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CTBTO SPECTRUM

15 YEARS

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COOK ISLANDS PRIME MINISTER **HENRY PUNA**
BRITISH FOREIGN SECRETARY **WILLIAM HAGUE**
INDONESIAN FOREIGN MINISTER **MARTY NATALEGAWA**
TURKISH FOREIGN MINISTER **AHMET DAVUTOĞLU**
FORMER JAPANESE FOREIGN MINISTER **YORIKO KAWAGUCHI**

and many more

SPECIAL EDITION: 15 YEARS OF THE CTBTO

THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY (CTBT) BANS ALL NUCLEAR EXPLOSIONS.

IT OPENED FOR SIGNATURE ON 24 SEPTEMBER 1996 IN NEW YORK.

As of 1 March 2012, 182 countries had signed the Treaty and 157 had ratified. Of the 44 nuclear capable States which must ratify the CTBT for it to enter into force, the so-called Annex 2 countries, 36 have done so to date while eight have yet to ratify: China, the Democratic People's Republic of Korea, Egypt, India, Iran, Israel, Pakistan and the United States.

The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) consists of the States Signatories and the Provisional Technical Secretariat. The main tasks of the CTBTO are to promote signatures and ratifications and to establish a global verification regime capable of detecting nuclear explosions underground, underwater and in the atmosphere.

The regime must be operational when the Treaty enters into force. It will consist of 337 monitoring facilities supported by an International Data Centre and on-site inspection measures. As of 1 March 2012, roughly 80 percent of the facilities of the International Monitoring System were fully operational.

15 YEARS

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17 FEBRUARY 2012: ➤
UN Secretary-General Ban Ki-moon, Swedish Foreign Minister Carl Bildt, Austrian State Secretary for Foreign Affairs Wolfgang Waldner and other dignitaries joined CTBTO staff in celebrating the 15th anniversary of the CTBTO at the United Nations in Vienna. Some 180 children from the American International School in Vienna sang at the event, which was attended by over 500 people.

Happy Birthday, CTBTO!

TIBOR TÓTH
Executive Secretary

The story of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) and its organization is that of a small optimistic team that set out on 17 March 1997 to build the world's largest multilateral verification regime – against the odds and despite the numerous challenges.

Back then, I was Chairman of the Working Group A, responsible for putting the first programme and budget of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) into place. I worked in an empty room with my computer set up on a carton of printing paper.

One year earlier, diplomats and scientists in Geneva had hammered out the terms of the Treaty and its verification regime – the "Grand Design". I don't think that anyone at the time fully grasped the complexity, what it would take in terms of effort, intellectual capacity and money. The monitoring system was to have 337 facilities worldwide, some of them in very remote locations. An unparalleled global data gathering, processing and distribution system had to be set up and a new on-site inspection regime developed.

The footnote to our marching orders was that we might have to ensure that this Grand Design was up and running within two or three years, should all 44 countries specified in the CTBT promptly ratify the Treaty. That was the expectation back in March 1997.

My friend Wolfgang Hoffmann, the CTBTO's first Executive Secretary, steered the young organization efficiently through the stormy waters of those early years. Only a year after we had set out, the nuclear tests in South Asia flouted the no-test norm. Then, in 1999, there was the shock of the CTBT's defeat in the U.S. Senate.

But we always moved forward. One by one, ever more of the 337 dots on the map became real monitoring stations. By 2004, we crossed the 100-station threshold. Data from our monitoring network were found to outperform any other system in terms of speed, quality and reliability. After the devastating Indian Ocean tsunami at the end of that year, CTBTO Member States decided to make the data available for tsunami warning efforts.

In 2006, the Democratic People's Republic of Korea conducted its first nuclear test. By then, half of the stations were in place – and the test was detected effectively in spite of its small yield. A year later, station number 200 went online – despite the financial crisis the organization was experiencing.

The year 2008 marked a major on-site inspection exercise in Kazakhstan, reinforcing the next layer of the verification regime. The following year witnessed the second DPRK nuclear test, immediately detected by dozens of stations.

In 2011, the earthquake, tsunami and nuclear power plant accident in Japan underlined the growing importance of the CTBTO's monitoring system for disaster mitigation.

Today, the Treaty and its verification regime stand proud and tall – 182 States have signed, of which 157 have ratified; 270 stations are fully operational. We are where we are today because of the outstanding quality of the CTBTO community. By the CTBTO community I mean both my team and the many outside scientists, academics, members of civil society and journalists from all continents who support our cause.

And of course, it would never have been possible without the sustained commitment of our Member States, who have continued to make substantial political, financial and scientific investments even through difficult years.

I think we can all be proud that we have managed to deliver on things that were just dreams in March 1997 and to turn them into reality by spring 2012.

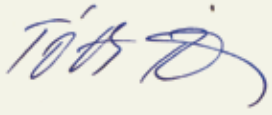
In this issue of Spectrum and the attached DVD, current and former staff members recount their impressions of this fascinating journey.

Henry Puna, Prime Minister of the Cook Islands, recalls the Pacific Islands' long struggle to end nuclear testing, which had devastating effects on the region.

William Hague, Marty Natalegawa, and Ahmet Davutoğlu, the foreign ministers of the UK, Indonesia and Turkey respectively, explain why the CTBT is indispensable for progress in nuclear disarmament and how they will continue to focus their political energy on the Treaty's entry into force.

Margaret Chan, Secretary-General of the World Health Organization (WHO), relates how CTBTO data helped the WHO tailor public health guidance during the Fukushima crisis, while Wendy Watson-Wright, Executive Secretary of UNESCO's Intergovernmental Oceanographic Commission, praises the data's added value for tsunami early warning. Former Japanese Foreign Minister Yoriko Kawaguchi highlights these applications of CTBTO data as an important incentive for outstanding countries to sign the CTBT.

And finally on the verification side, the CTBTO's Svetlana Nikolova raises awareness about the important work being carried out by the International Monitoring System station operators — in this case, in some of the most remote parts of Russia.




CTBTO


PUTTING AN END
TO NUCLEAR TEST EXPLOSIONS


omprehensive nuclear-test-ban treaty
PUTTING AN END
TO NUCLEAR TEST EXPLOSIONS


ENCOURAGING SCIENTIFIC ADVANCEMENT
COMPREHENSIVE
NUCLEAR-TEST-BAN
TREATY:
SCIENCE AND

Looking back, looking forward

The Cook Islands' support for the multiple global benefits of the CTBT

by **HENRY PUNA**
Prime Minister
of the Cook Islands

The Cook Islands' support for international efforts to eliminate nuclear weapons and halt nuclear weapons testing can best be understood at three different but inter-related levels.

NUCLEAR TESTING – A CAUSE FOR CONCERN IN THE REGION

From the initial settlement centuries ago of the fifteen islands in the centre of the South Pacific that history has subsequently come to know as 'the Cook Islands', there has been an intimate cultural and economic relationship between Cook Islanders and the surrounding ocean. From birth, generations of Cook Islanders have had a deep appreciation that the 'Moana Nui o Kiva', the great Pacific Ocean, is not only a maritime highway, connecting one island to another, but also the marine farm from which Cook Islanders harvest a major part of their daily sustenance. Any activities threatening the degradation of the marine environment would be unacceptable.

It was against that fundamental world view that Cook Islanders watched with growing concern as, in the post-World War II period, different world powers undertook nuclear testing programmes in the Trust Territory of the Pacific Islands in Micronesia in the late 1940s and 1950s, on Christmas and Malden Islands (some 1,200 km from the Northern Cook Islands) in the North Pacific in the 1950s, and on Mururoa and Fangataufa Islands in French Polynesia (some 2,400 km east of the Cook Islands' main island, Rarotonga) from the 1960s to the 1990s.

Cook Islanders perceived a possible threat to the maritime environment and the marine food supply from such tests, not only because the Cook Islands is the closest country to Moruroa and Fangataufa but also because many of the living resources on which they depended were highly migratory in nature and could possibly have originated in waters where testing had been carried out. That many of the tests were atmospheric in nature also raised concerns among Cook Islanders about the possible harmful effects to their health from such testing. In addition, the conduct of nuclear testing activities on Mururoa had a detrimental impact on the Cook Islands' economy, with visitors from beyond the Pacific opting for other destinations rather than visit islands where nuclear testing was perceived as taking place nearby.

TREATY OF RAROTONGA – A MAJOR REGIONAL INITIATIVE

To address the above concerns, and recognizing both the need to act collectively and its more general obligations as a member of the international community to promote peace and security, the Cook Islands increasingly turned its attention to initiatives at the Pacific regional level, collaborating with neighbouring governments all of which shared similar concerns. At the very first Forum of Pacific Heads of State and Government in 1971, for example, the Cook Islands joined with others in expressing collective concern at the potential hazards that atmospheric tests posed to health, safety and marine life in the region and called for a cessation of nuclear testing in French Polynesia.

Over succeeding years, nuclear testing became an increasing focus of discussions for the Cook Islands and other regional States at annual Forum meetings and related activities. An important product of those efforts

»In force, the CTBT will make an important contribution to the peace and security interests of the Cook Islands.«

was the South Pacific Nuclear Free Zone Treaty, commonly known as the Treaty of Rarotonga. Adopted by Pacific Leaders on 6 August 1985 when they gathered for their annual Forum meeting on Rarotonga, the Cook Islands' main island, the Treaty prohibits the testing, manufacturing, acquiring and stationing of nuclear explosive devices in any territory of Treaty parties. Accompanying the Treaty are three Protocols aimed at securing the support of nuclear powers for the nuclear free zone. All five nuclear-weapon States (China, France, Russia, the United Kingdom and the United States) have signed the relevant Protocols. The Treaty and its Protocols reflect the region's deep concern at the continuing nuclear arms race and the risk of nuclear war. Support for the objectives of the Treaty and Protocols continues to be promoted by the Cook Islands and its other regional partners.

THE CTBT: CENTRAL TO THE INTERNATIONAL DISARMAMENT AND NON-PROLIFERATION REGIME

In concluding the Treaty of Rarotonga, the Cook Islands and other Forum countries believed that such regional initiatives could contribute to efforts

23 JUNE 1995:
Over 1,500 people, nearly one quarter of Rarotonga's population, marched against French President Chirac's decision to resume nuclear testing in Moruroa. Raratonga, the most populated of the Cook Islands, hosts two CTBTO monitoring stations.
PHOTO © GREENPEACE / STEVE MORGAN

at the international level to reverse the nuclear arms race and promote the national security of each country in the region and the common security of all.

Among such broader global efforts are a number of treaties to which the Cook Islands is a party, including the Chemical Weapons Convention, the Biological and Toxin Weapons Convention, the Landmines Convention, the Cluster Munitions Convention and, most directly related to nuclear weapons, the Comprehensive Nuclear-Test-Ban Treaty (CTBT), signed by the Cook Islands on 5 December 1997. It subsequently ratified the CTBT on 6 September 2005, following the passage of implementing legislation with the unanimous support of all members through the Cook Islands Parliament.

Respecting the two core obligations of the CTBT as set out in Article 1 is, of course, fundamental. However, with Leaders of other States party to the Convention, my Government is also committed to doing whatever is possible within our available resources to promote the effective establishment and operation of a verification and monitoring regime, which is key to the CTBT's success. On the basis of a facility agreement signed between the Cook Islands and the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) in 2000, there are already in place on Rarotonga as part of the CTBTO's International Monitoring System an auxiliary seismic station and a radionuclide station. The latter station is a successor to one that had been hosted by the Cook Islands and operated by the National Radiation Laboratory of New Zealand for over 30 years at the site to monitor fallout from nuclear testing in the region.

My Government supports the Final Declaration of the Conference on Facilitating the Entry into Force of the CTBT (the Article XIV Conference) held on 23 September 2011, which emphasized the central importance of the CTBT for the international disarmament and non-proliferation regime and the need to implement a wide range of measures, especially those aimed at the early entry into force of the CTBT. In force, the CTBT will make an important contribution to the peace and security interests of the Cook Islands.

My Government also welcomes and strongly encourages the application of CTBTO data for civil and scientific purposes, as was done in 2011 to assist Japanese authorities in issuing tsunami warnings that helped to save lives following the devastating 11 March Japanese earthquake as well as by providing information about the dispersal of radioactivity following the tragic nuclear accident at Fukushima. As experience has shown, the Pacific Islands region is not immune to the disastrous effects of tsunamis and the timely application of CTBTO data could well prevent deaths and destruction in the future. There are many benefits to be realized by the international community from entry into force of the CTBT. My Government commends the strenuous efforts to date of many countries and individuals to realize that goal and will strongly support continuing efforts in the future.

BIOGRAPHICAL NOTE

HENRY PUNA
was elected Prime Minister of the Cook Islands in November 2010, ending a decade of Democratic Party rule. He first stood for Parliament at the 2004 election and in 2006 was elected leader of the Cook Islands Party – one of the two major political parties in the Cook Islands since 1965. Prior to entering politics, Puna worked as a lawyer.

Underpinning the international non-proliferation regime

The UK's commitment to bringing the CTBT into force

by **WILLIAM HAGUE**
UK Secretary of State for Foreign and Commonwealth Affairs

Britain is committed to upholding the Nuclear Non-Proliferation Treaty (NPT) and to the long term goal of a world free of nuclear weapons. Nuclear proliferation is a live threat to the security of the international community. It is our task to work together to respond to reduce the risks while spreading the benefits of peaceful civil nuclear technology. In Britain we demonstrate this resolve through our active membership of the multilateral disarmament machinery, our commitment to progress on the action plan agreed at the NPT Review Conference two years ago and our work with our international partners to build and maintain the political will needed to move along the path.

THE CTBT: A PINNACLE OF ARMS CONTROL AND DISARMAMENT

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) is a vital component of this architecture. The steps required to complete and sustain the Treaty's verification regime and bring it into force are central UK policy objectives. These shape our diplomatic and technical efforts in Vienna and elsewhere in support of the work of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) and the CTBT more generally. The Treaty plays a central role in underpinning the international non-proliferation regime and our collective efforts towards global disarmament. The cessation of all nuclear weapon test explosions and all other nuclear explosions will genuinely reduce the development and quality of nuclear weapons, making it harder for those States that choose to develop them to do so. This would be a powerful step towards a safer world.

The United Kingdom has a long history of support for a ban on the testing of nuclear weapons. After it was first proposed by the Indian Prime Minister Jawaharlal Nehru in 1954, British Prime Minister Harold Macmillan devoted considerable personal effort to securing a Soviet/U.S. agreement on a comprehensive ban on nuclear tests in the late 1950s and early 1960s. But despite these efforts, the international community had to settle for the Partial Test Ban Treaty in 1963. In the mid-1990s a convergence of interests led finally to the Comprehensive Nuclear-Test-Ban Treaty, which we and many others regard as the pinnacle of arms control and disarmament. The United Kingdom was one of the very first signatories to the Treaty. Today the total number of countries to have signed it has reached 182 and I believe we are not far from finally realizing the goal of the Treaty's entry into force.

IMPORTANT PROGRESS TOWARDS ENTRY INTO FORCE

In the last decade, while the NPT has come under increasing strain, progress towards the entry into force of the CTBT shows that we are still making strides and positive progress in the wider regime.

»There should now be no doubt that the Treaty's verification regime is fit for purpose.«

In December, we congratulated Indonesia for its ratification of the Treaty[1]. This significant move is indicative of the genuine strides that were made in 2011, following as it does the ratifications by Ghana and Guinea earlier in the year.

It is important that we maintain that momentum in 2012. We have already seen success with Guatemala's decision to ratify in January. These ratifications are a major step towards finalizing the Treaty's entry into force and a global ban on nuclear weapon test explosions. Putting in place a legally binding ban on nuclear test explosions is one of the UK Government's key disarmament and non-proliferation priorities and the Treaty's entry into force will strengthen not only our own national security but will also strengthen global security: we will all be safer with this Treaty than without it.

The Treaty is stronger with every new nation that adopts it, and I call on the remaining eight States that need to ratify the Treaty for it to enter into force to do so. I hope the Indonesian and Guatemalan examples of a change of direction in policy on the CTBT after 15 years will send a positive signal to them.

PROVIDING AN INDEPENDENT, MULTILATERAL VALIDATION OF ANY SUSPECT EVENT

At a technical level, preparations for entry into force also show great promise. The Treaty's verification system is close to completion. As of 1 March 2012, 270 of the 337 International Monitoring System (IMS) facilities were fully operational with 18 more stations having been installed. Without the ability of the IMS to give an independent, multilateral validation of any suspect event, the international community's response to any potential nuclear explosive test will be muted. The detection by the IMS of the sub-kiloton underground tests in the Democratic People's Republic of Korea (DPRK) shows the clear progress that has been made in refining this system and its importance in the enforcement of any regime. The Treaty's on-site inspection capability has taken great strides too. The successful integrated field exercise in Kazakhstan in 2008 was a significant milestone in progress towards an on-site inspection capability. I hope that the next such exercise in 2014 will show that we have moved even further forward in the last six years and the UK is providing practical support for this exercise. It is our fervent hope that it will represent a further major milestone for the Treaty.

The technical capabilities of the regime have improved beyond recognition from the days when the Treaty was negotiated in the mid-1990s. There should now be no doubt that the Treaty's verification regime is fit for purpose. Our understanding of the interaction of seismic, hydroacoustic, radionuclide and infrasound IMS stations, alongside the other means of verification at the international community's disposal, has continued to make good progress. These developments continue to build towards an on-site inspection capability, which alongside the detection of the DPRK tests, will both ensure that the case for the Treaty will be proven conclusively.

KEEPING ABREAST OF SCIENTIFIC AND TECHNICAL DEVELOPMENTS

The CTBT verification regime therefore has developed to a point where it now presents a formidable challenge for any would-be Treaty violator. That does not mean, however, that it is infallible, which is why we should continue to support the role played by national technical means. Science and technology continue to develop at a rapid pace. We must ensure that we make the most of developments in computing or detection that will improve all aspects of the verification regime over the coming years and continue to raise our standards ever higher in a bid to give ourselves as comprehensive a tool kit as possible to support the Treaty. As the CTBT: Science and Technology Conference in Vienna noted last June, progress in sensors, networks and observational technologies as well as advances in computing and processing power offer benefits that will improve the efficacy of all components of the Treaty's verification regime.

The CTBT network performed impressively in the aftermath of the devastating tragedy that affected Japan a year ago and was a strong demonstration of the network's ability to detect and identify the fallout from nuclear incidents. As the network grows its capability around the world, there will be nowhere that a nuclear test explosion can take place without detection. This can strengthen our own national security and the security of the world.

BIOGRAPHICAL NOTE

WILLIAM HAGUE
was appointed British Foreign Secretary in May 2010. He was first elected to Parliament in 1989 and held several posts in government in the 1990s, including Minister of State for Social Security and Disabled People from 1994 to 1995 and Secretary of State for Wales in 1995. In 1997 Hague was elected Leader of the Conservative party and remained in that position until 2001. From 2005 to 2010 he served as Shadow Foreign Secretary and Senior Member of the Shadow Cabinet.

[1] *The Indonesian Parliament ratified the CTBT on 6 December 2011. The ratification process was completed on 6 February 2012 when Indonesian Minister of Foreign Affairs Marty Natalegawa deposited the instrument of ratification of the CTBT with the UN Secretary-General in New York. Indonesia is one of the Annex 2 States that must ratify the CTBT before it can enter into force.*

Leading by example

Indonesia's ratification of the CTBT creates momentum for remaining countries to ratify

by **MARTY M. NATALEGAWA**
Minister for Foreign Affairs of the Republic of Indonesia

On 6 December 2011, the Indonesian Parliament took a significant step towards the global prohibition of nuclear test explosions by ratifying the Comprehensive Nuclear-Test-Ban Treaty (CTBT)[1]. By doing so, Indonesia increased the number of States that have ratified the Treaty to 156. With eight more ratifications from Annex 2 countries, the Treaty will come into force. Like Indonesia, these remaining eight are significant technology holders and thus their ratifications are mandatory for the Treaty to enter into force — as was the case for Indonesia. We have therefore made a strong declaration of commitment to a world without nuclear weapons. We have also made a timely contribution to the fortunes of the Treaty.

The timing of this move could not be more propitious. It came right after Indonesia, as Chair of the Association of Southeast Asian Nations (ASEAN), successfully facilitated the conclusion of negotiations between ASEAN and nuclear weapon States (NWS) to enable the NWS to accede to the Protocol of the Southeast Asia Nuclear Weapon Free Zone (SEANWFZ) Treaty.

[1] *The ratification process was completed on 6 February 2012.*

INSPIRING OTHER COUNTRIES TO FOLLOW SUIT

This is no less than a double breakthrough for Indonesia and ASEAN. Aside from benefiting the entire Asian region, these two developments will create positive momentum that could push the remaining Annex 2 countries to start their ratification process and help promote the universalization of the Treaty. Indeed, Indonesia's support for the Treaty and the vision of a world free from nuclear weapons is not something new. Indonesia affixed its name to the Treaty on the very day it was opened for signature: 24 September 1996. From then on, we have given it consistent support, because we regard it as a crucial stepping stone for achieving nuclear disarmament and non-proliferation.

A number of principles lie behind our firm commitment to the Treaty. First, the national mandate laid down by the 1945 Indonesian Constitution to help maintain peace and justice throughout the world. Second, because the Treaty is non-discriminatory and inclusive: under its provisions, all States – whether they have nuclear arsenals or not –must play by the same rules.

LATEST TECHNOLOGY TO MONITOR THE GLOBE

And third, because it is indeed doable: The technology is already in place to police nuclear explosions all around the world. This is made possible through an open-source International Monitoring System encompassing the entire planet, with its detectors dispersed from the poles to the tropics, whose data is owned by the 182 States that have so far signed the Treaty. Thus the Treaty represents the marriage of robust science to an inclusive and democratic international legal instrument.

We are also proud that our ratification crowned an initiative carried out in the context of our own vibrant and dynamic democracy, through which the Government has partnered closely with the legislature, civil society and other stakeholders, including the media. For only through a democratic approach, involving intensive deliberations with the participation of all stakeholders,

6 DECEMBER 2011: *Indonesian Members of Parliament sing the national anthem before the session when the CTBT was ratified.*

»The Treaty is non-discriminatory and inclusive.«

can a Treaty like this gain the strong sense of ownership at home.

It is true that in the past we deferred the process of its ratification. At that time, it was a matter of principle. We reiterated that States that possessed nuclear weapons should, after all, first and foremost commit to the Treaty ahead of anyone else. That position of principle has served its purpose. Our standing has contributed to the global effort to push for the NWS to commit themselves to the Treaty. Recent events show a glimmer of hope, a gleam of possibility that the cause of disarmament can move forward much more expeditiously. Thus, from today's vantage point, we in Indonesia believe we can help brighten that possibility by ratifying the Treaty. As I announced at the opening of the 2010 Nuclear Non-Proliferation Treaty Review Conference, Indonesia had decided that it was not in our interests to wait any longer. Indeed, the time to act had come.

INVESTING IN GLOBAL SECURITY

We heard familiar arguments against ratifying the Treaty, but they became too narrow to prevail. By embracing the Treaty, States lose none of their powers. On the contrary, they make a solid investment in global security insurance, a multilateral undertaking to rid planet Earth of nuclear weapons.

It must also be stressed that of 337 monitors employing four different technologies that the Treaty will rely on for verification once it is in force, 270 are already in place. And they are already functioning as a result of an investment of more than a billion dollars by the Treaty's signatories.

On Indonesia's part, we are contributing six certified seismic stations to the system, whose scientific capabilities offer a broad range of additional benefits to human security, including early warnings on tsunamis, new revelations about the behaviour of the Earth's crust and enhanced monitoring of volcanic eruptions. But the core benefit from the Treaty is, of course, the advancement of the cause of global disarmament. For as long as nations continue to invest their security in nuclear arsenals, the high risk of their use remains.

ERADICATING NUCLEAR WEAPONS

This is not a new concern for Indonesia. We have been dedicated to ridding the planet of nuclear weapons since shortly after their first use 65 years ago. Indonesia, one of the founders in 1961 of the Non-Aligned Movement (NAM), has been serving as coordinator of the Movement's disarmament working-group for almost two decades. As such we have been spearheading global multilateral disarmament efforts throughout the world. Indonesia was among the 10 ASEAN Member States that in 1995 concluded the SEANWFZ, the most ambitious nuclear-weapon-free zone in terms of its area of application.

Thus, by ratifying the CTBT, we have reiterated our commitment to nuclear non-proliferation and disarmament, to promoting this noble cause in the region and beyond, and to ensuring that these goals are fulfilled. This is the first of many steps that we will take to work for the universalization and enforcement of the Treaty. Inevitably, the tide of history is turning in favour of nuclear disarmament. And as the international community moves closer to the enforcement of the CTBT, humankind also moves away from the perils of the age of nuclear weapons toward a future of more durable security and peace.

BIOGRAPHICAL NOTE

MARTY M. NATALEGAWA was appointed Foreign Minister of Indonesia in 2009. Prior to this, he served as the Permanent Representative of Indonesia to the UN in New York from 2007 to 2009 and as the Ambassador of Indonesia to the United Kingdom and Ireland from 2005 to 2007.

From 2002 to 2005, Dr Natalegawa consecutively served as the Chief of Staff of the Office of the Minister for Foreign Affairs and as the Deputy Minister for ASEAN Cooperation in the Ministry of Foreign Affairs.

New approaches to security

Investing in a safer world free of nuclear weapons

by **AHMET DAVUTOĞLU,**
Minister of Foreign Affairs of the Republic of Turkey

In the dramatically changed global security environment of the 21st Century, the risks, challenges and threats faced by humanity are more multifaceted than ever. They also recognize no boundaries and therefore call for multilateral approaches in countering them. A shared commitment to embrace comprehensive security has thus become key to sustainable peace, security, stability and development.

Contrary to the old thinking, in today's world one can no longer argue that more arms bring more security. Indeed, the notion of security cannot be confined to merely military terms. On the contrary, security under the shadow of arms is a dangerous delusion which can lead to more tension and instability. It is the social, cultural, political and economic factors that increasingly enter into play and ensure a reliable and lasting security environment.

In this context, creating conditions for a world without nuclear weapons and other weapons of mass destruction (WMD) is a major investment towards a safer world and undiminished security for all. For a better future, nations should rely on the reconciling effect of cooperation and dialogue among themselves rather than the deterrent impact of nuclear arms. Global peace and security can be achieved only through a sense of common vision and interdependence, not the balance of nuclear terror.

MAINTAINING THE NPT'S INTEGRITY AND CREDIBILITY

It is in this frame of mind that we can find the virtue of non-proliferation and disarmament. Despite its imperfections, the Nuclear Non-Proliferation Treaty (NPT) is the cornerstone of the global nuclear non-proliferation regime. At the core of this regime lies the grand bargain under which non-nuclear weapon States renounced the acquisition of nuclear weapons in exchange for nuclear disarmament and for the right to the peaceful use of nuclear energy. If we fail to keep this bargain, we sacrifice the integrity and credibility of the NPT regime, which requires a firm commitment to and equal treatment of all its three pillars, namely non-proliferation, disarmament and the peaceful use of nuclear energy. The NPT regime has suffered a number of setbacks in recent years. There are countries which still remain outside the Treaty.

In the past, we have witnessed cases of non-compliance with regard to non-proliferation obligations. One country has announced its withdrawal from the Treaty, conducted nuclear tests and declared the possession of nuclear weapons. The proliferation of WMD becomes all the more worrying in the context of terrorism. The Comprehensive Nuclear-Test-Ban Treaty (CTBT) is yet to enter into force. Despite the progress achieved in reductions of deployed strategic warheads and their delivery systems, the goal of complete disarmament is still a distant achievement.

Against this background, the pivotal Prague Speech of U.S. President Obama has ushered in a new era, one which will hopefully be defined as a

»CTBT ratification by all countries in the Middle East is key to our common non-proliferation efforts.«

turning point by future generations. The entry into force of the new START Treaty as well as the successful NPT Review Conference of 2010 gives us hope for the years to come. Admittedly, such momentum is not always easy to achieve. Therefore we must strive hard to maintain and make maximum best use of it.

Possible benchmarks for the sustainability of the NPT in the long run include universalization of the Treaty, strengthening of the International Atomic Energy Agency (IAEA) safeguards system, reinforcement of export controls and the early entry into force of the CTBT. An overall reduction of the global stockpiles of nuclear weapons in a transparent, irreversible and verifiable manner is also of key importance. Recognition of the importance of ensuring the peaceful use of nuclear energy in the best security, safety and non-proliferation conditions, and of the crucial role of the IAEA in this respect, is equally essential.

Another priority area is the establishment of effectively verifiable nuclear-weapon-free zones (NWFZ). Given the volatile and unstable situation in the Middle East, developing a common regional understanding on the establishment of such a zone in this region is all the more important. The 2012 Conference to be organized in Helsinki to discuss this prospect will be an initial step in a long process, the success of which will depend on the genuine political engagement of all States in the Middle East from the very beginning.

A CONFIDENCE AND SECURITY BUILDING MEASURE

The ratification of the CTBT by all countries in the Middle East as an effective confidence and security building measure is also key to our common non-proliferation efforts. This and the broader linkage between the CTBT and NWFZ was indeed the particular focus of a cross-regional workshop on the role of the CTBT in regional and global security, jointly organized with the CTBTO under my patronage in Istanbul last November.

Apart from an active cooperation with the CTBTO at the technical level, including through its International Monitoring System, Turkey is also politically engaged in raising broad awareness about the objectives of the Treaty and encouraging its ratification. We pursue these efforts with steadfast commitment not least through the Non-Proliferation and Disarmament Initiative (NPDI), jointly established by 10 countries from different parts of the world to take forward the outcomes of the 2010 NPT Review Conference. The upcoming Ministerial Meeting of the NPDI which I will host in Istanbul just before the NPT Review Conference will allow the opportunity for a timely exchange on possible ways forward.

Of course, Turkey is not alone in its quest for the entry into force of the CTBT. Today the Treaty enjoys worldwide support and commitment to its objective of a verified, permanent, global ban on all types of nuclear explosive tests. Following the recent ratification by Indonesia, we need only eight more Annex 2 countries' ratification for the entry into force of the Treaty. The international community has spent enough time waiting. Now we need to make progress particularly on two fronts, and do so simultaneously and rapidly. One is by making the CTBT universal; the other is having the remaining eight Annex 2 countries ratify the Treaty. Moratoria are certainly important confidence-building instruments. Yet, in an issue like nuclear testing, legally binding treaties are indispensable.

When it comes to ratifying the CTBT, one bold step will lead to another which in turn will create leaps.

FINDING LASTING SOLUTIONS TO NUCLEAR CHALLENGES

Hence, 2012 will be a decisive year in the non-proliferation and disarmament fora. Undoubtedly, we have significant, complex and mostly intertwined challenges. Nevertheless, it is incumbent upon us to transform these challenges into opportunities. This is a must to achieve lasting stability, welfare and peace. To this end, political will and determination are extremely important. We ought to mobilize our efforts and resources, establish efficient cooperation and act with staunch determination. As to individual cases of proliferation concern, we should keep in mind that only negotiated, cooperative solutions can provide lasting solutions.

A fruitful NPT Review Conference, a constructive Middle East Conference, the end of stalemate at the Conference on Disarmament and last but not the least, further positive developments at the CTBT front, will bring us closer to our objective of a world free of nuclear weapons and thus make the world a safer place to live. In 2012, we have an important opportunity to make progress on all these fronts. Let us not miss this chance and dodge the hopes of future generations. Turkey is fully committed to take an active part in this honourable journey.

BIOGRAPHICAL NOTE

AHMET DAVUTOĞLU
was appointed Minister of Foreign Affairs of Turkey in May 2009. Previously, he held key academic positions in Turkey and published various books and articles on foreign policy in Turkish and English. His publications were translated into several other languages. During his academic career, Professor Davutoğlu also served as Assistant Professor at the International Islamic University of Malaysia where he established and chaired the Political Science Department until 1993.

A need for united action for the early entry into force of the CTBT

An appeal from the country of Hiroshima, Nagasaki and Fukushima

by **YORIKO KAWAGUCHI**
Co-Chair of the International Commission on Nuclear Non-proliferation and Disarmament (ICNND), Member of House of Councillors of Japan

On behalf of the Japanese people and the International Commission on Nuclear Non-proliferation and Disarmament (ICNND), I have the honour to send a message to the readers of *Spectrum*. The importance of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) cannot be overemphasized. The CTBT, along with the International Atomic Energy Agency (IAEA) safeguards, is an indispensable pillar of the international nuclear non-proliferation and disarmament regime based on the Nuclear Non-Proliferation Treaty (NPT). Japan thus attaches the utmost importance to the early entry into force of the CTBT.

As the only nation to have suffered nuclear devastation as a result of the bombs detonated over Hiroshima and Nagasaki in August 1945, and as a country that suffered from a nuclear power plant accident last year, our expectations of the CTBT are higher than ever. Because of my strong belief in the CTBT, I have undertaken work for the early entry into force of the Treaty over the years in my various capacities, in particular as Foreign Minister of Japan from 2002 to 2004 as well as Co-Chair of the ICNND.

Firstly, ever since chairing the 1st Conference on Facilitating the Entry into Force of the CTBT in 1999, Japan has participated actively in all ensuing conferences. As Foreign Minister at the time, I participated in the 3rd Conference on Facilitating the Entry into Force of the CTBT in 2003 and the 1st and 2nd "Friends of the CTBT" Foreign Ministers Meetings in 2002 and 2004. In August 2003, cooperating with Foreign Ministers of Austria and Finland, I sent Joint Ministerial Letters to the States that had not yet signed or ratified the CTBT in order to facilitate the early entry into force of the Treaty.

LAYING OUT A ROAD MAP TO RID THE WORLD OF NUCLEAR WEAPONS

Secondly, the ICNND attaches high importance to the role of the CTBT. The establishment of the ICNND was

MARCH 2011:
Satellite image showing damage after the Tohoku Earthquake and tsunami at the Fukushima Daiichi nuclear power plant, Japan.
Credit: DigitalGlobe

»In the face of the tragic events, the CTBTO quickly provided the international community with accurate and objective information on the composition and dispersion of radionuclides worldwide.«

proposed in June 2008 by Australian Prime Minister Kevin Rudd and Japanese Prime Minister Yasuo Fukuda as a joint initiative of the Australian and Japanese Governments in order to lay out a road map for the elimination of nuclear weapons. All the Commissioners, including former Australian Foreign Minister Gareth Evans and myself as Co-Chairs, fully shared this recognition, and the Commission thus recommended in its 2009 report entitled "Eliminating Nuclear Threats: A Practical Agenda for Global Policymakers", as follows:

"All states that have not already done so should sign and ratify the CTBT unconditionally and without delay. Pending entry into force, all states should continue to refrain from nuclear testing. All signatories should provide the necessary financial, technical and political support for the continued development and operation of the [Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization] CTBTO, including completing the global coverage of its monitoring systems, facilitating on-site inspection when warranted, and establishing effective national data centres and information gathering systems."

BRINGING THE CTBT INTO FORCE

Thirdly, recognizing that it is imperative to follow up and not to let such an important report be put on the shelf, we launched a new Asia Pacific Leadership Network for Nuclear Non-Proliferation and Disarmament (APLN) in May 2011. I am thankful to my co-chair Gareth Evans for the efforts he put in to create this.

The APLN is comprised of 30 former senior political, diplomatic and military leaders from 13 countries of the Asian region, including the States possessing nuclear weapons such as China, India and Pakistan. It is designed to build upon the work of the ICNND. Members of the APLN met for the first inaugural meeting in Tokyo in November 2011. We signed a joint statement strongly supporting a nuclear-weapon-free world and calling on policymakers to "get serious" about nuclear non-proliferation and disarmament. One of the five distinct but interrelated sets of policy commitments is action on the critical building blocks for both non-proliferation and disarmament, including bringing the CTBT into force.

Fourthly, it is important to support other governments' initiatives. For example, Kazakhstan, which has suffered hundreds of nuclear tests by the Soviet Union, has become a strong driving force against nuclear testing. An important recent initiative was the International Forum for a Nuclear Weapons-Free World to commemorate the 20th anniversary of the closure of the Semipalatinsk nuclear test site, which took place in Astana, Kazakhstan, in October 2011. The Forum, in which I also participated, issued a declaration urging all nations to ratify the CTBT.

As shown above, all kinds of efforts and united action around the world are indispensable to build a world without nuclear weapons, which includes realizing the early entry into force of the CTBT. The work of the CTBTO is crucial in this regard. Let me take this opportunity to express my strong support for Ambassador Tóth and the rest of the CTBTO staff. Remember that the international community stands firmly behind you!

RESPONDING RAPIDLY TO THE FUKUSHIMA ACCIDENT

One year has passed since the Great East Japan Earthquake and the subsequent nuclear accident at the Fukushima Daiichi nuclear power plant. In the face of the tragic events, the CTBTO quickly provided the international community with accurate and objective information on the composition and dispersion of radionuclides worldwide, using its Atmospheric Transport Modelling (ATM) calculations, helping to establish that radioactivity around the world was below harmful levels. I heard of the tremendous amount of work carried out by CTBTO staff and highly appreciate it. We agreed to include this point in the Final Declaration of the 7th Conference on Facilitating the Entry into Force of the CTBT. The CTBT verification system is capable of bringing scientific and civil benefits, including for tsunami

warning systems and other disaster alert systems in addition to its primary function of detecting nuclear explosions. Today the world has plenty of natural disasters. Here is my message from the nation that has suffered a nuclear power plant accident in the 21st century: the countries which have not adhered to the Treaty should do so at the earliest time, taking particular note of the advantages of the International Monitoring System (IMS) data in the event of natural disasters.

JAPAN HELPS TO ENHANCE THE CTBTO'S ATM SYSTEM

I have learned that the Government of Japan has decided to make a voluntary contribution of roughly US$ 737,000 for the enhancement of the ATM system. This amount covers approximately half of the total costs of one computer system and the enhancement of the data storage as estimated by the CTBTO. The ATM system needs to be enhanced since it provided objective CTBTO data during the Fukushima Daiichi nuclear power plant accident as mentioned above and helped to prevent further damages caused by rumours. Therefore, Japan decided to lead the project concerning the enhancement of the ATM system and to bear approximately half of the total costs. Further voluntary contributions by other countries would be highly appreciated to realize this project.

Finally, I wholeheartedly welcome the decision by the parliament of the Indonesia to approve ratification of the Treaty on 6 December 2011. As a fellow parliamentarian, I definitely put this at the top of my list of 2011's disarmament and non-proliferation news. Japan has continuously reiterated the importance of the Treaty to the Indonesian government and parliamentary officials in addition to promoting the CTBT at high-level bilateral talks. I also heard that the mayors of the cities of Hiroshima and Nagasaki and the international organization Mayors for Peace[1] sent timely letters addressed to the Chairman of the First Commission of the House of the Representatives of Indonesia in November 2011 to encourage the country's ratification. I strongly hope that other countries, inspired by Indonesia's positive move[2], will follow suit.

I would like to urge the international community to continue its hard work and take united action so that the Treaty can enter into force as soon as possible. Amongst various groups of countries supporting disarmament and non-proliferation, such as the Non-Aligned Movement (NAM) and the New Agenda Coalition (NAC), I have high expectations for the activities of the 10 non-nuclear weapon States[3] of the Non-Proliferation and Disarmament Initiative (NPDI). The NPDI was jointly launched by Australia and Japan in September 2010 as a new action-oriented and cross-regional group. One of the priorities of the NPDI is also the early entry into force of the CTBT. I sincerely hope that the international community, including civil society, unites behind the Treaty and that the year 2012 will bring us more good news for the future of the CTBT.

1 *Mayors for Peace was instigated by the mayors of Hiroshima and Nagasaki in 1982 as a call for worldwide solidarity in an initiative to ban nuclear weapons. Over 5,000 cities from 153 countries and regions had joined the organization by March 2012.*

2 *The ratification process was completed in February 2012.*

3 *Australia, Canada, Chile, Germany, Japan, Mexico, the Netherlands, Poland, Turkey and the United Arab Emirates.*

BIOGRAPHICAL NOTE

YORIKO KAWAGUCHI
has been a Member of the House of Councillors for the Liberal Democratic Party since 2005. She was Co-Chair of the International Commission on Nuclear Non-Proliferation and Disarmament from 2008 to 2010; Special Adviser to the Prime Minister of Japan, responsible for foreign affairs from 2004 to 2005; Minister for Foreign Affairs from 2002 to 2004, and Minister for the Environment from 2000 to 2002.

Previous positions included Managing Director of Suntory Ltd, Director General of Global Environmental Affairs at the Ministry of International Trade and Industry, and Minister at the Embassy of Japan to the United States.

15 YEARS

15 years of the CTBTO

1997
CTBTO begins work in Vienna

With Wolfgang Hoffmann as its Executive Secretary and just a handful of staff, the CTBTO started its operations on the seventh floor of the Vienna International Centre on 17 March 1997.

Even though the Treaty negotiations had been long and complex, the period between the Treaty's opening for signature on 24 September 1996, the establishment of the CTBTO on 19 November 1996, and the date the organization started its operations comprised a bare six months.

1998
Nuclear tests by India and Pakistan

Photo: UN Photo – Evan Schneider

Two weeks after India conducted two sets of nuclear tests, Pakistan responded by exploding two sets of its own underground nuclear devices on 28 May 1998. The tests sparked international condemnation and resulted in the universal adoption of United Nations Security Council Resolution 1172.

Although the CTBTO was still in its infancy, it was already receiving data from its first seismic stations. It was therefore able to provide Member States with estimates of the time, location and magnitude of the events.

1999
U. S. Senate rejects CTBT ratification

Speaking on CNN after the Senate failed to ratify the CTBT on 13 October, U.S. Secretary of State Madeleine Albright said: "What we've lost for the time being is the real international leadership in terms of trying to make others live up to the CTBT."

2000

First hydro-acoustic station certified

On 18 December, the first IMS hydroacoustic station was certified. HA08 is located on the island of Diego Garcia in the British Indian Ocean Territory (Chagos Archipelago).

IMS hydroacoustic stations monitor the oceans for evidence of a nuclear explosion. Installation of the stations is a highly specialized and costly operation, involving numerous technical and logistical challenges.

When complete, the network will comprise 11 stations. Few stations are required because of the efficient transmission of sound through water, meaning that even comparatively small signals are readily detectable at very long distances.

2001

First radio-nuclide laboratory certified

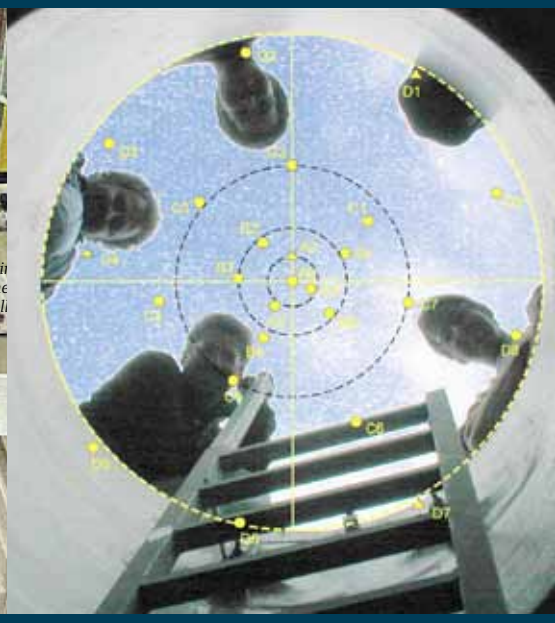
On 31 October, the world's first radionuclide laboratory designed to verify compliance with the CTBT was brought into service. RL03 is located just outside Vienna, Austria.

Radionuclide stations detect radionuclide particles and noble gases like xenon. Specific radionuclides such as xenon can help provide evidence of a nuclear explosion.

When complete, the network will include 16 laboratories.

2002

Almost 50 IMS stations now fully operational



Primary seismic station PS19 in Freyung, Germany, (see photo above) was one of 11 seismic stations to be certified in 2002. The yellow markings in the picture indicate the array element configuration.

Seismic stations monitor the Earth for underground nuclear explosions. Primary seismic stations relay data continuously in real time to the International Data Centre in Vienna. Auxiliary seismic stations provide information only upon request.

When complete, the seismic network will comprise 50 primary stations and 120 auxiliary stations around the globe.

15 YEARS

15 years of the CTBTO

2003
CTBT reaches 100 ratifications

Mauritania's ratification on 30 April 2003 increased the number of ratifications to 100. The photo shows radionuclide station RN43 in the distance during a sand storm at Nouakchott, Mauritania.

A number of other countries signed or ratified the CTBT in 2003: Côte d'Ivoire, Gambia, Albania, Kuwait, Oman, Algeria, Cyprus, Palau, Afghanistan, Kyrgyzstan, Honduras and Eritrea.

2004
100 IMS stations now fully operational

When infrasound station IS36 on New Zealand's Chatham Island was certified on 24 November, it became the 100th IMS station to become fully operational.

When complete, a network of 60 infrasound stations will monitor the Earth for atmospheric nuclear explosions. The construction of infrasound stations around the globe since 1997 has contributed to a revival of scientific interest in this technology.

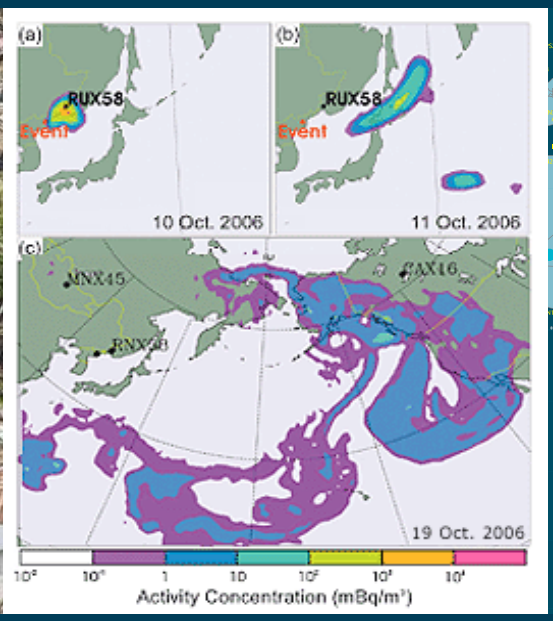
2005
Use of CTBT data for tsunami warning purposes

After the massive tsunami caused by an earthquake off the coast of Sumatra, Indonesia, on 26 December, claimed the lives of over 230,000 people, the CTBTO's Member States allowed the use of CTBT verification data for disaster mitigation purposes for the first time.

As of 1 March 2012 Australia, France, Indonesia, Japan, the Philippines, Thailand, Turkey and the United States had signed agreements with the CTBTO to receive tsunami warning data.

2006

1st nuclear test by North Korea

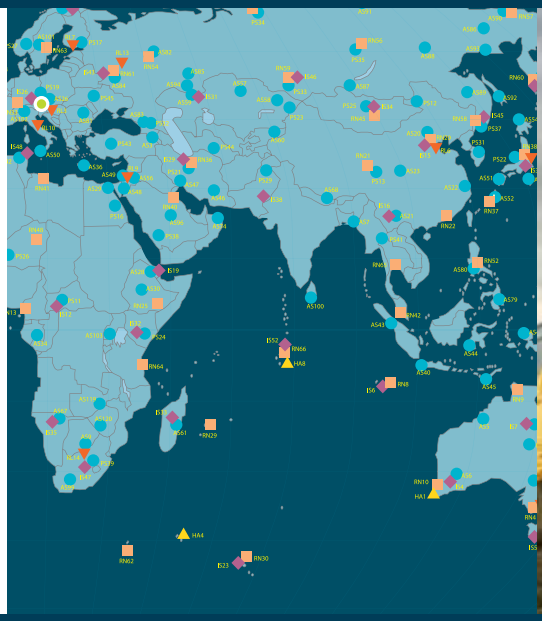


On 9 October, North Korea announced that it had conducted a nuclear test. Over 20 IMS stations detected the event. Less than two hours later, Member States received information on the time, location and magnitude of the event. Two weeks later, IMS radionuclide station RN16 at Yellowknife, Canada, registered a high concentration of the radionuclide xenon 133. Using Atmospheric Transport Modelling calculations, scientists at the CTBTO could link the detection of xenon 133 at RN16 to the site of the explosion in North Korea, providing "smoking gun" evidence of a nuclear test.

On 25 May 2009, North Korea conducted a second nuclear test. CTBTO Member States received the first automatic analysis of the event even before North Korea had announced the test. With the IMS network having expanded since 2006, 61 stations detected the event. The UN Security Council unanimously condemned both tests.

2007

Over 200 facilities now fully operational



IMS status as of 31 December 2007

IMS STATION TYPE	FULLY OPERATIONAL	INSTALLED BUT NOT CERTIFIED	UNDER CONSTRUCTION	TOTAL NUMBER OF FACILITIES FORESEEN IN THE TREATY
PRIMARY SEISMIC	37	5	3	50
AUXILIARY SEISMIC	78	21	8	120
HYDROACOUSTIC	10	1	0	11
INFRASOUND	39	0	7	60
RADIONUCLIDE	50	8	8	80
RADIONUCLIDE LABORATORIES	10			16
*TOTAL	**224**	**35**	**26**	**337**

* Contracts for another 9 stations were under negotiation while 43 had not started.

2008

CTBTO simulates huge on-site inspection exercise in Kazakhstan

over a four-week period, the CTBTO simulated its first entire on-site inspection (OSI), allowing it to assess the readiness of the OSI regime. The inspection area was located in a remote corner of Semipalatinsk – the Soviet Union's nuclear test site – ensuring that equipment was tested under realistic conditions. Around 200 participants were involved and over 50 tonnes of equipment were shipped to the site.

15 YEARS

15 years of the CTBTO

2009

Hundreds of scientists flock to Vienna

Around 450 scientists from over 70 countries congregated at the Hofburg Palace in Vienna in June to assess the CTBT's capability and readiness to detect nuclear explosions anywhere on the planet. Participants at the International Scientific Studies conference also discussed how the CTBT's global alarm system could benefit from future scientific and technological developments.

A follow-up conference – the Science and Technology 2011 conference – took place in Vienna in June 2011. The next conference in the series will take place in June 2013.

2010

182 signatures and 153 ratifications

"I have called on numerous occasions for those States whose ratification is required for the Treaty's entry into force to act first without waiting for others to do so. We can no longer wait for the perfect international environment before taking advantage of existing – and potentially short-lived – opportunities. Be Courageous. Take the initiative. Be the first mover."
UN Secretary-General Ban Ki-moon, fifth Ministerial Meeting, UNHQ, New York, September 2010

By the end of the year, 182 countries had signed the CTBT and 153 had ratified.

2011

Fukushima-Daiichi Disaster

After the 11 March devastating tsunami caused serious damage to the Fukushima-Daiichi nuclear power plant in Japan, the CTBTO provided 120 Member States and 1,200 institutions as well as international organizations concerned with disaster mitigation with information about the composition and dispersal of radioactive materials stemming from the plant.

The CTBTO also became a reliable source of information to the media and general public worldwide on the radioactive dispersal.

2012

CTBTO celebrates its 15th anniversary

On 6 February 2012 Indonesian Foreign Minister Marty Natalegawa deposited his country's instrument of ratification of the CTBT with the UN Secretary-General Ban Ki-moon at the UNHQ in New York.

As one of the 44 Annex 2 countries that must ratify the CTBT before it can enter into force, Indonesia's ratification was very significant.

As of 1 March 2012, 182 countries had signed the CTBT and 157 had ratified it. Eight Annex 2 countries still need to ratify: China, the Democratic People's Republic of Korea, Egypt, India, Iran, Israel, Pakistan and the United States.

Swedish Foreign Minister Carl Bildt addressing participants attending the CTBTO's 15th anniversary event at the United Nations in Vienna on 17 February 2012. UN Secretary-General Ban Ki-moon and Austrian State Secretary for Foreign Affairs Wolfgang Waldner are seated in the front left hand row.

15 YEARS

From nine staff to a bustling organi-zation

A small group with a huge task

WOLFGANG HOFFMANN
First Executive Secretary of the CTBTO from 1996 to 2005

When we started building up the verification regime, I thought that the Treaty would enter into force pretty soon and that the monitoring system would be complete.

But this was not the case due to the CTBT's very complicated Article XIV. Every other treaty would have been in force long ago.

It is very impressive to see that 270 of the 337 monitoring facilities are now fully operational. It has been a strenuous effort that has taken 15 years but it was worth the wait. At the beginning, it was only the seismic system that really existed. Now there are four technologies working together. On-site inspections were slightly neglected initially because we thought it was more useful to work on the monitoring system first. But in the meantime, on-site inspections have caught up and I think that the experiments that have been conducted show that the organization is capable of carrying out an on-site inspection whenever necessary.
In terms of challenges, we were a very small group of people with a huge task.

Other organizations in the building were very helpful. From the start, the CTBTO was treated as an existing international organization. States provided both political support and technical assistance and the quota of financial payments was actually higher than in other international organizations.

There was also a palpable feeling of optimism and enthusiasm amongst the staff. The States realized early on that there was no point in giving us 'dead wood' personnel – we made that very clear to them. We had an excellent team who performed their tasks exceptionally well. Despite receiving less pay than their counterparts in other organizations, they often worked longer hours.

An interesting development has been the use of monitoring data for civil and scientific applications such as for tsunami warnings and tracking radiation dispersal. Everybody was shocked by the devastating tsunami that occurred in Indonesia on 26 December 2004. At that time, it would have taken us two hours to provide tsunami warning centres with data so that they could issue warnings, which was just too long. Now we've reduced the time to three minutes, which means you can really warn people and help save lives. We have also provided many developing countries hosting International Monitoring System facilities with scientific and technical knowledge when constructing stations there. Taken together, all of the applications offered by the data help promote both political and scientific acceptance of the Treaty. Scientists are also keen to cooperate with us and it means that we are always at the forefront of scientific and technological advances.

On a more personal level, one of my most memorable moments as Executive Secretary was when I visited three of the tests sites of the nuclear powers: the French test site at Moruroa in the southern Pacific Ocean, the Nevada test site in the United States and the Soviet Union's Novaya Zemlya test site. It gave me great satisfaction to see that there was no more testing at any of these sites and I had an overwhelming feeling that the CTBT was definitely working.
In conclusion, I'd just like to express my gratitude to all of the staff. Without them, none of this would have been possible.

DVD

WATCH ATTACHED DVD FOR ADDITIONAL INSIGHTS FROM CTBTO STAFF

A safer world

JOACHIM SCHULZE
First Chief of the Radionuclide Section of the International Monitoring System (IMS) Division from 1997 to 2002

What is the best thing that can happen in your professional life? The answer: becoming a member of a newly established organization.

There are no feuds; everybody works to get things done. Back in March 1997, there were just nine names in the CTBTO telephone directory. I was the only scientist at the time in charge of all the technical work. The first technical survey for a radionuclide station was to the Chatham Islands – a two hour flight from New Zealand. I saw the same aircraft model that brought us back from Chatham to New Zealand two days later as a museum piece on top of a roof at Vienna Airport.

The main challenge was establishing the worldwide verification system. After decades of researching relevant verification technologies and data analysis methods, the scientific experts finally agreed on an efficient system comprising seismological, hydroacoustic, infrasound and radionuclide monitoring. The next decision was how many stations each technology needed. Diplomats asked: "How much does it cost?" Scientists asked: "What do you want?" In principle the solutions were based on how far each station could "look" in order to detect a nuclear explosion of 1 kt TNT equivalent or more. Hydroacoustic monitoring had the simplest rule for the number of stations: the distance for detection is nearly unlimited because of the sound wave transportation via the SOFAR channel with its waveguide property[1]. That's why only four stations are needed for each of the big ocean basins – the Atlantic, Pacific and Indian oceans – in order to localize a source signal and one as a reserve station. We needed 11 stations (four times three minus one) since a station south of Africa could monitor both the Indian and Atlantic oceans.

A worldwide community of scientists had already been created during the CTBT negotiations which worked and still works very well together. The radionuclide community organized workshops hosted by its members in order to develop a system which fulfilled the highest quality standards and could function everywhere in the world. At the beginning some Member States had doubts about whether noble gas detection capability was a useful tool. However, the scientific community managed to convince them of the importance for CTBT verification.

The CTBT verification regime is now a well-established worldwide system for monitoring compliance with the Treaty. At the same time, it is a huge scientific experiment which continuously provides new opportunities for making the world safer through test ban monitoring and the use of its data for tsunami warning, volcanic eruption detection and forecasting and tracking radionuclide clouds. The cost of the whole system up to now was about US$ 1.5 billion. Compared to the research and development budget for big countries or the cost of military equipment, it is peanuts. But it has a huge potential to make the world safer.

[1] *The SOFAR channel (short for Sound Frequency and Ranging channel), is a horizontal layer of water in the ocean at which depth the speed of sound is at its minimum. The SOFAR channel acts as a wave guide for sound, and low frequency sound waves within the channel may travel thousands of miles before dissipating.*

Shaping History

ALEXANDER VOROBIEV
Chief of Conference Services from 1997 to 2006

I was with the Russian Delegation at the Conference on Disarmament (CD) in Geneva from the time an agreement was reached in 1993 on a mandate to negotiate the CTBT until the conclusion of the negotiations.

I was mostly dealing with the legal and institutional issues. While the history of the negotiations at the CD is well documented, it would also be interesting at some point to see a record, unless it already exists in *WikiLeaks*, of the parallel consultations in Geneva between the five permanent members of the Security Council, where many of the provisions of the Treaty originated. Apart from the plenary meetings of the "P-5" delegations, we had smaller groups and I was meeting with the legal advisors.

In 1996, I was one of five diplomats appointed by the CD to negotiate a Host Country Agreement with the Austrian Government for the seat of the organization. We made a site-visit to Vienna in July that year to gather information about the proposed facilities. The negotiations posed a big challenge as there were many unknowns, including the future number of staff and equipment requirements.

One of the most complicated issues was to make provisions for the International Data Centre (IDC). We were offered an option to house it in the basement of the C-building. However, I

believe we made the right decision to keep the whole secretariat in one place. We were also able to secure a generous offer from the Austrian authorities to cover a big portion of the costs for special installations on the IDC floors, such as cabling and air-conditioning.

My contract with the CTBTO started on 1 April 1997 and I remember receiving it from the first Executive Secretary Wolfgang Hoffmann in the Palais des Nations (the United Nations Office in Geneva). On arrival in Vienna, I found that I had an office with a telephone but no PC and no staff.

One of the many challenges in the early days which I remember vividly was the first Article XIV Conference in 1999. The CTBT provisions are very brief about the format of the conference. The Member States and the CTBTO had to develop the rules of procedures, one of the most debated issues being the role of the signatories vis-à-vis the ratifiers, decide on the financing arrangements, etc. Leading up to the conference, consultations on the declaration were taking place on a daily basis. The conference itself had a dramatic twist as it coincided with the debate on the CTBT in the U.S. Senate, when the Treaty was rejected.

The CTBTO faced many difficulties in the early days but we also shared a feeling of being part of a process that was shaping history. Dear CTBTO colleagues, "May the Force be with you".

Unrivalled enthusiasm

ANITA BRAND-REITTER
General Services Clerk

When I started working for the General Services Section in May 1997, the CTBTO was not even two months old. We only occupied the seventh floor and the offices were furnished with old desks that other organizations in the Vienna International Centre didn't use any more.

There were neither procedures nor filing systems but there was great enthusiasm. The other organizations in the building were very helpful. The United Nations Industrial Development Organization assisted with the issuance of visas for duty travel, and the United Nations Office at Vienna moved our newly recruited staff members to Vienna. Our first Director of Administration organized a training day for me at the International Atomic Energy Agency's Travel and Transportation Unit to learn everything about the removal of household goods, customs declarations, legitimation cards etc. Then it was up to me to perform those tasks at the CTBTO. It was a very exciting time and there was a sense of togetherness I've never experienced before. Everybody worked together to get things done.

I'm also responsible for the shipment of equipment to install/maintain stations as well as shipping equipment for on-site inspection (OSI) exercises. The biggest challenge was to transport around 50 tons of equipment consisting of the obvious monitoring and measuring equipment as well as tents, sleeping bags, kitchen equipment etc. for a huge OSI exercise in Semipalatinsk, Kazakhstan.

In my position I have the privilege of meeting every new staff member who comes on board. It's great to see how excited and motivated everybody is. But nothing can beat the enthusiasm and spirit we had in the early days.

Planning ahead

FRANCES BOYLE
Director of Administration

I remember back in 1997 when I first joined the CTBTO as the Senior Budget and Planning Officer, my colleagues and I spent many hours working on the organization's first attempt to create a long-term plan.

At that time, everyone thought the Treaty would be signed and ratified within three years, so it was important and timely to consider where the organization would be in five years time.

One day, Peter Basham (see page 26), came into the office waving a napkin and exclaiming 'I did it, I did it, I know what the future looks like!'" On the napkin was a graph depicting the cost of the verification system ramping up over the next five years. One line showed the costs of building the stations going down over time and another showed the costs of post-certification activities going up. Although the presentation was unorthodox, the portrayal of how the programmes would develop over time proved to be surprisingly accurate and set the stage for future planning cycles.

As one of the first staff members to join the organization, I was inspired

by the fact the CTBTO was brand new and offered unique opportunities to build an international organization designed for the 21st century. It was probably the most important period of my professional career, definitely the most exciting and interesting. We had the opportunity to start from scratch, meet new colleagues, put our heads together as a team and develop an organization that would meet the Treaty's requirements.

After five years, I left the organization to return to the USA. But I came back in 2007 as a consultant. I was amazed at the transition and development the CTBTO had undergone: the IMS had progressed to the point of not just building but also sustaining stations, the IDC was operating smoothly and the OSI programme was rapidly becoming an important element of the verification regime. I was also impressed by the continued high quality of the staff.

I think people enjoy working here because it's a small organization and if they have any particular talents, they are usually recognized. That makes people feel good.

The right place at the right time

MARTA GALINDO ARRANZ
Maintenance Engineer

I see my arrival at the CTBTO as serendipity. In June 1997, when I was visiting Vienna on private business, I heard that the CTBTO was in urgent need of experts in the field of acoustics.

This just happened to be my academic background. In less than a week, I was part of the fledgling organization's hydroacoustic team. You study science, the propagation of sound, and suddenly you realize that this can be used for something that has a mission, something that has a goal for humanity. It made me feel very good, very proud.

Back then, the team's main task was identifying potential locations for IMS hydroacoustic stations. This involved a great deal of foreign travel to places like Crozet Island, Kerguelen in the French-Austral territories, Ascension Island, Socorro Island off Mexico's western coast, Cape Leewin in Western Australia, Corvo Island in the Azores Archipelago, Juan Fernandez Island off the coast of Chile . I have special memories from all of these places. For example, to get to Crozet, you need to go to Reunion and take a ship for five days. Then, when you arrive, the first thing you see is a huge colony of penguins, 50,000 pairs of King Penguins, waiting to greet you. It's an experience you will never forget.

Returning from that mission, our ship ran into a hurricane and the team and I had to wait for more than six hours in terrifyingly rough seas to get a satellite reading of our position in relation to the eye of the storm. It's a place where you do not want to be. Still, most of the memories are very good ones.

The time just went by so quickly. And when I look back and see all of our achievements, all the things that we've managed to do, I can just say WOW!

The early challenges

GERARDO SUÁREZ
First IMS Division Director from 1997 to 2006

Fifteen years ago, in the early days of August of 1997, the first group of senior managers of the IMS sat around a table on the seventh floor of the Vienna International Centre.

Most had never met before; only a handful had been technical experts during the negotiations. The endless rows of empty offices surrounding them were the most eloquent example of the formidable task they faced. The enthusiasm of the group, however, was contagious. The executive body of the organization had set out a budget and an ambitious work plan for the remaining months of that year. The programme, reflecting the optimism of those early days, included the installation of primary seismic and radionuclide stations in some countries that today have yet to sign the Treaty.

The first task at hand, however, was to recruit the technical experts needed for the installation of the IMS network. The early recruits of the IMS were leading members of their scientific communities worldwide. All came well equipped to deal with the complexities involved in installing delicate scientific

instruments in remote locations. In some technologies, however, the technical expertise had to be developed in collaboration with engineers and scientists from national institutions. Examples of this effort requiring the development of new instrumentation and analysis techniques were the infrasound and noble gas networks.

Technical issues were not the only obstacles to the deployment of the IMS network. The marching orders from the governing body were that the network had to be fully operational in three years. Reality was different: there were a number of complex diplomatic and legal issues to contend with, unforeseeable during the negotiations in Geneva. For example, the coordinates of the stations listed as an integral part of the Treaty are, in the majority of cases, incorrect. Lengthy legal discussions were needed to find a solution before deployment could proceed at full speed. The more difficult legal hurdle to the network deployment was the facility agreement. There were numerous intrinsic legal difficulties for many countries to enter rapidly into such an agreement. An exchange of diplomatic notes became the solution to temporarily circumvent this obstacle. Gradually, IMS stations were built and certified in the most adverse environments under enormous technical and cultural contrasts.

The monitoring network of the CTBT is now a reality. The Treaty now has a monitoring system that has demonstrated its technical prowess and capability to enforce a comprehensive ban of nuclear explosions. The challenge is now for the international community of nations to bring this long-sought Treaty into force.

Rising to the challenge

PETER BASHAM

First Coordinator of the IMS Division from 1997 to 2003

I felt very fortunate getting the position as IMS Coordinator in 1997. After studying seismology in university, I spent most of my early career doing research on the detection and identification of underground nuclear explosions.

I was also the Canadian technical delegate to the Group of Scientific Experts in the Conference on Disarmament in Geneva from 1976 to 1994 that developed the concept for the IMS, and the Canadian technical representative to the negotiations of the Treaty from 1994 to 1996. So I was very fortunate to have a chance to actually help implement the verification system that I had been working on for so long.

Doing so would turn out to be a very challenging affair. It has often been said that it must be a challenge to install and operate 337 monitoring facilities around the globe, with all of the technical, logistical and political problems that can be encountered. You simply don't realize how many of those there are until you begin. But we had an excellent staff in those early years of the IMS Division that got this difficult task off to a very promising start.

Not all of the problems were in the field. The IMS Division had an annual budget of about US$ 40 million, most of which was capital money for the building of the IMS networks. It was relatively easy to plan how to spend that money building stations; to actually spend it was another matter, because of the numerous administrative and logistical problems. In the early years, the organization's executive body could not understand why we had so much money left over at the end of the fiscal year, and therefore suggested that that money should lapse and refused to give us the requested amount the following year. We finally convinced them of the reasons for this under-expenditure and they agreed to carry the excess capital money into the next fiscal year.

In the early stages the executive body was not keen on the use of IMS data for purposes other than monitoring the CTBT. I, assisted by Peter Marshall (a British seismologist and nuclear expert), chaired the first meeting of IMS experts to describe the potential civil and scientific benefits of the verification technologies. This is now widely accepted by the CTBT community, and the tracking of radioactive releases from the Japanese nuclear power station damaged by the 2011 earthquake and tsunami is just the most recent example of these benefits.

Lack of space does not allow me to expand on the stimulating experiences that I had during my time in the CTBTO. Let me close by giving the current staff at the CTBTO my very best wishes for a successful completion of this difficult task.

Starting from scratch

EDWIN DINDI

Evaluation Officer from 1997 to 2009

I arrived in Vienna at the beginning of December 1997 when everything was starting from scratch. One of the most memorable events was how the organization's logo was decided on.

A number of staff were asked to brainstorm on what it should look like so that the general public would realize immediately that the CTBTO represents peace. We identified words like 'Earth', 'protection', 'eye', 'watching over the Earth' and 'peace'. So in the logo, the retina of the eye also represents the earth and the two curved half crescents symbolize protection around the Earth.

I also remember that the different divisions were operating like totally separate entities at the beginning. This was somewhat understandable because at this stage there were hardly any overlaps between the tasks of the divisions, especially the verification ones.

The IDC Division was busy configuring computers in readiness for receiving software and documentation from the Prototype International Data Centre (PIDC)[1] in the United States for the initial testing phase. The IMS Division was busy signing facility agreements to enable the building or upgrading of stations in various countries. And the OSI Division was busy working on its initial documentation that included operational manuals and developing materials to train the first-ever batch of inspectors. So at this stage, it was only the Administration Division and the International Cooperation section that were interacting fully with everyone and Member States were a bit concerned about this.

But as time went by and the IDC staff were happy with the software and documentation, they needed data from the IMS stations so they had to begin talking to IMS. Similarly, IMS stations were getting ready for certification and for this process to continue, data quality needed to have been tested and certified by the IDC. At about this time, the OSI began organizing field exercises for which they needed expertise from the IMS and IDC. So it had become clear that the divisions needed each other.

As a former staff member from the Evaluation Section, I can say that Evaluation also had its teething problems. First and foremost, staff were skeptical and suspicious about my Section's function. There was even some fear that we were evaluating staff performance, which was completely outside the mandate of the section. However, as the Evaluation Section began holding workshops and explaining what it was mandated to do, i.e. "to provide ongoing evaluation of processes, procedures and products and for the development, implementation and maintenance of the quality assurance measures" the misconception of the Section's function changed for the better. Thus, it also took time for the relevance and impact of evaluation and quality as inbuilt components of the verification regime to be appreciated.

1 The PIDC was located in Arlington, Virginia, USA, and developed the initial software for the processing of seismic and hydroacoustic monitoring data.

A family affair

MARIZEL ROJAS
Administrative Assistant

It's the strong sense of community that makes working at the CTBTO so special. It's more than team spirit, it's more like being in a family, in which there is a special bond because the work is for a good cause.

One date that is permanently engraved in my memory is 9/11, 2001. When it happened, word spread and it felt like we were all under attack – in shock, mourning and grieving. That day, I had the feeling of being part of one big family.

The same feeling of being part of one big family was prevalent when I gave birth to my daughter Sarah in 2002, with so many people congratulating me and sharing my happiness.

Kangaroos and frozen feet

ASHRAF ABUSHADY
Field Information Management and Communications Officer

Being chased by a kangaroo is one of my many memories since I started working for the OSI Division. We were on an exercise in the Bungonia region of Australia and the kangaroos liked to chew on our cables. I tried to stop them and made the mistake of getting too close!

I first joined the organization as a consultant in 1998. Since then, I've been on every single OSI exercise and have visited more than 40 countries on six continents. Some of the situations were tough, especially an exercise in the Semipalatinsk former nuclear test site in Kazakhstan when temperatures unexpectedly plunged to below zero. I remember waking up in my tent each morning to find my camp bed standing on ice, caused by freezing condensation. But the experiences have added to the satisfaction I get from my work. It's good to know that you can function and get your job done properly, whatever the conditions. I grew up a lot professionally inside this organization. I've also seen impressive developments in the field of communications, which have impacted on OSI.

The first exercise we had was in Kazakhstan and I remember that all we had for communications were two walkie-talkies that wouldn't work more than 300 metres apart. By comparison, when we did

15 YEARS

an exercise in Jordan a couple of years ago, we had about a ton of equipment with us that allowed us to communicate freely in any location in the world. We're one of the most technically-able organizations within the whole UN family. We have the latest equipment, the best technology and, now, vast experience built by experts from all around the world, working together. I think we are growing up very nicely.

Tangible progress

PORNSRI POLPHONG
Radionuclide Lead Analyst from 1999 to 2010

During a symposium at the Vienna International Centre in 1998, some CTBTO colleagues suggested that I apply for a position at the IDC.

The idea of working abroad had never crossed my mind. However, as I was a point of contact between the Office of Atomic Energy for Peace, Thailand, and the CTBTO, I was aware of the challenging task facing this young organization. I applied to the CTBTO and fortunately, after a six-month training course with the IDC at the Prototype International Data Centre in the United States, I was appointed as the first radionuclide Lead Analyst at the Radionuclide Monitoring Unit in March 1999. At that time all of the analysts shared an office on the sixth floor.

We each had our own cubicle but they were later removed for various reasons such as noise, ergonomic issues, etc. It was a great time to know and learn from individuals from different cultural and technological backgrounds. Most of the Radionuclide Unit's efforts were put into developing guidelines, testing data from the prototype stations, learning and testing the software, developing the support tools for data analysis, setting up the policies and procedures for the analysts to follow etc.

It was an exciting moment when the first radionuclide stations were certified in November 2000. Since then this number has increased: 61 radionuclide particulate stations out of 80 planned stations are now fully operational and eight of these stations also have noble gas systems that have been certified. I was the first and only Lead Analyst until June 2010 and am currently a consultant.

It has been a pleasure to be part of this fantastic team and to participate in the important work we do, especially when the IMS detected the nuclear tests by the Democratic People's Republic of Korea in October 2006 and in May 2009, and in 2011 when IMS radionuclide stations detected radioactivity from the nuclear accident at the Fukushima Daiichi nuclear power plant. The world's population has suffered enough from natural disasters.

With my long experience in this field, I am honoured to have the opportunity to support the peaceful use of nuclear technology, and I strongly support the campaign to closing the door on nuclear testing: more than enough tests have already been conducted.

Inspiring Identity

TODD VINCENT
Information Specialist

When I started working for the CTBTO's Public Information Section in 2000, it had a workforce of just five.

Today, some 15 people work there, equipped with all of the high-tech gadgetry necessary to raise media and public awareness of the CTBT. We've gone from a little garage, backyard kind of operation and evolved into a really quite impressive section. One of my most vivid memories was the development of a new corporate identity, including a revamp of the old logo. We were proud to launch the new corporate identity in 2002. It was a really important milestone in the history of the organization.

Over the years I've been involved in many Public Information (PI) projects and events. Some were large-scale and involved careful planning and execution, for example the 2008 launch of the CTBTO's public website. Others evolved quickly, exploding from a seed of an idea into a full-blown media event in a short space of time, with concomitant deadline-crunching and loss of sleep. Still, looking back, it's my involvement with the development of the new CTBTO corporate identity that gives me a lasting sense of satisfaction. Before then, CTBTO was a little-known entity, which is why it was decided to include the name alongside the logo. We were the new kids on the block back then. But today our logo is a presence that people who have worked with us over

the years immediately recognize from afar.

Over the last two years I've helped introduce an new element into PI. We've built up the audio-visual project from scratch and have published more than 70 clips on our YouTube channel. It's been rewarding to see that major networks have also broadcast our video material.

Working for a technically advanced organization, it's exciting to be part of a team that is investing in cutting edge developments in the communications field. For example, I've been involved in the development of the upcoming *CTBTO Spectrum* iPad App, which will bring our publication into the digital age and greatly increase the organization's exposure.

Reducing the gender gap

AWOBA MACHEINER
Information Assistant

When I joined in May 2002, Kazakhstan had just signed the Treaty and there was this buzz, this excitement, and I thought the Treaty would enter into force very soon.

Well, that was 10 years ago... of course there have been many changes, one of which is the fact that we have more women in senior managerial positions. For example, when I first joined the CTBTO there were no female directors and today two out of five directors are women.

Tales from the islands

ANDREW FORBES
Hydroacoustics Officer

One of my proudest moments at the CTBTO was the 2007 certification of the hydroacoustic station on Wake Island, an isolated volcanic atoll in the North Pacific Ocean.

It was the last hydroacoustic station to be completed, which meant that our contribution to the broader monitoring network was also complete.

It was also a hard-won victory as we'd suffered some serious challenges installing that station. We were once halfway there with the shore station when a typhoon came through and wiped out most of the island's infrastructure and delayed our programme by up to a year and a half. But with determination and good will, HA11 was finally installed and certified.

Another special memory concerns Robinson Crusoe Island in the Juan Fernandez archipelago, off the coast of Chile. The island is home to a hydroacoustic and an infrasound station. In February 2010, a massive tsunami swept over the island and the stations were destroyed. But the destruction of the stations was of small consequence compared to the damage and loss of life suffered on the island. In the emergency situation, with food, clothing and shelter in short supply, little thought was given to the children who had lost their toys and playthings. But, very quickly, staff at CTBTO headquarters responded. A collection in support of the children of Robinson Crusoe Island raised more than 1,000 Euros in less than a day.

That was a very heart-warming moment for me, because staff members joined together and tried to make a difference, not technically but from a human point of view. Local operator Marcelo Rossi took responsibility for obtaining new toys and playground equipment, and today, courtesy of CTBTO, the children enjoy swings and a trampoline set up in a sheltered spot. We also collected a number of Spanish books back in Vienna which we sent over for distribution.

Rebuilding the stations will take longer. The tsunami destroyed not only the land station but also vital underwater equipment. Weather conditions and the island's remote location mean that reconstruction work will take as long as two years.

I joined the CTBTO because it provided a chance to help build a more secure future for my children. And I still believe that. We make progress each year and we get closer and closer to completing the network. Once it's fully in place and operating 24/7, I think we will continue to make the world a safer place.

Effective communication in emergencies

The importance of inter-agency collaboration during the Japan disasters

by **MARGARET CHAN**
Director-General of the World Health Organization

One year has now passed since Japan suffered a nearly unimaginable triple catastrophe: an earthquake and a tsunami, followed by a nuclear disaster at the Fukushima Daiichi nuclear power plant, which caused the release of radioactive isotopes into the atmosphere on 11 March 2011.

We now know and can be thankful that although the accident at Fukushima was an industrial disaster, it was not a public health disaster with worldwide consequences. To date, no radiation injuries have been reported as a result of the accident. The limited nature of the event was a result of the resilience and resourcefulness of the Japanese people, in addition to the early response actions of many national and local agencies, working together.

This complex event demanded a multi-hazard, multi-agency collaborative response. A wide range of concerns quickly emerged: about radiation exposure, the safety of food and water, environmental consequences and the prospect of infectious diseases. People in Japan, surrounding Asian countries, Pacific Island countries, and eventually the entire global community needed advice quickly about those matters and many others, including urgent issues of daily living, such as evacuation, relocation, trade and travel, maternal health and breastfeeding, and mental health. Effective communication was necessary to inform decision-making, prevent risky actions, allay fears and promote healthy behaviour.

As the directing and coordinating authority on international health work within the United Nations system, the World Health Organization (WHO) is the lead agency for global public health issues. To carry out its work with maximum

Photo: Giovanni Verlini / IAEA

MAY 2011:
International Atomic Energy Agency (IAEA) inspectors visit the Fukushima nuclear power plant.

»These [CTBTO monitoring] data were absolutely essential for WHO's work. These data allowed us to properly assess the constantly changing situation and to tailor public health guidance accordingly.«

effectiveness, WHO is organized into a three-level, decentralized structure: its Headquarters are in Geneva, Switzerland, and there are six regional offices and 149 country offices. This decentralized structure, along with WHO's 194 Member States, constitutes a powerful tool for managing public health emergencies.

RESPONDING TO THE FUKUSHIMA DISASTER

Japan belongs to the WHO Western Pacific Regional Office (WPRO) in Manila, Philippines. Therefore, WPRO led WHO's response to the Fukushima disaster, assisted by WHO Headquarters and the WHO Centre for Health Development (WHO Kobe Centre), which was established after the Kobe earthquake in 1995. Situation reports, public health advice and technical support were provided to Member States and the international community through these offices.

Coordinated efforts were facilitated by the activation of a powerful legal instrument, the International Health Regulations (2005), which was negotiated by WHO Member States and came into force in 2007. The IHR is an internationally agreed framework for reporting,

assessing and responding to public health events of international concern. In the case of a radiation emergency (whether intentional, natural or accidental), the IHR reinforce capacities for monitoring public health risk. In the Fukushima event, the IHR mechanism was activated immediately upon notification of its occurrence. This initial notification from Japan to WPRO, through Japan's IHR National Focal Point, started the critical process of information sharing and ongoing situation monitoring. Japan shared a great deal of information through the IHR network; in turn, WHO communicated this information to all Member States in the region.

PROVIDING PUBLIC HEALTH ADVICE

Issuing situation reports is a standard disaster response practice for WHO. During the Fukushima event, demand for frequent updates was extremely high. Because of the nature of the emergency and the volume of demand, WPRO issued an early first situation report despite an understandable lack of clarity in the first few hours of the event. Access to information in English was limited, so WHO established a system for accessing information in Japanese. This provided a much needed, more comprehensive view of the situation. Japan also welcomed a WHO field mission to the affected area so that we could provide more accurate situation reports in a timely manner. WHO was then able to conduct public health risk assessments and provide public health advice.

Our work was not conducted in isolation. WHO collaborated with a number of partners, including the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) to share information and exchange views on a range of issues. As a member of the Inter-Agency Committee for Response to Nuclear Emergencies (IACRNE), WHO worked closely with the International Atomic Energy Agency (IAEA), the World Meteorological Organization, the Food and Agriculture Organization, the United Nations Scientific Committee on the Effects of Atomic Radiation, the International Civil Aviation Organization, the International Maritime Organization and the European Commission.

»Responding to a nuclear event like the Fukushima Daiichi nuclear power plant accident highlights the importance of accurate data, as supplied by the CTBTO. «

In the Joint Radiation Emergency Management Plan of the International Organizations, WHO is responsible for: public health risk assessment and response; biological and clinical dosimetry; emergency medical response, including the diagnosis and treatment of radiation injuries; long-term medical follow-up; mitigation of mental health impact; and food safety. In this emergency, WHO relied on its specialized networks, such as the Radiation Emergency Medical Preparedness and Assistance Network, the International Food Safety Authorities Network and collaborating centres.

CTBTO DATA ESSENTIAL FOR WHO'S WORK

Timely, accurate data are always critical for an effective response. Monitoring data and analysis reports, including information from radionuclide stations and about any potential radioactive spread, were provided to IAEA and WHO by the CTBTO. These data were absolutely essential for WHO's work. These data allowed us to properly assess the constantly changing situation and to tailor public health guidance accordingly.

As we are all aware, the accident has reignited a worldwide debate about the safety of nuclear energy. The experience in Japan proved the efficacy of public health measures that should be applied for immediate protection after a nuclear accident. Other challenges will require long-term public health commitment, such as the mental health impact of this triple disaster. WHO continues to work with the Government of Japan to monitor the situation, with emphasis on the health impact of the disaster. It is laudable that this impact has been largely restricted to Japan, owing in large part to effective response measures.

Responding to a nuclear event like the Fukushima Daiichi nuclear power plant accident highlights the importance of accurate data, as supplied by the CTBTO. Further, coordination between WHO, other UN agencies, and our many partners and stakeholders, in close collaboration with the affected country, is essential. Lessons learned from the 2011 Great East Japan earthquake and tsunami disaster will certainly contribute to our capacity to respond to such complex situations.

BIOGRAPHICAL NOTE

MARGARET CHAN
has been the Director-General of the World Health Organization (WHO) since November 2006. Prior to this, she held several senior positions within WHO after joining the organization in 2003 as Director of the Department for Protection of the Human Environment.

From 1994 to 2003, Dr Chan served as Director of Health of Hong Kong during which time she introduced new services to prevent the spread of disease and promote better health as well as initiatives to improve communicable disease surveillance and response.

UNESCO & CTBTO: Working together to issue timely alerts

Buttressing the global tsunami warning network

by **WENDY WATSON-WRIGHT**
Executive Secretary of the Intergovernmental Oceanographic Commission of UNESCO and Assistant Director General of UNESCO

Tsunami is a Japanese word meaning 'harbour wave'. Tsunamis are primarily generated from an underwater shallow earthquake. They are usually small in deep waters, but become large and cause damage when they approach coasts or harbours. A characteristic of tsunamis is that their destructive impact can occur far away from the area of origin.

Tsunami warning centres and regional tsunami warning systems build on existing detection, verification and communication networks such as international seismic and sea level networks. These include the international seismic monitoring network, the international array of sea level measuring stations (the Global Sea Level Observing System, the Global Telecommunication System of the World Meteorological Organization and associated public geostationary satellites) and the internet. The detailed functioning of a tsunami warning system and centre have been described earlier in *Spectrum* issues 6 and 13.

MASSIVE INDONESIAN TSUNAMI TRIGGERS DEVELOPMENT OF MORE TSUNAMI WARNING SYSTEMS

No single country can develop basin wide tsunami detection systems. As a consequence, the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC/UNESCO) has since 1965 been responsible for the intergovernmental coordination of the Pacific Tsunami Warning System (PTWS). Following the devastating tsunami of 26 December 2004 in the Indian Ocean, the IOC Member States requested at the 23rd IOC Assembly in June 2005 that similar warning systems be developed for the Indian Ocean, the Caribbean Sea and adjacent regions as well as the northeast Atlantic, the Mediterranean and connected seas. The IOC is primarily concerned with international coordination among nations, while the operational duties of the tsunami warning centres reside with national agencies.

Also following the 2004 tsunami, IOC/UNESCO and the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) agreed to explore the potential of using data from the International Monitoring System (IMS) for tsunami warning purposes.

CTBTO APPROVES TRIAL USE OF MONITORING DATA FOR TSUNAMI WARNING PURPOSES

The CTBTO decided at its special session on 4 March 2005 to cooperate with IOC/UNESCO on a possible contribution to an effective tsunami warning system. The two organizations agreed to share efforts to facilitate the development and operation of tsunami warning centres.

Initially the CTBTO authorized the exploratory provision of data from the IMS requested by national authorities and by international tsunami warning

JANUARY 2010:
Earthquake damage, Port au Prince, Haiti.
Photo courtesy of U.S. Coast Guard Sandra Kay Kneen

The CTBTO National Data Centre in Haiti: helping enhance seismic monitoring and knowledge on tsunami hazards

On 12 January 2010, a 7.3 magnitude earthquake struck Haiti and caused many human casualties, considerable material losses and immense suffering. The capital, Port au Prince, was heavily affected. The "Palais National", the site of the Haitian Executive Power, and other public buildings collapsed. Hundreds of civil servants died and the capacity of Haiti to deal with the crisis was severely impacted. The earthquake lasted 53 seconds but the disaster lasted much longer.

The seismic hazard in Haiti was not unknown to the specialized scientific community, but there was less awareness in large segments of the population and among decision makers. For instance schoolbooks mentioned little – if anything – about the historical earthquakes and tsunamis that affected Port au Prince in 1751, 1770 and 1860 and the one that affected Cap Haitien in 1842. Consequently an environment/society had emerged that had little resilience to earthquakes and tsunamis.

Following the 2010 earthquake, the Haitian Government, with the support of national and international partners, has engaged in establishing a permanent seismic observation network managed by the Bureau of Mines and Energy (BME). These partners are the National Observatory for the Environment and Vulnerability (ONEV), the Directorate of Civil Protection (DPC), the Faculty of Sciences of the Haitian State University (UEH/FDS), the United States Geological Service (USGS), Natural Resources Canada (NRCan), l'Institut Physique du Globe de Paris (IPGP), Purdue University and the United States Development Agency (USAID).

The CTBTO has been an important partner in this endeavour as well and has contributed by establishing the CTBTO National Data Centre (NDC) at the BME in September 2011 in close cooperation with UNESCO. The CTBTO NDC is part of the Haitian Seismological Technical Unit (UTS) created in February 2011. The UTS will be responsible for monitoring seismic activity at the national and regional level and for ensuring the compilation of a database useful for research. In addition, the UTS shall promote data exchange with other countries in the region and provide the necessary information on seismic hazards for decision-makers regarding land-use planning in Haiti. These efforts were also underpinned by a training course for Haitian technicians in seismic observation in partnerships with regional centres and universities.

The CTBTO NDC serves as an example of how technology developed by the CTBTO is used for civil purposes. Knowledge on seismic hazards and the contribution to data exchange and analysis provide technical and decision-making institutions with products and tools that can contribute to reducing loss of life and property caused by earthquakes and tsunamis. NDC products can also be of use in the efforts of the scientific community to maintain awareness of the seismic risks faced by Haitian society.

3 FEBRUARY 2010: *CTBTO Executive Secretary Tibor Tóth and UNESCO Director-General Irina Bokova after signing an agreement to enhance cooperation between the two organizations, especially for tsunami warnings.*

»As of March 2012, Australia, France, Indonesia, Japan, Malaysia, the Philippines, Thailand, Turkey and USA have taken advantage of incorporating CTBTO seismic data into the use of their national tsunami monitoring.«

organizations that were recognized by IOC/UNESCO In accordance with a decision taken by the CTBTO's Working Group concerned with verification issues, IOC/UNESCO has to approve/recognize the national tsunami warning centres that have submitted requests to the CTBTO to use seismic and other IMS data for purposes of producing tsunami warnings.

These centres are officially nominated by Member States to IOC/UNESCO and are national institutions that adhere to the intergovernmental governance of UNESCO. The CTBTO thereafter receives confirmation from IOC/UNESCO of "approved/recognized" tsunami warning centres, which will receive IMS data.

WORKING TOGETHER TO ISSUE EARLIER TSUNAMI ALERTS

The provisional arrangement between the two organizations proved effective in the development phase of the new tsunami warning systems. In recognition of the successful trial period, an agreement was signed on 3 February 2010 by Irina Bokova, Director-General of UNESCO, and Tibor Tóth, Executive Secretary of the CTBTO, to enhance cooperation between the two organizations, notably for the benefit of tsunami early warning systems and capacity-building in developing countries.

The benefits of using the IMS stations as a supplement to the existing network of seismic stations are:

- a more uniform setting of the stations in the network;
- higher data availability and faster data transmission;
- highly accurate data due to equipment that record seismic waves over a wide range of frequencies; and
- Some IMS stations are in isolated places not populated by other networks.

All of these are factors that contribute to the more accurate determination of earthquake parameters and hence to the issuing of earlier tsunami alerts deriving from potentially tsunamigenic earthquakes.

OVER 2 GIGABYTES OF MONITORING DATA SENT DAILY TO TSUNAMI WARNING ORGANIZATIONS

As of March 2012, Australia, France, Indonesia, Japan, Malaysia, the Philippines, Thailand, Turkey and the USA had taken advantage of incorporating CTBTO seismic data into the use of their national tsunami monitoring. Additional countries are expected to sign agreements with the CTBTO in the near future. As an indicator, in 2011, about 2.3 gigabytes of IMS primary seismic, auxiliary seismic and hydroacoustic data were sent in near-real time daily to tsunami warning organizations.

The provision of seismic data is not the only outcome of the strengthened CTBTO – UNESCO collaboration. IOC/UNESCO and the CTBTO have partnered in assisting Haiti to develop its capacity for seismic and tsunami monitoring (see text box on opposite page).

In closing I want to thank the CTBTO for the very fruitful and productive collaboration our two organizations have enjoyed over the past years and we look forward to continuing along this track.

Dr Watson-Wright thanks Thorkild Aarup, Head IOC Tsunami Unit, Bernardo Aliaga, IOC Programme Specialist and Diana Patricia Mosquera, UNESCO Programme Specialist based in Port au Prince, Haiti, for their assistance with this article.

BIOGRAPHICAL NOTE

WENDY WATSON-WRIGHT has been Assistant Director General and Executive Secretary of the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO) since January 2010.

Prior to joining the IOC, Dr Watson-Wright held a number of senior positions within the Public Service of Canada, including Assistant Deputy Minister, Science, for Fisheries and Oceans Canada from 2001 to 2009 where she was responsible for providing the leadership and policy and scientific direction for all science activities in the department.

From Southwestern Siberia to Kamchatka

How Russian station operators meet the challenge

BY SVETLANA NIKOLOVA

BACKGROUND INFORMATION

THE RUSSIAN FEDERATION

was one of the first countries to sign the Comprehensive Nuclear-Test-Ban Treaty (CTBT) on 24 September 1996. Its subsequent ratification on 30 June 2000 was very significant as Russia is one of the 44 States that must sign and ratify the CTBT before it can enter into force. Russia also supports the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) at the technical level: it hosts 32 International Monitoring System (IMS) facilities, of which 24 are fully operational. Russia has the second highest number of IMS facilities on its territory of any Member State after the United States.

An 18,000 km round trip beginning in Moscow to three IMS sites in the Russian Federation.

Smouldering volcanoes, bubbling geysers, giant brown bears, Arctic wolves…the Kamchatka peninsula has been described as wild, remote and an area of captivating natural beauty. This was my last port of call during an 18,000 km round trip across the Russian Federation over a two-week period in October 2011.

The aim of my journey was to check the operation and maintenance status of nine International Monitoring System (IMS) facilities located at three different sites. Such visits are essential for the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) to ensure that it has a full understanding of the way the IMS stations are operated and maintained. The visits also provided the local station operators with an opportunity to discuss any operational issues with a CTBTO representative. From Moscow, I travelled first to Southwestern Siberia, then on to Vladivostok in the Russian Far East and from there north to Kamchatka and finally back to Moscow.

All of the monitoring facilities I visited are co-located with stations operated by the Special Monitoring Service of the Ministry of Defense of the Russian Federation (SMS). Two SMS representatives – Vitalij Korionov and Yury Juralev – accompanied me throughout the trip.

Our first stop was Barnaul, the administrative centre of the Altayskiy Kray. The journey across gridlocked Moscow to Barnaul and then on to Zalesovo took about seven hours. The nearest town to Zalesovo is Zarinsk but the road from Zarinsk is in a dreadful state of disrepair and it takes over an hour in winter to drive about 30 km.

The region is very sparsely populated and lies in a moderate seismicity zone close to the boundary between tectonic plates. There are occasional earthquakes with magnitudes of up to 6 on the Richter scale.

There are three IMS stations in Zalesovo on the territory of the military detachment – a primary seismic station (PS33), an infrasound station (IS46) and a radionuclide station (RN59). PS33 is a 10-element seismic array arranged in two concentric circles over the 3 km aperture. IS46 consists of a 4-element array shaped in the form of an irregular triangle with one element in the centre. The sides of the triangle are approximately 3 km.

ACCESS BY SNOW MOBILE ONLY DURING WINTER MONTHS

The stations in Zalesovo monitor a vast area including the whole of central Siberia and part of the Mongolian plateau. The stations have been specially constructed to withstand temperatures which can plummet to minus 50 degrees Celsius with an average temperature of minus 40 degrees Celsius from December to February. During the winter months, the stations can only be accessed with snow mobiles.

There was a recent power upgrade at the elements and a surveillance video system designed by the IMS Division has been installed in Zalesovo, where the station operators also have a base. The surveillance system consists of a video camera and an alarm system to monitor the elements of PS33 and IS46 in the field and also to prevent the vandalism and thefts that have occurred in the past. For example, the ropes from the masts of PS33 have been stolen several times.

The new power system includes a power breakout box. This allows the 220 V power supply to be shut down for safety reasons and to switch to the

Station operators of PS33 and IS46 Pavel Fefelkin (seated left) and Anatoliy Shabrikov (centre) with Svetlana Nikolova in Zalesovo.

Radionuclide station operators Angelica Prib (right) and Galina Baseeva (far left) with representatives from the Special Monitoring Service of the Ministry of Defense (SMS) at RN59 in Zalesovo.

Igor Medvedev, station operator of PS37 and IS45 at Ussuriysk.

battery supply in case of power outages caused by violent storms. Since the improvement of a lightning protection system in 2011, the station operators have not encountered any more problems caused by violent lightning.

The operators of PS33 and IS46 – Pavel Fefelkin and Anatoliy Shabrikov – are able to monitor the stations remotely from the base in Zalesovo. As soon as there is a problem with the transmission of data or, for example, with the temperature in the vault, they are notified and can take timely action.

UNWAVERING COMMITMENT AND DEDICATION

Angelica Prib and Galina Baseeva are responsible for operating and maintaining the radionuclide station RN59 in Zalesovo.

"We run the station, carry out all necessary maintenance work and write reports for the CTBTO. We also replace the filters at RN59 on a daily basis which means making the one hour journey from Zarinsk to Zalesovo every single day regardless of the weather conditions. In order to maintain the station properly, it's really important to have a specialized technical background," Angelica and Galina explained.

USSURIYSK ALONG THE TRANS-SIBERIAN RAILROAD

After departing from Zalesovo, we caught a plane to Vladivostok. Loosely translated from Russian as "Overlord of the East", Vladivostok is situated at the head of the Golden Horn Bay not far from Russia's borders with China and North Korea and just across the Sea of Japan. From Vladivostok, we drove for three hours to Ussuriysk, which is just 60 km from the Chinese border.

The IMS facilities – a primary seismic station (PS37), an infrasound station (IS45) and a radionuclide station (RN58) – are co-located with an SMS station 53 km away from Ussuriysk in Grigirievka village. It can take over one hour in the winter to drive this short distance.

PS37 is a 10-element seismic array. Using an array rather than just one sensor to collect signals improves the signal to noise ratio and enables weak signals to be detected. In addition, seismic arrays allow the azimuth[1] and approximate distance to the seismic source to be determined. PS37 is located roughly 200 km to the north of North Korea in an area with very low seismic background noise, enhancing its detection capability. It was the closest IMS station used for the detection and location of the North Korean nuclear explosion in 2009.

[1] *The azimuth is a station-to-event angle measured clockwise from true North.*

CONTENDING WITH THE ELEMENTS

The operators of PS37 and IS45, Igor Medvedev, Gennadiy Sitnikov, Vladimir Shapakov, and of RN58, Andrey Berejnoy and Vasilij Himich, are confronted with a number of challenges.

The first and utmost challenge is to keep the stations running well and to meet the high requirements for IMS stations' data availability and quality, the station operators explained.

As well as being very familiar with all the equipment, they have to be able to reach each station element in a short time if something unusual happens and the element stops transmitting data. They monitor the state of health records at the station regularly and take corrective action if they find something not working properly.

The harsh winter conditions with heavy snow make these tasks even more difficult. "Winter is actually the best season to reach the sites. This is because the swampy nature of soil in the area makes it virtually impossible

SMS representative Vitalij Korionov (front left) with station operators in Ussuriysk.

Station operator Andrey Berejnoy changing the filter at radionuclide station RN58, near Ussuriysk.

Igor Pitetskiy, station operator of PS36 and IS44 at Petropavlovsk-Kamchatskiy.

to access the site at other times of the year," explained the operators. "The region suffers from forest fires in the spring and late autumn but preventive measures are taken to avoid the fires from reaching PS37 and IS45. And the swampy nature of the soil also makes it virtually impossible to build roads in the vicinity. "

RN58 is one of 19 IMS radionuclide stations fitted with noble gas equipment that registered radionuclides from the Fukushima nuclear power plant in March 2011.

HOME TO OVER 200 VOLCANOES

Located almost 7,000 km from Moscow – a nine hour plane journey – Petropavlovsk-Kamchatskiy is a major sea port in the Far East of Russia and the second largest city in the world that is unreachable by road. During the Soviet era, the area was shrouded in secrecy and closed to foreigners and even to most Russians because of the presence of military bases on the peninsula.

Covering an area similar in size to California, Kamchatka is home to over 200 volcanoes, at least 30 of which are active. The Avacha volcanic group lies on the Pacific Ring of Fire, 25 km from the Pacific coastline and 30 km from Petropavlovsk-Kamchatskiy, the capital and largest city on Russia's Kamchatka Peninsula. Some of the local population continue to believe that the volcanoes are inhabited by spirits who hunt whales at night and roast them over the flaming lava.

The Klyuchevskoy volcano lies 220 miles north of Petropavlovsk-Kamchatskiy and is one of the largest on-land active volcanoes in the world, reaching an altitude of 4,750 metres above mean sea level. The Klyuchevskoy volcano began a major eruption on 30 September 1994 that disrupted air traffic across the North Pacific for the next 60 hours. On 2 January 2011, a thin layer of ash from the active Kizimen volcano located 265 km away from Petropavlovsk-Kamchatskiy, covered the entire city.

The low level of 'cultural' (or human-related) noise in the area and its exposure to strong winds that can carry both low-frequency sound waves and airborne radioactive particles from long distances make Petropavlovsk-Kamchatskiy an ideal location for three of the IMS's verification technologies. The IMS stations are actually located some 100 km from Petropavlovsk-Kamchatskiy and comprise a primary seismic station (PS36) and an infrasound station (IS44). The radionuclide station (RN60) is located in a village called Tundrovo 10 km from the city. PS36 and IS44 are co-located with the SMS station in a place called Nachiki.

The site is manned constantly by two station operators – Igor Pitetskiy and Alexander Kachan – who spend alternate weeks at the site. The 120 km journey to their home town is not feasible every day in view of the treacherous roads, and the site can only be accessed in winter months with snow mobiles.

Brown bears are frequent in the area so the stations are surrounded by fences to keep inquisitive wild life at bay. However, heavy snowfall last winter caused some of the fences to collapse under the sheer weight. The doors of the vault are regularly covered in up to two metres of snow, making it extremely difficult to open them.

The station operators also explained that the vehicle breaks down frequently because of the road conditions. At the beginning of spring when the snow starts to melt, the snow bikes often sink in the snow. And flooding from melting snow and heavy rains in springtime is common. Over the years this has led to rusting inside the vaults and also placed the power supply located in the equipment enclosures in jeopardy. Other maintenance chores include evacuating the station equipment whenever necessary so as to prevent potential damage from increased underground water table (The upper level of an underground surface

Central Recording Facility at Petropavlovsk-Kamchatskiy.

Surprise visitors at Petropavlovsk-Kamchatskiy.

in which the soil or rocks are permanently saturated with water) in the spring.

They also have to ensure that the rampant vegetation surrounding the stations is cut down regularly as well as replacing the batteries, as required. In the summer of 2012, a series of measures will be undertaken to optimize station operation including the installation of new equipment vaults, a surveillance system and a power upgrade.

Radionuclide station RN60 is located just outside Petropavlovsk-Kamchatskiy and is manned every day by two station operators – Oksana Kotelnikova and Elena Kozlova – who alternate their daily shifts. They ensure the continuous transmission of data to the National Data Centre in Dubna, just outside Moscow, from where the data are transmitted to the CTBTO's International Data Centre in Vienna.

A CLOSE ENCOUNTER OF THE FURRY KIND

Visiting these three remote locations made me really appreciate the continuous support of the Special Monitoring Service of the Ministry of Defense in terms of manpower and logistics. I was also struck by the unwavering commitment and dedication of the station operators. Not only do they regularly contend with extreme weather conditions to ensure the smooth running of the stations but they also need specialized technical knowledge and years of experience.

Maintaining and operating these stations is not just a challenging task – it can even involve an unexpected visitor. Station operator Igor Pitetskiy described what happened to him one summer day at the site of IS44.

"There was a scheduled maintenance of the infrasound station elements. I opened the equipment vault, looked around and froze with fear not knowing whether I should run into the vault or shoot up to the radio mast – a bear was staring at me from behind the bush! My choice was spontaneous but right – the mobile connection works at the radio mast. From the radio mast I could see a baby bear. His mother must have been somewhere nearby. I spent approximately half an hour up the radio mast without any chance to call anyone because my mobile phone was in the vehicle.

My brown 'operator' was 'maintaining' the inlets of the noise reduction system. I whistled and the baby bear ran away even faster than me. For some time I pretended to be an eagle overlooking the surroundings – and afterwards I took all necessary precautions and managed to climb down and return to the Central Recording Facility. I suggested that the operators should be provided with a gun but was advised to take an intensive climbing course instead!"

BIOGRAPHICAL NOTE

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REFLECTIONS ON 15 YEARS OF THE CTBTO

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