"Unfinished Business": Twentieth Anniversary of the Comprehensive Nuclear-Test-Ban Treaty

By Tariq Rauf[1]

STOCKHOLM, 26 September 2016: Three days before the 20th anniversary of the opening for signature of the Comprehensive Nuclear-Test-Ban Treaty's (CTBT), on 21st September 2016, several foreign ministers and other high-level representatives of UN Member States met in New York and united in a call for the prompt entry-into-force of the treaty. UN Secretary-General Ban Ki-moon recalled that, "This year is the twentieth anniversary of the treaty's opening for signature. But this is not a celebration. It is a stark reminder of the work that remains".

On 24th September 1996, US President William J. "Bill" Clinton was the first to sign the CTBT at United Nations Headquarters in New York and referred to the treaty as "the longest-sought, hardest-fought prize in arms control history".

The opening for signature of the CTBT in September 1996 marked the culmination of a half-century long effort that witnessed more than 2,060 nuclear test explosions, to ban nuclear testing forever. As of today, 183 States have signed the treaty of which 166 have ratified it. Earlier, on 15th September 2016, a "Joint Statement" on the CTBT was made by the nuclear Non-Proliferation Treaty (NPT) nuclear-weapon States that said that "a nuclear-weapon test explosion or any other nuclear explosion would defeat the object and purpose of the CTBT" and urged all States that have not done so to sign and ratify the treaty.

The CTBT has an unusual formula for achieving its entry-into-force—44 named States have to sign and ratify. Of these, 36 States have already signed and ratified but 8 States are holding up entry-into-force. China, Egypt, Iran, Israel and the US have signed but not ratified. India, North Korea and Pakistan have yet to even sign.

On 14 October 1999, the US Senate delivered a crushing blow by rejecting ratification of the CTBT, marking the first such rejection of an internationally negotiated pact since rejection by the US Senate of the Treaty of Versailles in 1920 that led to the collapse of the League of Nations and later the advent of the Second World War.

Security Council resolution

Now in the twilight of his term in office, US President Barack H. Obama's administration in a last ditch effort to promote the CTBT pushed through Resolution 2310 (2016) at the UN

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Security Council. The Council vote was 14 in favour with one abstention (Egypt). The resolution, inter alia, calls upon: all States to refrain from carrying out nuclear-weapon test explosions; urges all States that have either not signed or not ratified the treaty, particularly the 8 States, to do so without delay; and expresses support for the International Monitoring System (IMS) of the CTBT Organization (CTBTO).

The original version of this resolution was drafted to be adopted under the framework of Chapter VII of the UN Charter which would have made the resolution legally binding on all UN Member States, but was changed to its present formulation after negotiations with China and the Russian Federation. Pursuit of measures legally binding on *all* UN Member States through chapter VII resolutions of the Security Council, such as 1887 (2009), 1540 (2004) and 1373 (2001), is highly problematic as this procedure bypasses international forums mandated to multilaterally negotiate conventions and treaties on nuclear disarmament and non-proliferation such as the Conference on Disarmament in Geneva. It also reflects the tendency of the five permanent members of the Security Council to push through measures without the full involvement of the broader UN membership and thus is internationally unrepresentative and lacks legitimacy.

This tactic by the Obama administration of pushing through a CTBT resolution in the Security Council could well backfire with dire consequences for the CTBTO, as already 34 US Senators have formally sent to the White House their constitutional objections to this course of action and have filed bills to prevent the authorization or appropriation of approximately $ 32 million per year provided by the US to the CTBTO, which is 25% of its budget. A funding cut off by the US Congress would be disastrous for the CTBTO. As such, a Security Council resolution on the CTBT though based on noble aspirations in the end could turn out to be undesirable and counterproductive.

A Security Council resolution by itself cannot create nor establish any new legally-binding internationally accepted norm against nuclear weapons testing, whether or not adopted under chapter VII of the Charter. Though, it can raise the political costs of nuclear testing in the future by States such as North Korea or India, neither of which have signed the CTBT.

On the other hand, the Joint Statement on the CTBT made by the NPT nuclear-weapon States, referred to above, is a welcome development that should be commended by all States party to the CTBT and the NPT and heeded in particular by the non-signatory States to the CTBT.

Global ban on nuclear test explosions

The CTBT is a fundamental pillar of the global nuclear disarmament and non-proliferation regime, second in importance only to the 1968 nuclear Non-Proliferation Treaty (NPT). The NPT with 191 States parties is the world's most widely adhered to multilateral nuclear arms control agreement. While the NPT provides the walls of the nuclear arms control structure by prohibiting non-nuclear weapon States from developing nuclear weapons and placing all of their nuclear material and activities under international verification, the CTBT provides the roof by banning all types of nuclear explosive tests in all environments forever.

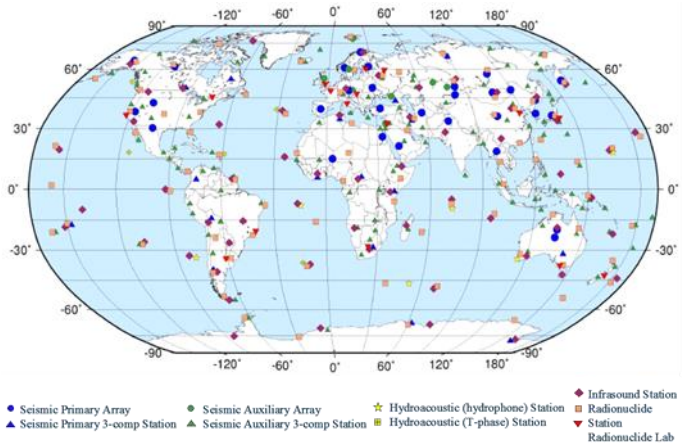
The world's first nuclear explosion, the "Trinity" test, was carried out at 05:29:45 on 16 July 1946 at Alamogordo in New Mexico in the US. The Soviet Union followed suit on 29 August 1949 and the United Kingdom on 3 October 1952. By the mid-1950s, both the Soviet Union and the United States were regularly testing high-yield thermonuclear weapons in the atmosphere leading to widespread radioactive fallout in the southern and northern hemispheres. It took one of the leaders of the Non-Aligned Movement countries, Prime Minister Jawharlal Nehru of India, to first propose a "standstill agreement" on nuclear testing in 1954. But, it took the Cuban missile crisis of October 1964, which brought the US and the USSR close to a nuclear war, to reach agreement in 1963 on the Partial Test Ban Treaty (PTBT) that banned nuclear testing in the atmosphere, in outer space and under water. The PTBT ended atmospheric nuclear tests by the UK, USA and the USSR, but China and France continued with atmospheric nuclear testing until 1980 and 1974, respectively. Underground nuclear testing, however, continued with the last nuclear tests by the USSR in 1990, UK in 1991, USA in 1992, China and France in 1996 – India followed by Pakistan tested in May 1998, and North Korea remains the only State continuing with nuclear testing.

The 1968 NPT included a call for a permanent end to all nuclear testing that was not heeded until 1995, when as part of indefinitely extending the treaty States parties decided to complete negotiation on a CTBT no later than 1996. Within weeks of agreeing to this, both China and France resumed nuclear testing and only stopped in 1996 after universal international condemnation. Negotiations on the CTBT were completed in the Conference (CD) on Disarmament during the summer of 1996, but then India vetoed its adoption by the CD. Consequently, Australia along with 127 co-sponsors submitted the CTBT to the UN General Assembly, which adopted it on 10 September 1996 by a vote of 158 in favour and 3 against (Bhutan, India and Libya). The CTBT then opened for signature on 24 September 1996 and was signed on that date by 71 States including the five nuclear-weapon States (China, France, Russian Federation, United Kingdom and United States).

The first blow against the CTBT was inflicted in May 1998 when India which had refused to sign the treaty carried out a series of nuclear tests; not to be outdone, Pakistan followed with its own series of tests. Less than a decade later, in 2006 North Korea carried out its first test and remains the only country testing nuclear weapons in the 21st century.

CTBT International Monitoring System

The CTBT permanently bans all nuclear explosions on Earth whether for military of "peaceful" purposes. It establishes a global International Monitoring System (IMS) for verification to detect any nuclear explosion conducted anywhere – underground, underwater or in the atmosphere. The purpose of the IMS is to monitor countries' compliance with the CTBT. The IMS currently with 283 stations is monitoring the planet for any sign of a nuclear explosion, and when completed and fully operational will consist of 321 monitoring stations and 16 laboratories spread across 89 countries.



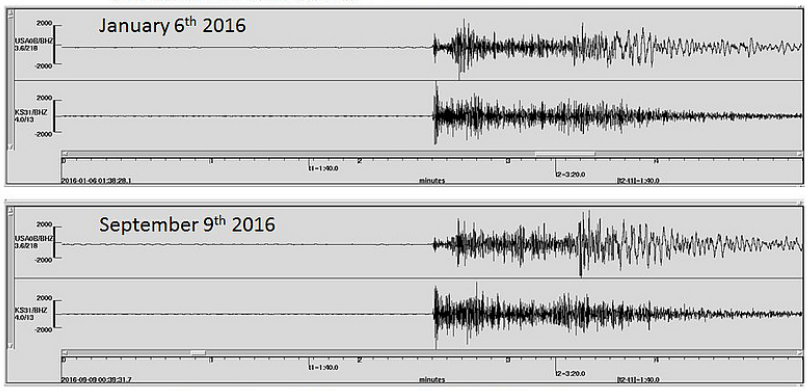
Source: CTBTO

The IMS is based on four complementary verification methodologies, utilizing the most modern technology available. Seismic, hydroacoustic and infrasound stations monitor the underground, the large oceans and the atmosphere respectively. Radionuclide stations detect radioactive debris from atmospheric explosions or vented (released) by underground or underwater nuclear explosions. Radionuclide laboratories assist radionuclide stations in identifying these radioactive substances.

The data collected by the IMS is processed and analyzed by the International Data Centre (IDC) which produces data bulletins for States for their evaluation and judgement. The incoming data are used to register, locate and analyze “events” for the detection of nuclear explosions. The data are processed in real time, with the first automatic analysis or data bulletin released within two hours.

The most recent example of the efficacy of the IMS was demonstrated earlier this month when early in the morning of 09 September 2016, an unusual seismic event was detected at 00:30 (UTC) by the IMS of the CTBTO in Vienna. Later that same morning, North Korea announced that it had successfully carried out its fifth nuclear test since 2006, and the second this year.

The recordings of the seismic waves generated by the 6 January and 9 September nuclear detonations by the Democratic People’s republic of Korea (DPRK) were released by the CTBTO and appear below. These images show that the latest test was more powerful than the previous one and its location estimate placed it in the area of the DPRK’s nuclear test site at Punggye Ri. Without the CTBTO, the world would not have seen these seismic wave recordings and images and would not have known the size of the explosion as confirmed by the world’s nuclear explosion monitoring system.



Comparison of seismic signals at CTBTO stations
USRK (USSURIYSK) and KSRS (WONJU)
for January 6th and Sept 9th 2016 events

Source: CTBTO

Civilian and Scientific Applications of the IMS

The IMS now is nearly 90% complete and represents an investment in nuclear test verification of more than $ 1 billion. According to Dr Lassina Zerbo, Executive Secretary of the CTBTO, “The CTBTO’s International Monitoring System has found a wider mission than its creators ever foresaw: monitoring an active and evolving Earth. Some compare the system to a combined giant Earth stethoscope and sniffer that looks, listens, feels and sniffs for planetary irregularities".

Earthquake and Tsunami Warning

For example, the IMS’ seismic sensors picked up the impact in 1998 of a Swiss Air MD11 passenger jet that crashed at Peggy’s Cove in Nova Scotia (Canada), this seismic data provided the only accurate means of the timing of the crash. The 170 seismic stations of the IMS in addition to monitoring the ground for shockwaves created by nuclear explosions also have important civilian and scientific applications such as acquiring and disseminating data on earthquakes, and for research on the Earth’s structure and climate change. Earthquakes occur in many parts of the world along tectonic plate borders and there is a good chance that they will be picked up by the IMS seismic stations. The way in which seismic waves are influenced when they pass through the Earth’s interior structures also helps to understand their composition and the underground structure. This in turn improves the identification and characterization of nuclear explosions for CTBT verification purposes.

A further benefit of the IMS’ seismic stations network relates to early warning of tsunamis following major earthquakes. On 26 December 2006, a 9.3 magnitude earthquake on the seabed near Aceh in northern Indonesia generated a powerful surface wave that resulted in the strongest tsunami for 40 years. The tsunami generated ocean waves as high as 10.5 metres with a velocity of 8 metres per second (29km/hour) that killed more than 240,000 people, injured half-a-million and severely impacted more than 158 million people, many of whom are still recovering from their ordeal. In March 2005, the CTBTO together with the Intergovernmental Oceanographic Commission (IOC) of UNESCO agreed to set up a tsunami alert system drawing on the IMS seismic data.

Monitoring Climate Change

The 80 stations of the IMS radionuclide network deploy air samplers to detect radioactive particles or noble gases. A nuclear explosion ejects radioactive material–solids and gases–into the surrounding environment. These substances provide the ultimate evidence that a nuclear detonation has taken place but their detection depends on many factors, most of all on the setting in which the explosion occurred. A well-contained underground nuclear explosion will not release solid radioactive residues into the air. But there is another methodology way to detect nuclear explosions by finding their gaseous releases, radioactive noble gases, in particular xenon. Once the gas has escaped into the atmosphere, it is dispersed by winds and can be picked up by the radionuclide detectors to provide the "smoking gun" evidence of a nuclear explosion. These same air samplers also measure concentrations of specific natural radionuclides that are relevant to understand climate change. The atmospheric transport models can help to determine the quantity of dust and pollens, as well as the evolution of chemical contents in dust to analyze the climate impact of megacities or trends in monsoon circulation, and to monitor the stratosphere/troposphere and solar activity changes.

The radionuclide network also detected and monitored releases of noble gases from the accident at the Fukushima nuclear power plant complex in Japan in March 2011. The IMS detected that after a few weeks the entire northern hemisphere contained radioxenon concentrations in excess of 1,000 times above the normal background level in nature—but these still were insignificant from a human health perspective. In terms of a source of noble gases, the Fukushima nuclear accident corresponded to an atmospheric nuclear explosion of 1 megaton. The design criterion for the IMS is 1 kiloton, or 1,000 times less.

Ocean Monitoring and Whale Songs

The CTBTO IMS includes 11 hydroacoustic stations that monitor the world's oceans for the sound waves emitted by underwater nuclear explosions. The data generated by this network also can be harvested for research on the calving of icebergs and the breakup of ice shelves as indicators of global and ocean warming. Another byproduct is weather prediction through inference of ocean temperatures. Migration of whale populations can also be monitored, as well as whale noises recorded for studying marine mammal behaviour.

Ears for the Earth

The IMS' 45 infrasound sensors pick up infrasonic waves in the Earth's atmosphere. On 15 February 2013, the CTBTO's infrasound monitoring stations detected the signals from a meteor that had entered the atmosphere and disintegrated in the skies over Chelyabinsk in Russia. The CTBTO network–the only global one of its kind to detect infrasound–recorded the shock wave caused by the exploding fireball which circled the globe twice. Infrasound detects low frequency sound below 10 Hz, which cannot be picked up by human ears. The sound generated by meteorites is moving and therefore can be distinguished from mining and volcanic explosions. The infrasound data including micropressure changes in the atmosphere generated by infrasonic waves such as from meteor blasts are useful for scientists to better understand the altitude, energy released and breakup of meteorites.

Entry-into-Force of the CTBT

Eight countries named above are holding up the entry-into-force of the CTBT. Without this the CTBTO cannot carry out on-site inspections to investigate allegations of clandestine nuclear tests. Speaking at a SIPRI event organized in Vienna in April 2015, Dr Zerbo of the CTBTO warned that:

> *"As we approach the 20th anniversary of the opening for signature of the CTBT, we must not lose the sense of urgency in bringing this Treaty into force. It is indeed disheartening that while the importance of the entry into force of the CTBT has been widely recognized by the international community, it is yet to be reached.*
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> *If the international community is serious about the CTBT, then then it must act. That political will must be felt. Those countries that have continued to block the entry into force of the Treaty need to hear from their friends and allies that the CTBT is and will continue to be a top priority in the efforts to prevent the spread of nuclear weapons and reduce the nuclear threat.*
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> *The entry into force of the CTBT is not just the responsibility of any one group of states. The CTBT represents the culmination of a decades-long endeavour by the international community, both scientific and technical, but also diplomatic and political, to put an end to nuclear testing by anyone, anywhere, for all time. And the world is already reaping the benefits of the Treaty even though it has not yet entered into force.*
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> *An unwelcome but powerful illustration of the value of the CTBT verification system was the nuclear test conducted by the Democratic People's Republic of Korea (DPRK) on 12 February 2013; the third such event following the 2006 and 2009 announced nuclear tests. The event was detected by 94 IMS seismic stations, and data was made available to Member States approximately one hour after its receipt by the IDC – more than ninety minutes before the DPRK publicly announced the test.*
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> *On 9 and 14 April 2013, the Takasaki radionuclide station in Japan detected a significant quantity of Xenon isotopes consistent with a fission event occurring approximately 55 days prior to the measurement – coinciding with the 12 February event. The Xenon detection was shown to be consistent with the DPRK announced nuclear test. There is a fundamental point to be underscored here. No national system was able make this detection and associate it with the DPRK test – even those with the most advanced and extensive capabilities. This is a true testament that multilateral verification is effective, reliable and necessary for moving toward a world free of nuclear weapons.*
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> *For we must not stop asking ourselves what the consequences of failure to bring the CTBT into force would be, including to the credibility of the NPT and the international non-proliferation regime as a whole – in other words, on humanity's most precious asset, and the condition for our well-being and that of future generations: peace and security".*

Since that statement was made, North Korea has conducted two more nuclear tests this year—in January and in September. None of the eight States holding up entry-into-force of the CTBTO have made an iota of progress and none seems to be in the offing.

To make matters worse, none of the 48 States that form the Nuclear Suppliers Group (NSG) have had the wisdom or deemed it fit to make CTBT adherence a pre-condition for considering the membership applications of India and Pakistan. The NSG to retain any of its fast fading credibility must insist on CTBT signature and ratification by all its current members, and especially by any new members as a non-negotiable pre-condition.

Overall the environment for nuclear disarmament and arms control is fast deteriorating and a new Cold War has started. Binding obligations undertaken by the nuclear-weapon States under the NPT are not being implemented, efforts to start multilateral negotiations on a convention or treaty to outlaw nuclear weapons are stymied, nuclear force modernization is underway in the nuclear-armed States, thousands of tonnes of weapon-usable nuclear material remain outside any international accountability or monitoring, and the role of nuclear weapons in the military postures of the nuclear-armed States is on the increase, to note but a few destabilizing trends.

The CTBT reached its 20th anniversary on 24th September but prospects for its entry-into-force remain dim. The NPT will reach its 50th anniversary in 2020 and prospects for a nuclear-weapon-free world remain non-existent. In light of these depressing developments and blatant hypocrisy by the nuclear-armed States, a large group of non-nuclear-weapon States is likely to push through a resolution at this year's UN General Assembly on starting multilateral negotiations on banning nuclear weapons even though the nuclear-armed States and their allies will oppose and boycott the proceedings. Another resolution on the CTBT will be adopted by the General Assembly but to what effect? The CTBT remains "unfinished business" from the legacy of the Cold War, it is time that the business is completed of finally putting an end to all nuclear explosions in all environments for all time and to reap the civilian and scientific benefits for humanity of the IMS which is the world's most extensive international verification and monitoring system—by securing the entry-into-force of the CTBT without further delay.

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