.

So today I issue a challenge to all leaders of all countries that have not yet endorsed the CTBT: Visit the site of a nuclear test.

Speak to the population exposed to the fallout. Then take action to prevent this from ever happening again.

Today, on this fifteenth anniversary, we remember the victims. At the same time, we remember the hope in which the CTBT was conceived.

The hope for a future where international peace and security do not depend on the mad doctrine of mutually assured destruction or hang on the thin thread of good luck.

Nuclear disarmament and non-proliferation are not utopian ideals. They are critical to global peace and security.

We have a legal and moral obligation to rid our world of nuclear tests and nuclear weapons. When we put an end to nuclear tests, we get closer to eliminating all nuclear weapons. A world free of nuclear weapons will be safer and more prosperous.

Governments now spend vast sums of money to build and test arsenals of death. The world is over-armed and development is under-funded. It is time to reverse that equation.

Excellencies, the CTBT was a milestone. It is an essential building block in strengthening the rule of law in nuclear disarmament and non-proliferation. That is why it is distressing that this Treaty has yet to enter into force.

When I chaired this Preparatory Commission, I never imagined I would one day return as

Secretary-General. But I certainly believed that this Treaty would have entered into force by now. We will continue pressing to reach this goal.

In the meantime, we are using the Preparatory Commission's scientific expertise to protect people from the effects of natural disasters. Last year when the earthquake in Japan damaged the Fukushima Daiichi nuclear facility, the Treaty's International Monitoring System immediately kicked into gear. It helped the Japanese Government issue warnings. And it provided all countries with critical information on the spread of radiation.

This is just one example of the added value of the CTBTO. This is why I invited the CTBTO to the High-Level Meeting on Nuclear Security and Safety I convened last September.

Of course, the Treaty's real value lies in its moral and legal authority in outlawing nuclear tests once and for all.

Dear friends, a woman exposed to the fallout of atomic testing once said that as she watched the nuclear bombs fall, she never thought they would wipe out her immune system. This woman made a heartfelt plea to governments. She said—I quote: "While remembering the victims of past nuclear weapons tests, we must also protect the health and safety of future generations—by ratifying the Comprehensive Nuclear-Test-Ban Treaty."

I am here today to amplify her call, so that it reaches people in power.

I urge all Governments that have not yet signed or ratified this Treaty to immediately do so. I especially call for action by the countries whose ratification is essential for the Treaty to enter into force. Indonesia is one—and I commend Jakarta for depositing its instrument of ratification earlier this month.

I met [Indonesian Foreign] Minister Marty Natalegawa in my office and received this instrument of ratification. And it was the first time during my last five years as Secretary-General that this instrument of ratification was deposited to me personally. What is more important is that Indonesia was one of the nine countries whose ratification is essential to get this treaty into force.

Now we have only eight countries and I am ready to meet all these leaders and if necessary travel with Ambassador Tibor Toth to those eight countries who are still reluctant or may have doubts about the ratification of this treaty. So that is my commitment.

There is no good reason to avoid signing or ratifying this Treaty. Any country opposed to signing or ratifying is simply failing to meet its responsibilities as a member of the international community.

It is irresponsible to see this Treaty still waiting to come into effect 15 years after it was opened for signature. I urge all States to honour existing moratoria on nuclear weapons tests—and to avoid any action that would undermine the Treaty.

We have opportunities coming up: the Nuclear Security Summit next month in Seoul: the Preparatory Committee for the NPT Review Conference: and a conference on the establishment of a Middle East zone free of nuclear weapons and other weapons of mass destruction.

My Special Envoy is working very hard to convene this conference, as was mandated by the NPT Review Conference of 2010.

Excellencies, we have another celebration taking place today. It is not a fifteenth anniversary—it is a first birthday.

CTBTO Preparatory Commission

UN Secretary-General Ban Ki-moon speaks at the CTBTO 15th anniversary in Vienna, Austria.

It is my great pleasure to officially open the new Vienna Office of the United Nations Office for Disarmament Affairs. The establishment of this Office is a response to the growing need for cooperation in all areas of disarmament, non-proliferation and arms control. It will especially improve collaboration among the Vienna-based organizations and specialized agencies. The Office will also bring in regional intergovernmental organizations like the Organization for Security and Co-operation in Europe.

I have high hopes for this Office. I thank Member States for the voluntary contributions that have helped bring it into being. The Government of Austria has been especially generous, another sign of its commitment to the United Nations.

Excellencies, Ladies and Gentlemen, the work you do here in these offices is part of a global movement to rid the world of its most deadly threat. Now: let us press even harder toward realizing our vision of a nuclear-weapon-free world.

Thank you.

APPENDIX C

Additional Resources

***Now More Than Ever: The Case for the Comprehensive Nuclear Test Ban Treaty,* Arms Control Association, February 2010**

http://www.armscontrol.org/system/files/ACA_CTB_Briefing_Book.pdf

U.S. State Department's Article-By-Article Analysis of the Comprehensive Nuclear Test-Ban Treaty

www.state.gov/t/isn/trty/16522.htm

Technical Issues Related to the Comprehensive Nuclear Test Ban Treaty, National Academy of Sciences, 2012

http://www.nap.edu/catalog.php?record_id=12849

Website of the Comprehensive Nuclear-Test Ban Treaty Organization in Vienna

www.CTBTO.org

Website of the Project for the Comprehensive Test Ban Treaty

www.ProjectfortheCTBT.org
www.twitter.com/CTBTnow

Roundtable conference organizers: Daryl G. Kimball, Elena Sokova, Tom Collina, and Kelsey Davenport.

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

THE COMPREHENSIVE NUCLEAR TEST BAN TREATY has already helped bring an end to nuclear testing and reduced nuclear arms competition. Before the CTBT was opened for signature in Sept. 1996, there had been 2,046 nuclear tests. Since then there have been six tests by three countries. But until the CTBT enters into force, the door to renewed nuclear testing is still open. To close the door on testing, eight key states must still ratify the treaty.

With the CTBT in force, the established nuclear-weapon states would not be able to proof-test new nuclear warhead designs. Newer nuclear nations would find it far more difficult to build more-advanced warhead types, and emerging nuclear states would encounter greater obstacles in fielding a reliable arsenal. The CTBT strengthens global capabilities to detect and deter testing and will reduce nuclear dangers.

This conference report details the value of the CTBT and outlines obstacles and pathways to its entry into force.

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