CTBTO PREPARATORY COMMISSION | preparatory commission for the comprehensive nuclear-test-ban treaty organization

14th World Congress on Public Health

Message by the Executive Secretary of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization

Dr Lassina Zerbo

Kolkata, 14 February 2015

Excellencies,
Distinguished participants,
Ladies and gentlemen,

The contribution of the Comprehensive Nuclear-Test-Ban Treaty Organization to this conference may not be obvious at first sight, so let me explain.

In August this year, the world will commemorate the 70th anniversary of the bombings of Hiroshima and Nagasaki. This might be the last decadal commemoration in which the surviving *Hibakusha* will be able to relate the unspeakable horrors that nuclear weapons can inflict upon humans.

Fortunately, nuclear weapons have never been used again in war. Unfortunately, however, human suffering from nuclear weapons was not confined to Hiroshima and Nagasaki. Over 2,000 nuclear test explosions have been conducted since 1945 in the atmosphere, underground, underwater and in outer space.

About 75% of these tests have been conducted underground and only a handful have been carried out underwater or in outer space. The remaining explosions were set off in the atmosphere. Atmospheric tests alone accounted for 428 megatons of explosive power, equivalent to over 29,000 Hiroshima size bombs.

The amount of radioactivity generated by a nuclear explosion can vary depending on its design and the location of the detonation. Atmospheric tests create fission products that can contaminate the atmosphere and the Earth's surface.

The radioactive particles from nuclear test explosions are characterized by different periods of decay and emission rates and travel great distances before falling to Earth. Once the radionuclides have dispersed, they can affect the human body in various ways.

Prior to 1950 little consideration was given to the health impacts of the worldwide dispersion of radioactivity from nuclear testing. It was a husband and wife team of physicians in the United States, Eric and Louise Rice, who initiated ground-breaking research. Through their *Baby Tooth Survey*, the team collected over 300,000 deciduous teeth from children of various ages across the United States.

The results showed a steady rise in strontium-90 (a radioactive isotope produced by nuclear fission) throughout the country, peaking at around 50 times higher than that in children born before the advent of large-scale atmospheric testing. Studies have shown a causal relationship between exposure to strontium-90 and the risk of contracting leukaemia, a disease that may reveal itself even decades after exposure.

Another isotope produced by nuclear fission, iodine-131, can be transferred to nursing infants via the mother's breast milk and through the consumption of dairy products. Children are especially vulnerable as iodine-131 accumulates in the thyroid. The International Physicians for the Prevention of Nuclear War estimated that over 20,000 children may have been exposed during the years of atmospheric testing.

A study conducted by the U.S. Center for Disease Control and Prevention and the U.S. National Cancer Institute concluded that every human being born since 1951 in the United States has been exposed internally and externally to radiation from the nuclear tests conducted at the Nevada Test Site. In particular, people exposed to iodine-131 may have an increased risk of developing thyroid disease - including cancer.

It has also been scientifically demonstrated that radioactive particles from nuclear testing during the Cold War still persist in the stratosphere. Even though they are clearly not harmful to human health, these plutonium and caesium radionuclides which remain in the upper atmosphere for many years can be driven down by atmospheric events.

A 1991 study by the International Physicians for the Prevention of Nuclear War estimated that the radiation and radioactive materials from atmospheric testing up until the year 2000 could cause 430,000 cancer deaths, some of which had already occurred by the time the results were published. The study predicted that roughly 2.4 million people could eventually die from cancer as a result of atmospheric testing.

Many generations from now, anthropologists will still be able to see the legacy of nuclear testing through the spikes in radioactive isotope carbon-14 in the remains of every human, animal or plant that existed during that era.

Excellencies,
Distinguished participants,
Ladies and gentlemen,

It is particularly fitting that this Congress is being hosted by India because Jawaharlal Nehru was the first statesman to call for a halt to nuclear explosions in 1954. Concerned with the emergence of hydrogen bombs and the destructive forces that were unleashed during the testing of such weapons, as well as the consequences for human health and the environment, Nehru called for a "standstill agreement" pending a full prohibition of the weapons themselves.

Increasing public pressure and the sobering experience of the 1962 Cuban Missile Crisis, in which the superpowers found themselves on the brink of nuclear war, eventually led to the conclusion of the *Partial Test Ban Treaty* (PTBT) in 1963. The preamble of the PTBT lists as one of its objectives "to put an end to the contamination of man's environment by radioactive substances".

While the PTBT drove testing underground, it merely reduced the emissions from nuclear testing. Its impact was attenuated by the fact that 70% of all nuclear tests were conducted after 1963 and at an increasing number of locations.

So while underground testing mitigated the problem of radiation doses from short-lived radionuclides such as iodine-131, large amounts of plutonium, iodine-129 and caesium-135 were released underground. In addition, exposure occurred beyond the test site if radioactive gases leaked or were vented unexpectedly.

Moreover, it has also been found that despite earlier beliefs, underground testing can contaminate ground water sources for long periods of time after the underground tests occurred.

One of the most long-lived isotopes is plutonium-239, one of the fissile materials used in nuclear weapons. Its half-life is 24,000 years – the same time span to which some anthropologists backdate the death of the last Neanderthal on the Iberian peninsula.

The human health and environmental consequences of nuclear testing are clear both in the atmosphere and underground. While generations to come will continue to be plagued by the legacy of nuclear testing, the humanitarian impact of more than 2,000 tests played a

significant role in securing the conclusion of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) in 1996.

While this Treaty has yet to become global law due to its demanding entry into force clause, it has been signed by 183 countries or 94% of all nations, which adhere to it as if it were legally binding. The only country which continues to conduct nuclear tests is North Korea, further contributing to its international isolation.

And while the three North Korean tests in 2006, 2009 and 2013 are three too many, a fully enforced and implemented CTBT offers a credible promise of finally reaching a world without the menace of nuclear weapons testing, which will eventually lead to the complete elimination of nuclear weapons.

However, without the CTBT in force, there is no guarantee that nuclear testing, and a related arms race will not resume. The impact of such a scenario would be disastrous, not only for international security but also in terms of human health and the environment.

Excellencies,
Distinguished participants,
Ladies and gentlemen,

The CTBT also makes other valuable contributions to human health and safety which were not foreseen when it was being negotiated. To verify Treaty compliance, we have established a network of over 300 monitoring stations that scan the entire globe for signs of nuclear explosions.

These stations send data in near-real time, with unrivalled reliability and precision, data that have proved their usefulness not only in regard to North Korea's nuclear tests, but also for disaster warning and scientific research. At present, 14 tsunami warning centres in 13 countries make use of our data to issue more timely and precise warnings. UN Secretary General Ban Ki-moon once said: "Even before entering into force, the CTBT is saving lives."

The system also features 80 stations that can detect minute traces of radioactivity. The radionuclide network can detect residual radiation dispersed by the wind as well as the noble gases that may seep through the Earth from underground tests.

Apart from detecting nuclear explosions, these stations also register the dispersion of radioactivity stemming from other sources anywhere in the world, for example from nuclear power plant accidents. One of our analysts even showed me spikes on a spectrogram from the station on the rooftop of my organization in Vienna that could have been caused by a pedestrian passing nearby who had received radiotherapy.

By using Atmospheric Transport Modelling (ATM) and meteorological data it is possible to trace the various three-dimensional travel paths of any selected radionuclide. As was the case in the aftermath of the 2011 Fukushima nuclear power plant accident, ATM can be used to predict the dispersion of radionuclides throughout the atmosphere as well as to backtrack the source of radioactive emission.

This information is made available to all CTBTO Member States whose radiation protection and public health agencies can use it to inform the public. This was the case during the 2011 Fukushima power plant accident, when the levels of radioactivity detected outside Japan were found to be safe.

Had our system been established at the time of the 1986 Chernobyl nuclear power plant accident, information about the concentration, type and direction of the radioactive emissions would have been readily available. Our radionuclide stations in Europe continue to pick up residual radiation from Chernobyl to this day.

Beyond the issue of radionuclides, scientists have also found our data to be a treasure trove for studying phenomena as diverse as volcanic eruptions, meteor blasts, climate change, storm systems and even oceans and marine life.

I hope to have increased your interest in our system and its many spin-offs. If you wish to join the world's largest scientific forum in this field, I warmly invite you to the *CTBT: Science and Technology Conference* from 22 to 26 June in Vienna's Imperial Hofburg Palace.

I look forward to welcoming many of you there and wish you every success in your deliberations.