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

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CTBTO SPECTRUM

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SWITZERLAND'S PRESIDENT AND MINISTER OF FOREIGN AFFAIRS

Micheline Calmy-Rey

MOVING FORWARD ON NUCLEAR NON-PROLIFERATION AND DISARMAMENT

HER ROYAL HIGHNESS

Princess Sumaya bint El Hassan of Jordan

SAFEGUARDING THE ARAB RENAISSANCE

NEW ZEALAND'S MINISTER FOR DISARMAMENT AND ARMS CONTROL

Georgina te Heuheu

THE END OF NUCLEAR TESTING IS WITHIN OUR REACH

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) bans all nuclear explosions on Earth.

It opened for signature on 24 September 1996 in New York.

As of October 2010, 182 countries had signed the Treaty and 153 had ratified it. Of the 44 nuclear capable States which must ratify the CTBT for it to enter into force, the so-called Annex 2 countries, 35 have done so to date while nine have yet to ratify: China, the Democratic People's Republic of Korea, Egypt, India, Indonesia, Iran, Israel, Pakistan and the United States. On 3 May 2010, Indonesia stated that it had initiated the CTBT ratification process.

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.

COVER IMAGE:
Pattreeya Thapanapaha investigates a problem with the VSAT link of the Global Communications Infrastructure, Vienna. Austria.
Photo: Marianne Weiss

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EDITORIAL
ANNIKA THUNBORG
CTBTO SPOKESPERSON

From 11 March and over the ensuing weeks, scientists at the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) worked around the clock. When the devastating magnitude 9.0 earthquake struck northern Japan, CTBTO data contributed to rapid tsunami warning alerts and tracked the dispersal of radioactivity from the damaged Fukushima plant around the world.

The global alarm system of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) is being set up to scan the world for any sign of a nuclear explosion. In the process of detecting the needle in the haystack – the nuclear test – the system registers over 30,000 events a year. This information can be used for a wide range of civil purposes, from enhancing our understanding of the Earth to following volcanic ash clouds and the movement of whales.

Our verification regime demonstrates the synergy between making the world secure from nuclear weapons and promoting human welfare and development.

Several articles in this issue of CTBTO Spectrum touch upon this point. They focus on the CTBTO's contribution to mitigating the disasters in Japan, on our dedicated data analysts who distinguish between earthquakes and explosions, on the committed chief who leads the team that ensures the smooth running of the CTBT monitoring system, on the National Data Centre in the Republic of Congo as a model for the Central African region, and on why the Portuguese State Secretary believes that a facility agreement is one of the best tools for building up the verification regime.

International security expert Alyson Bailes discusses the need for a related kind of synergy: the one between weapons of mass destruction and conventional arms – a topic we will revisit in a later edition of Spectrum. She also expresses her hope that future generations of women will want to focus on this subject. I echo her sentiments and trust that in the very near future, women all over the world will be given the same opportunities and support as men to become politicians, diplomats and experts on non-proliferation and disarmament as well as scientists and technical experts in the verification sciences. Remember that you will receive a warm welcome at the CTBTO!

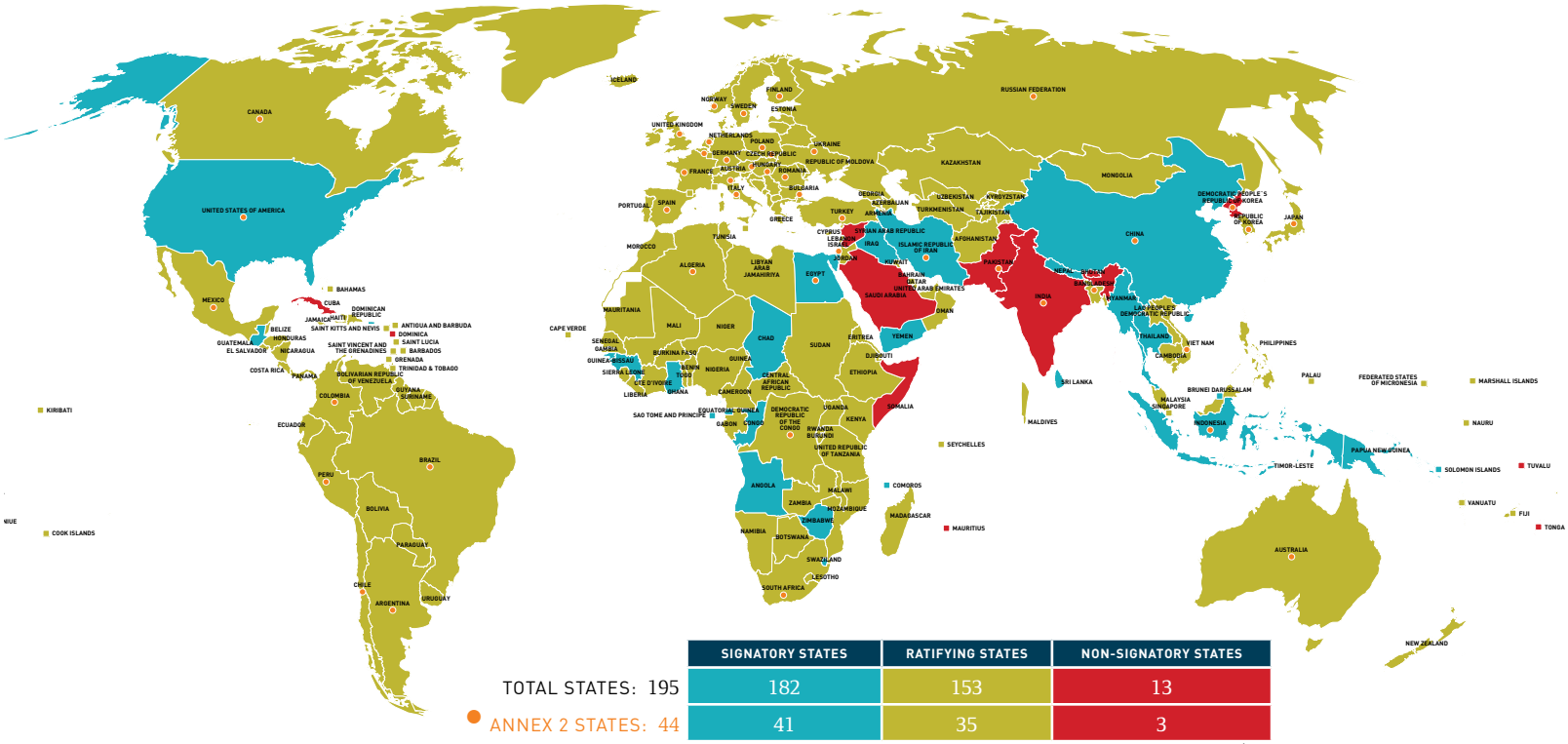
In the wake of the Fukushima disaster, it has become even more important to focus on the nexus between nuclear safety and nuclear security, and on the need to put in place layer upon layer of mutually reinforcing international, regional and bilateral non-proliferation and disarmament arrangements in order to build a safer and more secure world. UN Secretary General Ban Ki-moon has recently highlighted this nexus as part of his five-point strategy to improve nuclear safety. In her article "Safeguarding the Arab Renaissance", Princess Sumaya of Jordan underlines the necessity of connecting these dots in the Arab world.

We usually associate the CTBT with peace and security: it is a core element of nuclear non-proliferation, a catalyst for nuclear disarmament, and part and parcel of a nuclear-weapon-free world. It also prevents further health and environmental damage caused by nuclear explosions. And it can serve as a confidence – and security-building measure. The President of Switzerland Micheline Calmy-Rey and the New Zealand Disarmament Minister Georgina te Heuheu elaborate eloquently on these aspects in their respective articles.

But it is also important to remember that the CTBT is crucial in connection with the development of nuclear energy for peaceful purposes. Whatever impact the Fukushima disaster has on the predicted nuclear renaissance it is a fact that more and more States are mastering the nuclear fuel cycle. The decision between using nuclear energy for peaceful or for weapons purposes will become more a political and legal issue rather than one of technology and know-how. The CTBT provides the last and clearly visible barrier between permitted and prohibited activities – a legal line that needs to be drawn clearly and irrevocably.

The CTBTO's global nature with its equal and democratic distribution of data proved to be an important asset for governments, organizations and people all over the world during the Fukushima disaster. The CTBT, which is equally non-discriminatory with the same rights and obligations for all its members, sets a new legal and verification standard for nuclear weapons, thus making a great contribution towards creating a safer and more secure world.

STATUS OF SIGNATURES AND RATIFICATIONS
AS OF 16 MAY 2011



	SIGNATORY STATES	RATIFYING STATES	NON-SIGNATORY STATES
TOTAL STATES: 195	182	153	13
● ANNEX 2 STATES: 44	41	35	3

FOR MORE DETAILED INFORMATION ON SIGNATURE AND RATIFICATION VISIT WWW.CTBTO.ORG/MAP

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FACEBOOK

QUOTES

"Universal ratification of the test ban treaty would be a step toward creating a truly global community of nations, in which all share the responsibility for humankind's future."

PRESIDENT MIKHAIL GORBACHEV
NEW YORK TIMES OP-ED,
28 DECEMBER 2010

"The United States and China underlined their commitment to the eventual realization of a world without nuclear weapons and the need to strengthen the international nuclear non-proliferation regime to address the threats of nuclear proliferation and nuclear terrorism. In this regard, both sides support early entry into force of the Comprehensive Nuclear Test Ban Treaty (CTBT)..."

U.S. – CHINA
JOINT STATEMENT
19 JANUARY 2011

"In 2011, as a result of the shared commitment between the Government and Parliament, Indonesia, Insha-Allah, will complete the ratification process and will encourage various parties to do the same so that the CTBT treaty will soon enter into force."

MARTY NATALEGAWA
INDONESIA'S FOREIGN MINISTER,
ANNUAL PRESS STATEMENT,
JAKARTA, INDONESIA, 7 JANUARY 2011

"We call on China, the United States, Egypt, Iran, Israel and Indonesia to ratify, and on India, Pakistan and North Korea to sign and ratify the Comprehensive Test Ban Treaty, that has already been ratified by 153 nations, so that the Treaty can be brought into full legal force."

NOBEL PEACE LAUREATES,
FINAL DECLARATION,
11th WORLD SUMMIT, HIROSHIMA,
JAPAN, 14 NOVEMBER 2010

"Ratification of the CTBT represents an essential step on the path toward a world without nuclear weapons. We believe that the national security of the United States, and all states, will be enhanced when the test ban enters into force."

ROSE GOTTEMOELLER
U.S. ASSISTANT SECRETARY OF STATE FOR ARMS CONTROL,
VILNIUS UNIVERSITY,
LITHUANIA, 9 FEBRUARY 2011

"Once again we encourage all countries which have not yet done so to sign and ratify this Treaty [CTBT]. Unilateral moratoriums on nuclear tests are useful, but they cannot substitute for enshrining this key obligation for global security in the international law."

SERGEI LAVROV
RUSSIAN FOREIGN MINISTER,
CONFERENCE ON DISARMAMENT,
GENEVA, SWITZERLAND,
1 MARCH 2011

Moving forward on nuclear non-proliferation and disarmament

A view from Switzerland

BY MICHELINE CALMY-REY,
PRESIDENT OF THE SWISS CONFEDERATION
AND MINISTER OF FOREIGN AFFAIRS, SWITZERLAND


© Philippe Christin

On 5 February 2011, the U.S. Secretary of State, Hillary Clinton, and the Russian Foreign Minister, Sergei Lavrov, exchanged the instruments of ratification of the New START on the sidelines of the Munich Security Conference, officially bringing the New START into force. This was an important step towards President Barack Obama's visionary goal – spelled out in Prague in April 2009 – of a nuclear-weapon-free world.

SERIOUS CHALLENGES REMAIN BEFORE A NUCLEAR-WEAPON-FREE WORLD CAN BE REALIZED

On the other hand, without denying this positive development, we have to face the fact that serious challenges remain on the road to a nuclear-weapon-free world. From a broader point of view, Switzerland remains convinced that one cannot expect full commitment to the disarmament process – as well as more concrete progress – before the international community can be convinced that:

- nuclear weapons are not the appropriate means to meet the current security challenges, which include terrorism, organized crime, migration, the misuse of information technology, and financial market instability or climate change;
- nuclear weapons constitute an existential threat to the world in themselves. Their very existence makes them attractive to proliferators, whether States or non-State actors, and as a consequence increases instability rather than stability; and that
- credible long-term security policies must be based on universal, non-discriminatory and legally-binding instruments. In the current situation, however, the world is encumbered with a haves and have-nots approach to nuclear disarmament.

Just because today the ball seems to be in the court of the nuclear weapon States, must the non-nuclear weapon States give up on the objective of a world without nuclear weapons? Is nuclear disarmament an issue for nuclear weapon States alone? The answer is clearly "no". We all are stakeholders in our planet's survival, and we all have the right – and the obligation – to get involved in the nuclear disarmament process.

»Since a nuclear war would threaten the very survival of humankind, a debate should be launched on the legitimacy of the use of nuclear weapons regardless of the legitimacy of the motive of defence that can be invoked. «

NUCLEAR WEAPONS ARE IMMORAL AND ILLEGAL

At the 2010 Nuclear Non-Proliferation Treaty (NPT) Review Conference, I denounced nuclear weapons as immoral and illegal. They are fundamentally

immoral because they cause massive and indiscriminate destruction in terms of human lives, material resources and consequences for the environment. They are illegal by their very nature with regard to international humanitarian law. Their use violates without exception all fundamental principles and rules of international humanitarian law. Since a nuclear war would threaten the very survival of humankind, a debate should be launched on the legitimacy of the use of nuclear weapons regardless of the legitimacy of the motive of defence that can be invoked. We must examine the question regarding the point at which the rights of States must yield to the interests of humanity. Switzerland, the depositary of the Geneva Conventions, feels a special responsibility to bring the humanitarian perspective back to the heart of the debate on nuclear disarmament. To this end, Switzerland has initiated a study on the subject of delegitimizing nuclear weapons, and it has successfully worked for the inclusion of a reference to international humanitarian law in the final document of the last NPT Review Conference. Switzerland intends to remain actively engaged in this humanitarian approach.

As a State that gives high priority to strengthening international peace, and as one convinced of the importance of the multilateral framework in this respect, Switzerland has also recently developed a range of activities as intermediate steps in promoting the vision of a world without nuclear weapons. Together with Chile, Malaysia, New Zealand and Nigeria, Switzerland has tabled proposals to reduce the alert levels of nuclear weapons. The fact that hundreds of nuclear weapons remain on a high alert level, ready to be fired within minutes, poses a specific and unacceptable threat. These levels of alert do not make any sense some 20 years after the end of the Cold War. They do not correspond to the current international situation. Switzerland has thus sponsored a UN General Assembly resolution on "de-alerting" nuclear weapons, which was adopted by an overwhelming majority of States at the 2010 UN General Assembly. Switzerland will remain active on this issue.

»By limiting the development of more advanced types of nuclear weapons, the CTBT prevents the proliferation of nuclear weapons in all its aspects. «

The 2010 NPT Review Conference also agreed on a comprehensive action plan on nuclear disarmament, which includes concrete steps towards the total elimination of nuclear weapons. It must now be our aim to ensure that these commitments are fulfilled. Their implementation must be closely monitored and the irreversibility of the steps taken must be ensured.

One of these commitments is related to the entry into force of the Comprehensive Nuclear-Test-Ban Treaty (CTBT). Switzerland was among the first States to sign and ratify the CTBT. In addition, in 2003 a Swiss seismic station was inaugurated as part of the International Monitoring System to verify compliance with the Treaty.

SWITZERLAND'S UNWAVERING SUPPORT FOR THE CTBT

Switzerland's full support for the objectives of the CTBT is not only related to the fact that the Treaty bans all nuclear tests, anytime, anywhere and in any form. The CTBT is also intended to constrain the qualitative development of nuclear weapons. By limiting the development of more advanced types of nuclear weapons, the CTBT prevents the proliferation of nuclear weapons in all its aspects. Since the conclusion of the negotiations on such a treaty was one of the objectives adopted by the 1995 NPT Review and Extension Conference, the CTBT also constitutes a guarantee for maintaining the fundamental commitment to nuclear disarmament given by the nuclear weapon States. Furthermore, with the establishment of a wide-ranging monitoring system, the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) provides the international community with a tremendous confidence-building measure. Last, but not least, if it enters into force, the CTBT will prevent further potential health and environmental damage caused by nuclear test explosions.

Switzerland will thus continue to spare no effort to promote the entry into force of the CTBT. In this context, Switzerland will support the organization of a special segment focusing on nuclear disarmament at the upcoming 125th International Parliamentary Union Assembly, due to take place in Bern in October 2011.

It is also important to identify other areas where additional efforts are needed. In this context, Switzerland underlines the field of nuclear doctrines, where the logic of nuclear deterrence has hardly evolved since the Cold War. Switzerland is convinced that a future and sustainable concept of security must be widened to include not only military and strategic aspects but also the economic, energy,

Auxiliary seismic station AS102, Davos, Switzerland

Micheline Calmy-Rey speaking at the 2010 NPT Review Conference, New York, 3 May 2010. UN Photo/Evan Schneider

environmental, development and humanitarian dimensions. Nuclear weapons will never be eliminated if one does not envisage a future without them. A debate is urgently needed on security without nuclear weapons. Switzerland will also be active on these issues during the coming years in order to contribute to the new NPT review process, which will begin in 2012.

Looking at the renewed disarmament efforts as well as the challenges ahead, Switzerland cannot but conclude that there is no alternative to outlawing the use of nuclear weapons and gradually and systematically getting rid of them. The Five-Point Plan of the UN Secretary General of October 2008 sets out how we could proceed towards the outlawing of nuclear weapons. Switzerland supports this plan. It has the advantage of flexibility. It does not preclude the ultimate grand design of a Nuclear Weapons Convention and it does not preclude a step-by-step approach.

»If it enters into force, the CTBT will prevent further potential health and environmental damage caused by nuclear test explosions.«

Nuclear disarmament is not a matter of idealism. It is a matter of reason and responsibility. And it is not an illusion either. The real illusion is to believe that some States can continue to rely on such weapons and prevent their proliferation. Nuclear disarmament is also a matter of conviction and of creativity, the one stimulating the other. Convinced that the total elimination of nuclear weapons is a noble goal, Switzerland will continue to contribute constructively and concretely towards the achievement of this objective.

BIOGRAPHICAL NOTE

MICHELINE CALMY-REY is President of the Swiss Confederation, an office she held once before in 2007. Ms Calmy-Rey has been a member of the Swiss Federal Council since 2003 as Head of the Federal Department of Foreign Affairs. She pursues an active foreign policy marked by a commitment to promoting peace, respect for international law and human rights, and the fight against poverty. Previously, Ms Calmy-Rey was a member of the Geneva Cantonal Government.

VOICES

Safeguarding the Arab Renaissance

BY HER ROYAL HIGHNESS PRINCESS SUMAYA BINT EL HASSAN OF JORDAN

The Arab world is on the move. Overwhelming poverty, unemployment and frustration have led to the toppling of old monoliths of repression as Arabs unite in their desire to build a better future. There is fear and there is uncertainty, but there is also a distinct absence of ideology in the chants of the hopeful. The fact is, employment, opportunity and dignity will not emerge from profligate political jockeying, but from committed investment in science, innovation and enterprise. The energy that will ignite our region is fuel for progress, not anger at the other. Much of that energy looks likely to be nuclear.

The recent disaster at Japan's Fukushima nuclear power plant has prompted a renewed focus on nuclear safety around the world. Events at Fukushima have emphasised the need to tighten safety and to learn from the failings of older facilities. In the Arab world, calls have already been made for proposed nuclear projects to make safety an intrinsic part of the design and ongoing management culture of future facilities. Fukushima has taught us that disasters, no matter how unlikely they seem at the design stage, must be anticipated and planned for. Regular audits and comprehensive emergency contingency plans must become a feature of all projects in the Middle East.

With the help of the International Atomic Energy Agency (IAEA) and the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), we in Jordan are ready to help shape our nuclear renaissance safely and securely, with a full commitment to non-proliferation and disarmament in our region.

ADDRESSING JORDAN'S ENERGY NEEDS

The greater Middle East is rumbling with an unprecedented hunger for more energy and more reliability in supply. Jordan, Turkey, Egypt and Saudi Arabia are just some of the States that have declared an interest in developing peaceful nuclear technology to meet future energy needs safely and securely. This is an inevitable part of our region's progress away from fossil fuels and from their destructive environmental and political implications. But in our fractured neighbourhood, a need for energy security seems to sit with a deep fear of having nuclear capable neighbours. This should not be the case. The nuclear agenda in our

region has flipped from military to socio-economic in most right-thinking administrations, while a raft of international agreements and protocols have enmeshed most governments in a peaceful, regional nuclear structure. Measures such as the IAEA Safeguards on peaceful nuclear activities, Additional Protocol measures, the Comprehensive Nuclear-Test-Ban Treaty (CTBT) and the Fissile Material Cut-Off Treaty will change the landscape with the cooperation of most regional actors. We must ensure that the stragglers follow suit and that public perceptions are informed and encouraged by the possibilities of peaceful and safe nuclear development.

THE CTBT: CENTRAL TO GLOBAL AND REGIONAL DISARMAMENT AND NON-PROLIFERATION EFFORTS

At El Hassan Science City (EHSC), our relationship with the CTBTO is greatly valued. The CTBTO's commitment to promoting peaceful development in our region, and around the world, is founded on monitoring activities and strengthened by its facilitation of dialogue and discussion. The value of trust in multinational engagement cannot be overstated, particularly in our region where national social contracts are being renegotiated and an evermore sophisticated population is looking for hope beyond politics. The CTBTO's work greatly enhances cooperative possibilities for nations in transition and for economies on the verge of drawing down their dormant human capital.

Jordan is an ardent supporter of the CTBT and of the efforts of the CTBTO to ensure that testing of nuclear weapons is banned in all its forms. We are proud to give a home to the CTBTO auxiliary seismic station at Tel Alasfar, which has been in operation since 2002, and we believe that the organization is central to global and regional disarmament and non-proliferation efforts. As a signatory since 1996, Jordan has

»We in Jordan are ready to help shape our nuclear renaissance safely and securely, with a full commitment to non-proliferation and disarmament in our region.«

many scientists and policymakers who have learnt much from the cultural framework of CTBT institutions. More recently, our strategic decision to adopt nuclear energy for peaceful purposes has added impetus to our efforts in the area of international monitoring and disarmament diplomacy. We believe that the CTBT and other multilateral treaties should be a basic component of the moral obligations and responsibilities of countries seeking to develop peaceful nuclear technologies, or those already in possession of them. It is in this environment that the Kingdom is seeking to go nuclear. Energy is of great concern to all Jordanians as we import a staggering 95 percent of our energy requirements, at a cost of over 20 percent of the nation's gross domestic product.

The process of engagement with the public on nuclear issues is still at an early stage but our intentions are clear. Work has recently begun on a White Paper that will illustrate the benefits of peaceful nuclear energy in the Kingdom. The wide-ranging document will bed its position in the immense energy/water challenge that faces us and will include lessons learnt from Fukushima. The document will highlight the many factors and components of Jordan's nuclear energy programme and will place the nuclear initiative in the context of planned energy diversification, electricity generation and demand, water scarcity and resources, the environment, job creation and capacity building. Of course, it will also take note of the ever-changing geopolitical environment that defines our region for many in the West. Issues that hold as much importance for us will also be covered, including the regulatory environment, international obligations and the potential benefits to an informed nation that embraces the nuclear option.

BRIDGING THE DIVIDE BETWEEN POLICYMAKERS AND SCIENTIFIC COMMUNITIES

The Jordan Atomic Energy Commission is also beginning a process of engagement with the general public to measure perceptions of nuclear energy and of Jordan's fledging nuclear programme in particular. This is a process from which we can all benefit. At EHSC, we believe it is vital for the CTBTO to build partnerships not only with Member States but also within Member States, with civil society organizations and the wider public. We are honoured to provide a link that makes this possible. Our expertise can only help in bridging the divide between policymakers and scientific communities, and in making this new nuclear age a peaceful and prosperous one.

USEFULNESS OF CTBT MONITORING DATA

The Jordanian National Data Centre (NDC) in Amman is a key component of our efforts to promote peace through scientific know-how. Currently based at the Jordan Seismological Observatory, we hope that the CTBTO will help us to expand the usefulness of this data repository and the utility of its unique expertise. As a first step to expanding our community engagement, we hope to establish sub-NDCs at several Jordanian universities to maximize the benefits to be derived from the data provided by the International Monitoring System

»Another key goal of our cooperation with the CTBTO is the expansion of Treaty acceptance in the region.«

Aerial image of El Hassan Science City in Amman, Jordan.

(IMS) and the International Data Centre at the CTBTO. Encouraging universities to use data provided by the CTBTO's facilities would greatly aid the process of broadening civil society involvement in the monitoring process.

Another key goal of our cooperation with the CTBTO is the expansion of Treaty acceptance in the region. To aid this process, we are keen to establish a Regional Data Centre in Jordan. We believe that such a centre would benefit our cooperative work in several ways. Firstly, it would encourage and facilitate researchers from neighbouring countries and help preparations to implement the verification regime beyond our borders. Secondly, it would provide a valuable platform for the use of underappreciated scientific data in other countries. We have gained valuable experience by establishing and expanding the first NDC in the Middle East, with the cooperation of the CTBTO, and we have developed rare technical expertise that should be shared with our fellow Arabs. Jordan is an ideal candidate for the role for many other reasons, not least because of our central location and our open borders. It is my hope that a Regional Data Centre would eventually lead to the establishment of a Middle East Training Centre, further enhancing opportunities for Jordanian and Arab involvement in international nuclear and energy organizations.

USING IMS DATA TO HELP SCIENTIFIC RESEARCH

A vital step to expanding Jordan's contribution to CTBT goals is our proposal to establish sub-NDCs at some of our top science universities, including Princess Sumaya University for Technology, Yarmuk University, and the Jordan University of Science and Technology. Setting up sub-NDCs at universities would increase the use of invaluable IMS data to aid scientific research in fields as diverse as seismology, geology, the environment and Information and Communication Technologies (ICT).

The Arab world remains far behind the rest of the planet when it comes to nuclear energy. As the count of nuclear reactors on the globe races beyond 450, we Arabs have yet to inaugurate a single one. But the discussion is well under way. Before Fukushima, the nuclear renaissance that had sparked debate in Russia, India, China and many more diverse and energy-thirsty nations, had also hit the Arab world. Like many countries that have emerged from shaky economic and political transitions, the Arab States will need help and investment to make goals a reality under a shared commitment to safety and security. The rewards for us are ones that the West will share: development, stability and the global contribution to peace and sustainability of a people with ambitions, optimism and the energy to build new societies.

BIOGRAPHICAL NOTE

HER ROYAL HIGHNESS PRINCESS SUMAYA BINT EL HASSAN is President of the Royal Scientific Society, Chair of the Board of Trustees of Princess Sumaya University for Technology and founder of El Hassan Science City. Princess Sumaya is an advocate of science as a catalyst for change in the Arab World. She champions scientific excellence in education, research and innovation to promote sustainable development in Jordan and the region. The Princess is committed to maximizing human potential through education and opportunity.

The end of nuclear testing is within our reach

BY GEORGINA TE HEUHEU,
NEW ZEALAND'S MINISTER FOR
DISARMAMENT AND ARMS CONTROL

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) is a vital element in today's multilateral framework for nuclear disarmament and non-proliferation. Its entry into force would be a major step towards a world free of nuclear weapons – which must be our ultimate destination. But this year is the fifteenth since the Treaty was opened for signature, and it is yet to enter into force.

New Zealand has always been a strong advocate of the Treaty. New Zealand signed the Treaty just three days after it was opened for signature on 27 September 1996 and each year in the United Nations General Assembly takes turns with Australia and Mexico to run a resolution in support of the Treaty. New Zealand also hosts six monitoring stations which form part of the verification system on its territory, as well as one of ten currently certified radionuclide laboratories.

NEW ZEALAND'S DECADES-LONG STRUGGLE TO MAKE THE WORLD A SAFER PLACE

These actions are consistent with New Zealand's long history of opposing nuclear weapons and nuclear testing.

New Zealanders have worked for decades for the complete cessation of nuclear testing around the world. Since the 1950s, when nuclear weapons first started being tested in our region, successive New Zealand governments have contributed to global and regional efforts to stop testing. Those efforts have included taking direct action, such as the dispatching of New Zealand warships to the testing grounds of the Pacific, and pursuing more traditional diplomatic and legal initiatives.

In the five decades following World War II, at least 285 atmospheric and underground tests were carried out in the Pacific. Although far from the world's heavily populated metropolitan regions, the chosen sites were not empty. They were inhabited by small and vulnerable communities, some of which were exposed to environmental and health effects that remain to this day. Nuclear testing in the Pacific strengthened New Zealand's resolve that nuclear weapons provided no solution to the problems of the world and that they had no place in our region. It inspired the creation of the South Pacific Nuclear-Weapon-Free Zone by the Treaty of Rarotonga in 1985, and New Zealand's own nuclear-free legislation in 1987, the New Zealand Nuclear Free Zone, Disarmament and Arms Control Act, both of which occupy a special place in our national identity.

»… an effective and verifiable CTBT is an essential step on the road to a nuclear-weapon-free world.«

The Licorne test, Moruroa Atoll, southern Pacific Ocean, 3 July 1970. AFP Getty Images.

»Fifteen years after the CTBT's negotiation, there can no longer be any arguments that a global ban on nuclear testing is not feasible or cannot be verified.«

IMPORTANCE OF A UNIVERSAL AND VERIFIABLE BAN ON NUCLEAR TESTS

Like many other countries, however, New Zealand was convinced that the most effective way to achieve an end to nuclear testing would be through a universal and verifiable global ban. The negotiation of the CTBT in 1996 was a very positive step in that direction. At the heart of the Treaty is the recognition that banning nuclear tests effectively places a qualitative cap on the development and improvement of nuclear weapons. In short, an effective and verifiable CTBT is an essential step on the road to a nuclear-weapon-free world.

While the opening of the CTBT for signature in September 1996 was the culmination of many years of technical, scientific and diplomatic work, the next two challenges – pulling together the necessary ratifications for entry into force and building the Treaty's verification system – were only just beginning.

Substantial progress has been made on both goals. The CTBT has now been signed by 182 States and ratified by 153. Approximately 85 percent of the International Monitoring System (IMS) stations have been installed, of which almost 80 percent have been certified and are fully operational. The International Data Centre continues to provide Member States with essential products (such as raw data and data analysis results) and services using an ever-increasing stream of data from the IMS. Work is also underway to develop the necessary framework for the final verification measure included in the Treaty, an on-site inspection (OSI).

The global progress that has been made reflects a near-universal recognition and acceptance of the objectives of the Treaty, and has contributed to the global moratorium on nuclear testing. But it is not enough. As we have seen as recently as 2009 when North Korea conducted a nuclear test, a norm against nuclear testing which has a moral rather than a legal force cannot be relied upon to prevent a breach, and a verification regime that is not complete cannot provide an adequate response.

PROMOTING THE CTBT'S ENTRY INTO FORCE

There have been many initiatives since 1996 to promote the entry into force of the Treaty, including the biennial Article XIV (Entry into Force) conferences and the annual resolutions of the United Nations General Assembly. The CTBT also features prominently on the agenda of the Nuclear Non-Proliferation Treaty (NPT) Review Conferences, with the 2010 Conference reaffirming the essential role of the Treaty within the nuclear disarmament and non-proliferation regime. And with the help of the Government of Kazakhstan, 2010 also saw the inauguration of an international day against nuclear testing on 29 August.

These initiatives have had some success. The number of ratifications continues to grow, with recent additions from the Pacific region such as the Marshall Islands and Papua New Guinea further contributing to the universalization of the Treaty. Positive signals from among the remaining Annex II States are also significant, and New Zealand warmly welcomes the public commitments from Indonesia and the United States to move forward on ratification.

There can, however, be no substitute for entry into force of the Treaty and for the completion of the verification regime. Fifteen years after the CTBT's negotiation, there can no longer be any arguments that a global ban on nuclear testing is not feasible or cannot be verified. If we – as individual countries and as an international community – are serious

Map showing the South Pacific Nuclear Weapon-Free Zone. Courtesy of Nuclear Threat Initiative (NTI).

about ending nuclear testing and paving the way towards a nuclear-weapon-free world, there can be no better way of demonstrating our commitment to that ideal than by signing and ratifying the CTBT and seeing it enter into force.

STATES THAT HAVE NOT YET SIGNED OR RATIFIED THE CTBT SHOULD DO SO IMMEDIATELY

In this regard the nine remaining Annex 2 States bear a special responsibility for the CTBT's entry into force. At the same time that New Zealand looks to those States to take immediate steps to sign and ratify the Treaty, we will take every opportunity to encourage other remaining States, including those in the Pacific, to ratify the Treaty, and support the efforts of those moving towards this goal.

We, the international community, must also continue to work collectively towards a verification regime to monitor Treaty compliance that will be operational at entry into force. This will require the support of all Member States. Adequate resources and political support are also indispensible, whether in the form of technical expertise, budgetary contributions or the construction of monitoring stations.

CTBT MEMBERSHIP OFFERS A NUMBER OF ADDITIONAL BENEFITS

The benefits to States from CTBT membership are far greater than the costs. The products of the IMS network are an increasingly important global scientific resource, as shown in particular by the work now being done in the field of tsunami early warnings. In addition, all States hosting monitoring stations own and operate those stations and receive technical and financial assistance to ensure their continued operation. For many States, the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) provides capacity building assistance through technical workshops and training.

However, what New Zealand values most about being part of the CTBT is contributing to the movement towards a great global good: the end of nuclear testing for all time. This is an essential step towards the ultimate goal of eliminating nuclear weapons and the threat they pose to life on earth. New Zealand would like to see the CTBT enter into force sooner rather than later and calls on all States yet to sign and ratify the Treaty to do so without further delay.

Air sampler at radionuclide station RN47, Kaitaia, New Zealand

BIOGRAPHICAL NOTE

GEORGINA TE HEUHEU
is New Zealand's Minister for Disarmament and Arms Control, Minister for Courts, Minister of Pacific Island Affairs and Associate Minister of Maori Affairs. Mrs te Heuheu was the first Maori woman to be admitted to the High Court of New Zealand as a Barrister and Solicitor. She went on to practise law in Wellington and Rotorua before entering Parliament in 1996. She became only the second Maori woman appointed to a New Zealand Cabinet in 1998. From 1998 to 1999, Mrs te Heuheu was New Zealand's Minister for Courts, Minister of Women's Affairs, Associate Minister for Treaty of Waitangi Negotiations and Associate Minister of Health.

Weapons of mass destruction and conventional disarmament: Scope for Synergy?

BY ALYSON J.K. BAILES, UNIVERSITY OF ICELAND

During my career both as an official and a researcher, I have spent more or less equal time and effort dealing with the issues of Weapons of Mass Destruction (WMD) and with conventional arms control and armament policy. In retrospect I realize it is uncommon to combine these two interests, perhaps especially for a woman. While female pioneers like Alva Myrdal were equally concerned about all arms and destructive techniques, in modern times we tend to find women most prominently engaged on WMD issues on the one hand, and issues of inhumane conventional weaponry and small arms on the other. This is perhaps not surprising given the particular ethical and humanitarian issues that both those topics raise, and the way they both relate to a gender discourse (the huge majority of small arms users are men). It is also noteworthy how few women work on the supply side of the arms business, in the defence industry and on arms collaboration policy.

Some might say this is to women's credit: but it is a pity if it strengthens the tendency in the arms control establishment to draw hard frontiers – and maintain separate career tracks – between WMD-related issues and those of conventional disarmament. For one thing, technological advances are threatening to dissolve that barrier by introducing non-nuclear, – chemical or – biological techniques that could have the same massive and indiscriminate impact as existing WMD. For another, the struggle to reduce arms and end conflicts is always in need of fresh ideas; and some might conceivably emerge from thinking about contrasts and comparisons between the two fields, notably in terms of the challenges they pose for control and the possible solutions. This article will try to do just that, though necessarily in very broad terms – and offering more questions than answers.

LEGALITY ISSUES AND THE USE OF DIFFERENT TYPES OF WEAPONS

The most obvious contrasts between mass-destruction weapons and others are in terms of legality and use. Owning and trading in most conventional arms is legal, in contrast to the formal prohibition of chemical and biological weapons, and of nuclear weapons other than for five States under the provisions of the Nuclear Non-Proliferation Treaty (NPT). Conventional weapons are used every day throughout the world, for hunting and personal protection, internal conflict and policing purposes as well as inter-State war. Countries that have developed nuclear weapons would all claim – whether we believe them or not – that they have them in order not to use them, i.e. for deterrence and only secondly for defence. Moreover, no way has yet been found to use such weapons for practical purposes of local warfare, crisis management or internal order, though defence planners have sometimes toyed with inventions – like neutron bombs or 'mini-nukes' – whose apparent 'useability' would risk eroding the nuclear taboo.

Even so, there are ways in which the two weaponry challenges are interlinked or run parallel. Nuclear weapons, and chemical and biological ones if used in a context of warfare, require conventional weapons – missiles, drones, aircraft or submarines – to

Titan 2- the largest intercontinental ballistic missile ever built by the United States. Courtesy of Kingdafy

deliver them. Missiles have become a central but peculiarly intractable issue of arms control precisely because they can carry multiple payloads, plus having 'peaceful' uses in space exploration. Technologies like precision guidance have similar across-the-board applications.

In policy terms, the two kinds of capability become fatefully intertwined when nuclear capacity is seen as offsetting a conventional force deficit, or as a way of protecting territories so small, remote and close to the enemy that their defensibility may otherwise be in doubt. Such thinking has been found on both sides of the NATO/Warsaw Pact (now, NATO/Russia) or the India/Pakistan relationship, and it may also be a motive for smaller States facing regional isolation. Among the grave risks of such 'nuclear dependence' is that it gives any conventional clash the potential of escalating into WMD use that would be fateful not just for the targets, but for the users and the world. The 21st century concern about terrorists or other non-State groups gaining 'asymmetrical' advantages by acquiring WMD techniques also has conventional parallels: *vide* the worldwide effort to stop terrorists getting MANPADs[1] that can be used *inter alia* to attack top political targets.

MOST CONVENTIONAL ARMS ARE PRODUCED, TRADED AND OWNED BY LARGE STATES

Even the more abstract, symbolic purposes that nuclear status is often seen as serving, linked as it is to permanent UN Security Council membership and regional leadership, are not completely alien to the conventional field. The great bulk of conventional arms are produced, traded and owned by large States[2] that are not at war, lack major internal conflicts and face relatively low risks of armed violence all round. This may partly be explained by economic motives (arms sales, employment in the defence industry, keeping a technological edge) and by the post-Cold War increase in military interventions overseas. Yet the sheer size of arsenals, including many weapons systems ill-fitted to modern expeditionary purposes, suggests that less tangible factors like generalized deterrence, self-assertion and status-building must be at play.

These connections are not just intellectually intriguing, but matter for anyone aiming to monitor, curb and eventually eliminate the tools of violence. Regional enmities and aggressive national policies may all too easily break out through the conventional channel if the nuclear route is suppressed, and vice versa. Conversely, the kind of progress in trust and cooperation that allows WMD to be cut back or eliminated also helps reduce excess conventional arms build-up, and at best ends with nations using their weapons cooperatively as in joint peace missions – like Europeans in East and West after the Cold War. One kind of arms control should never be made hostage to the other, not least because the most urgent weapons-related risks for peace and humanity will differ objectively from region to region and case to case. But it is legitimate to ask if they could inform and reinforce each other better than at present.

PROGRESS IN CONVENTIONAL ARMS CONTROL

At first sight, it is the contrasts between the two fields that stand out in this respect

[1] Man-portable air defence systems.

[2] The top five weapons producers are the United States, Russia, Germany, the United Kingdom and France; the top exporters are the United States, the United Kingdom, France and Russia (facts from the Stockholm International Peace Research Institute, http://www.sipri.org).

Russian SA-6 GAINFUL is a two stage, solid-fuel, low-altitude surface-to-air missile. Photo courtesy of weapons.technology.youngester.com

too. Conventional arms control has made most progress hitherto through regional deals that cut levels, improve transparency and/or constrain forces' behaviour; with global provisions reserved for inhumane weapons that in practice matter less for winning wars. Negotiated nuclear cuts have also been limited to the U.S./Russian relationship, while nuclear – or WMD-free zones provide an important regional dimension; but the most fundamental instruments of WMD control are still the global ones – including the Comprehensive Nuclear-Test-Ban Treaty (CTBT). This makes sense not just because WMD are an issue for all humanity, but also because the threat of proliferation and break-out looms so large in this field and demands global treatment in an age of worldwide trade, travel and technology diffusion.

»… the most fundamental instruments of WMD control are still the global ones – including the Comprehensive Nuclear-Test-Ban Treaty (CTBT).«

At the technical level, meanwhile, the issue of testing is less germane to conventional weapons dangers – except, tellingly, for missiles – than for nuclear restraint. It is also hard to think of techniques that could be applied to it in the same global style as they can be for purposes of monitoring nuclear breakout, like seismic monitoring or the emissions monitoring linked with a fissile materials cut-off. This does not of course mean that the verification machinery being established by the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) could not be put to good use in other fields of security governance and science[3]. Nor is it saying that the CTBTO's high standards in terms of non-discrimination and comprehensiveness, with equal rights and obligations for all Member States, would not be desirable as a model for conventional disarmament or indeed for quantitative nuclear reductions. It is just that it has so far proved beyond the reach of practical politics to transplant such approaches to other than 'inhumane' weapons.

CALLS FOR AN ARMS TRADE TREATY

The parallels that do exist in control approaches can be seen above all in the 'dual-use' dilemma. Just as WMD policy seeks to build firewalls between non-weapon-related nuclear, chemical and biological activities and their destructive applications, conventional disarmers must find ways to stop 'leakage' from, and misapplication of, personal gun ownership and the national arsenals needed for minimum defence and peace missions. The conventional task is on a different scale because of the ubiquity and huge economic weight of the arms trade: yet this merely underlines the importance of the current United Nations drive for an Arms Trade Treaty that would regulate and restrain transfers globally – and on a universal and equal basis – for the first time in history. Also crucial for curbing both WMD and conventional proliferation are mundane measures like safety of stocks, export controls, tracing technologies and detection of illegal transfer routes. Finally, unwanted weapons and materials of both kinds must be destroyed without endangering people or the environment. Cooperation on such tasks, in regional groupings or between big powers, has double value in both fields for its confidence-building effects.

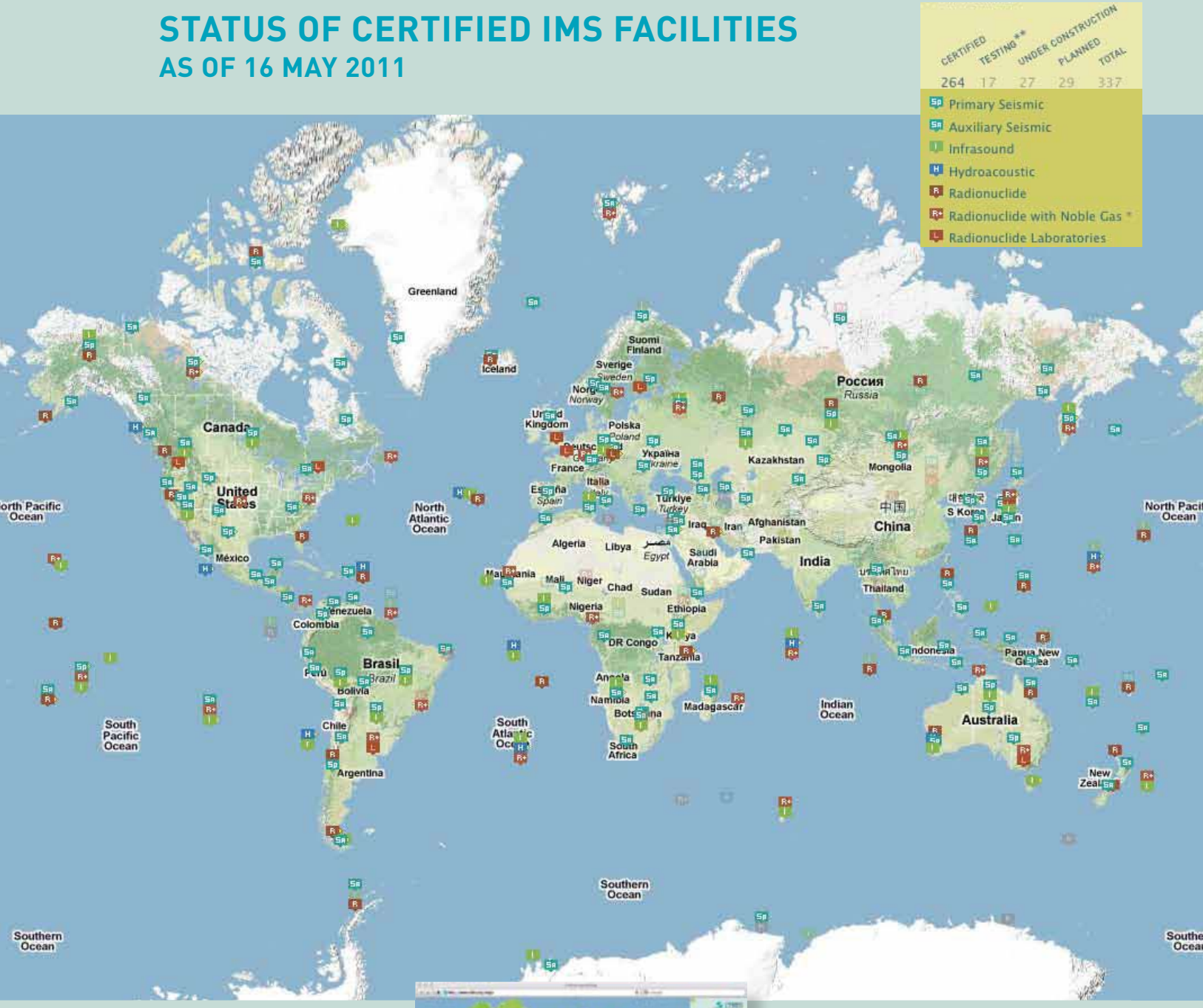
The ultimate challenge in each realm of disarmament is to find political solutions that unite States of different regions, persuasions and levels of development. The ultimate obstacles are the human attitudes of 'Mine are OK, yours not,' 'I'm not going first,' and 'I prefer the risks of arms racing to those of reduction.' Women can fall into those mental traps too, but should not. My fondest wish is that more of them in the new generation will work on the whole range of issues outlined above.

[3] Such possibilities are discussed on the CTBTO website at http://www.ctbto.org/verification-regime/potential-civil-and-scientific-applicationsof-ctbt-verification-data-and-technologies/.

BIOGRAPHICAL NOTE

ALYSON BAILES
is currently teaching security studies at the University of Iceland and the College of Europe at Bruges, after a career spent mainly in the British Diplomatic Service. From 2002 to 2007, she was Director of the Stockholm International Peace Research Institute (SIPRI) and also served on the Weapons of Mass Destruction Commission headed by Dr Hans Blix. In June 2010 she was a keynote speaker on conventional arms control at the Annual Security Review Conference of the Organization for Security and Co-operation in Europe (OSCE) .

STATUS OF CERTIFIED IMS FACILITIES
AS OF 16 MAY 2011



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Global radiation monitoring in the wake of the Fukushima disaster

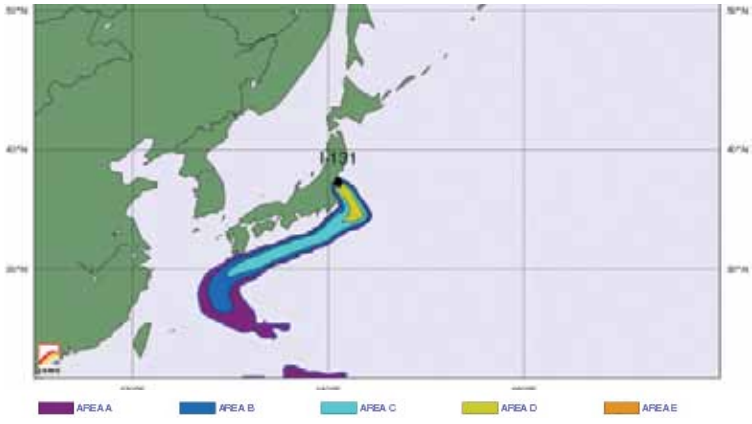
BY KIRSTEN HAUPT AND THOMAS MÜTZELBURG

Since the double disaster of the 9.0 magnitude earthquake and tsunami that affected hundreds of thousands of people and seriously damaged the Fukushima Daiichi power plant in Japan on 11 March 2011, minute traces of radioactive emissions from Fukushima have spread across the entire globe. By mid-April, most of the radionuclide stations of the International Monitoring System (IMS) had detected radioactive particles and noble gases from the Fukushima accident. The IMS is a global network that will comprise 337 facilities when complete. Sixty-three of the 80 planned IMS radionuclide stations are already operational and able to detect airborne radioactivity.

SPREADING ACROSS THE ENTIRE GLOBE

The first analysis results of the monitoring data became available a few days after the accident. A clear picture quickly emerged. Initial detections of radioactive materials were made on 12 March at the Takasaki monitoring station in Japan, just 300 km away from the troubled power plant. The dispersion of the radioactive isotopes could then be followed to eastern Russia on 14 March and to the west coast of the United States two days later.

Nine days after the accident, the radioactive cloud had crossed Northern America. Three days later, when a station in Iceland picked up radioactive materials, it was clear that the cloud had reached Europe. By day 15, traces from the accident in Fukushima were detectable all across the northern hemisphere. For the first four weeks, the radioactive materials remained confined to the northern hemisphere, with the equator initially acting as a dividing line between the northern and southern air masses. By 13 April, radioactivity had spread to the southern hemisphere of the Asia-Pacific region and had been detected at stations located in Australia, Fiji, Malaysia and Papua New Guinea.



Fukushima Daiichi power plant: a regional dispersion simulation (Austrian Meteorological Service ZAMG)

UNPARALLELED SENSITIVITY

The monitoring system of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) can detect a range of radioactive isotopes, among them iodine-131 and caesium-137. Looking at the ratios between the various radioactive isotopes enables the source of the emission to be identified. In the case of the current readings, findings clearly indicate radionuclide releases from a damaged nuclear power plant, which is consistent with the recent accident at Fukushima in Japan. By 13 April, the average level of radioactivity picked up by the stations worldwide continued to decline, which is also due to the relatively short half-lives of iodine-131 (8 days) and xenon-133 (5.2 days).

The CTBTO's radionuclide stations are designed to register minuscule amounts of radioactive particles and noble gases – down to a number of a few atoms. The system's sensitivity is second-to-none – it can detect a concentration of 0.1 g of radioactive xenon evenly distributed within the entire atmosphere of the Earth. A rooftop detector at the CTBTO's headquarters in Vienna still catches traces of emissions from the 1986 Chernobyl disaster.

BENEFITS FOR DISASTER MITIGATION EFFORTS

The IMS is being built to ensure compliance with the Comprehensive Nuclear-Test-Ban Treaty (CTBT), which bans all nuclear explosions. CTBTO monitoring data and technologies, however, offer a host of additional benefits, particularly in relation to disaster mitigation. One of these benefits is already in place – the contribution of data to tsunami warning efforts. In 2006, Member States mandated the CTBTO to provide seismic and hydroacoustic monitoring data to a number of tsunami warning centres in the Indo-Pacific region. Data were also made available to Japan when it was hit by the massive earthquake on 11 March. Tragically, tens of thousands of people were killed by the tsunami; but many were saved due

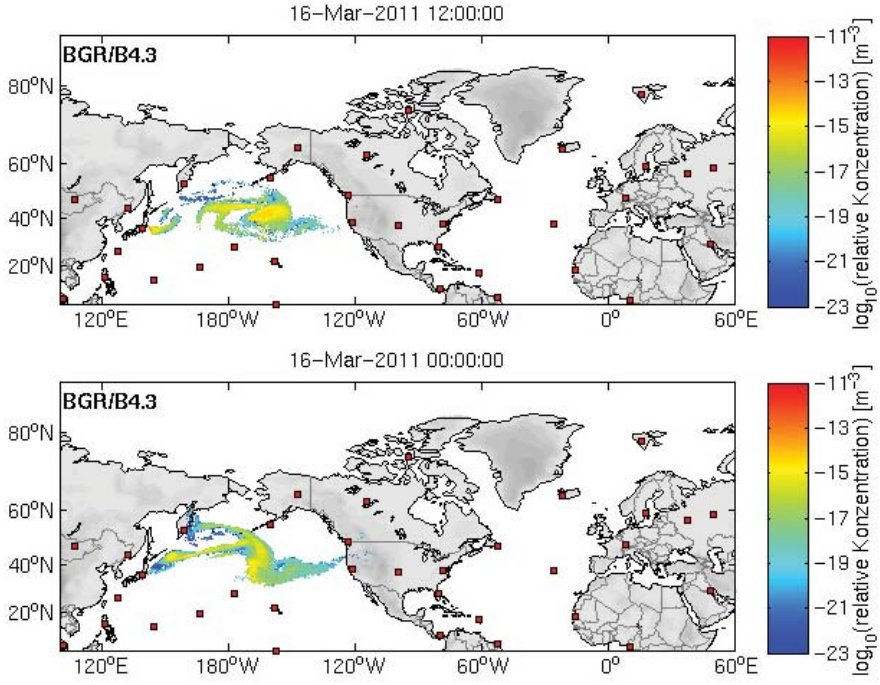
to the rapid alerts. According to Japanese authorities, CTBTO data helped them to issue tsunami warnings within a few minutes, thus allowing many people to escape to higher ground. CTBTO data also helped other countries in the region, such as Australia, Indonesia, Malaysia, the Philippines and the United States, to issue timely tsunami warnings, even though the wave turned out to have lost its devastating power by the time it had reached these countries' shores.

ENHANCED COOPERATION WITH OTHER INTERNATIONAL ORGANIZATIONS

Following an initiative by United Nations Secretary-General Ban Ki-moon, relevant international organizations agreed on 25 March 2011 to enhance cooperation to help mitigate the consequences of the nuclear disaster in Japan. These organizations include the CTBTO, the International Atomic Energy Agency (IAEA), the World Meteorological Organization (WMO), the UN Development Programme (UNDP), the World Health Organization (WHO) and the UN Office for Disarmament Affairs (UNODA).

The CTBTO contributes to this effort by providing information on the detection of radioactive isotopes from its worldwide monitoring network. The CTBTO can also assist in predicting the global dispersion of radioactive material by using its atmospheric transport modelling (ATM) tool, which has been developed in cooperation with the WMO. This method allows for the calculation of the dispersion of a given radionuclide emission, using meteorological data. This calculation can be performed as back tracking in order to identify the area where a radionuclide may have been released, calculated from the station where it was observed. In the case of Fukushima, where the point of release was known, the CTBTO applied forward ATM to predict where radionuclides would travel in the future.

Although the emissions were initially based on estimates only, they proved to be 95 percent correct as the radionuclides mostly reached the stations within hours of the time predicted. With information made available later by the IAEA on the release level of radioactive substances at the Fukushima power plant – the so-called source term – the CTBTO has been able to quantify and refine its global dispersion predictions.



Simulation of dispersion of radioactivity. Courtesy of the German Federal Institute for Geosciences and Natural Resources

RADIOACTIVITY OUTSIDE OF JAPAN BELOW HARMFUL LEVELS

The present event has understandably given rise to concerns about manmade radiation. In particular, atmospheric nuclear testing in the 1950s and 1960s caused widespread fallout, resulting in radiation-related diseases and deaths and rendering vast areas uninhabitable to this day. These nuclear tests had the most direct impact on the immediate region. The danger from fallout decreases with distance, as radioactive particles are dispersed into the atmosphere or washed out through precipitation. A number of radioactive isotopes also have a limited half-life of a few days or weeks, which reduces the overall radioactivity with time. Other radioactive substances though, such as plutonium, linger for thousands of years. The locations where over 1,500 underground nuclear tests were carried out worldwide are highly contaminated and have had to be completely fenced off to limit the danger to humans.

The cumulative effects of the nuclear explosions resulted in much higher levels of radioactivity than were observed after the Chernobyl disaster. Radioactive isotopes could be traced in the baby teeth of children born even at great distances from the test sites in these decades. By comparison, the levels detected at stations outside Japan up until May 2011 have been far below levels that could cause harm to humans and the environment. The levels are comparable to natural background radiation, such as cosmic radiation and radiation from the environment on Earth, and are lower than those from manmade sources, such as medical applications or nuclear power plants (under normal operations) or isotope production facilities.

BIOGRAPHICAL NOTES

KIRSTEN HAUPT
is a historian who has been working for CTBTO Public Information since 2005. Prior to this, she worked for 13 years in the field of public information in peacekeeping missions in Cambodia and in the former Yugoslavia.

THOMAS MÜTZELBURG
joined CTBTO Public Information in April 2011. Prior to this, he worked for the German Foreign Office in Berlin and Vienna from 2005 on CTBT-related issues.

Beacons in the nuclear night

Maintaining the health of the International Monitoring System

BY PETER RICKWOOD

Natalie Brely, Chief of the Monitoring Support Facilities Section at the International Monitoring System Division.

Shouting voices, a flaming brand, and one after the other the beacons burst into flames sending the signal from hilltop to hilltop.

Beacons have offered protection by raising the alarm against danger for more than two thousand years. They've dispatched the signal about impending invasions and borne the message that led to the defeat of navies. The light of a beacon, the lighthouse on a treacherous shore, has guided sailors to safety.

Today a network of beacons girds the planet, monitoring the land, sea and air for the dangers of nuclear explosions. It employs advanced technologies, yet its purpose is fundamentally the same as its hilltop predecessors: it offers vigilance and the means to warn of danger.

TSUNAMI WARNING IN 2011

In March 2011 the International Monitoring System (IMS) registered the huge earthquake off the coast of Japan, flashing messages to tsunami warning centres. Then sensors that sniff the air started tracking radiation in the atmosphere from the damaged Fukushima nuclear reactors.

The requirement of a lighthouse keeper was to ensure that there would always be a beam of light flashing from the lighthouse. Enshrined in the Comprehensive Nuclear-Test-Ban Treaty (CTBT) is a performance requirement just as rigid. There is only a two per cent allowance for failure by land and sea facilities in reporting data. In other words, the system has to meet a 98 per cent standard for making data available to the International Data Centre (IDC) in Vienna. Atmospheric monitoring has to meet a 95 percent criterion.

Ensuring maintenance and logistical support for the system to meet these requirements is the task of a group of some 25 women and men (regular and temporary staff) headed by Natalie Brely at the Vienna headquarters of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO).

It sounds straightforward. But access to stations in remote locations such as Antarctica is limited to a few months every year. Logistical challenges for other isolated facilities also require extensive planning. And, the more mundane task of avoiding delays to delivery of equipment at States' customs posts may be just as challenging.

CTBTO LIGHTHOUSE KEEPERS

"We have to ensure that the woman or man running a CTBTO facility has all the necessary tools, equipment and knowledge to attempt to avoid problems or be able to fix them as fast as possible. The bottom line

is that a station can be down for no more than seven days, which requires us to detect, troubleshoot, identify and repair a failure as fast as possible. It is important that the station is brought back to operation as soon as possible," Brely said.

As of the end of February 2011, there were nearly 1,000 women and men in 84 countries, the CTBTO equivalent of lighthouse keepers, operating its monitoring facilities.

"Each station, when it's built, is provisioned with spare parts, manuals and tools in order to be able to react in the event of a break down," Brely said. "When a station is certified, which means that it meets Treaty requirements and is capable of being part of the monitoring system, we have a snapshot of all its components and an environment which allows us to adapt the support and supply chain structure in an optimal manner."

Some parts, such as computers and digitizers, have a life expectancy of three to 10 years, said Brely. A seismometer may have a 20 year life expectancy. "Good engineering attempts to ensure that all these components are designed in a modular fashion. If a part breaks down, you replace it with a new one."

STAYING AHEAD OF THE SYSTEM'S NEEDS

Which, loosely translated, means that Brely and her team must remain in continuous motion to stay ahead of the huge system's routine maintenance needs and replacement of parts. That doesn't take into account the unforeseen, emergencies and catastrophic failures, "but we do try to plan for these as best as possible" she says with a smile.

And when facilities are located in the middle of deserts, on remote islands, or close to the Earth's poles, keeping them running becomes even more of a challenge.

From an investment of 1 billion USD over the last 15 years, engineers have installed a system of monitors, some in the world's most desolate places, to detect any evidence of nuclear explosions. This system is the verification arm of the Treaty.

By the end of 2011, 280 of 337 facilities when the system is complete, will have been certified. The cost of operating and sustaining the network in 2011 will be nearly 30 million USD.

Data are collected round the clock by a planet-wide stethoscope, amplifying sounds from the Earth to determine if any of them could be a nuclear explosion. Seismic and infrasound facilities monitor underground, and the Earth's atmosphere and hydroacoustic stations listen for sounds in the oceans. Radionuclide facilities sniff the atmosphere for evidence of radioactive particles and gases.

A DELUGE OF DATA

Every year IMS facilities log about 30,000 events. In the deluge of data dispatched to the CTBTO headquarters in Vienna by satellite, these are the signals that could indicate a nuclear explosion.

The information is provided in a form known as waveform data. To the uninitiated it appears to be indecipherable squiggles. The squiggles, however, are the language in which the electronic record of seismic, infrasound and hydroacoustic monitoring data are expressed.

On a daily basis ten gigabytes of such data are transmitted by satellite to the CTBTO's headquarters. Under the terms of the Treaty, all of its 182 Member States have equal rights to make use of the data. "This is the beauty of this Treaty," says Brely. "No matter if a country hosts one, none or many monitoring facilities, all Member States have equal rights to all the data."

The numbers belie the fact that the monitoring system is not only the sum of its technologies and facilities but also the operators serving it, Brely says.

The response is to have a policy of forward investment, she explains, one that makes every effort to ensure station operators have all the tools, knowledge and equipment they need.

"We need to make sure that all the operators understand their role and each one recognizes the importance and value of the system. Only by accomplishing that will we be able to really ensure that the monitoring system and the CTBT in its entirety will be sustainable and reliable for years to come."

Brely, a Canadian born mother of four children, honed her skills to manage support of the CTBTO monitoring facilities from 20 years experience in maintenance and logistics in the Canadian armed forces. "It taught me the indisputable value of the power of a team and the reality that it's only as strong as its weakest link," she said.

REGIONAL DEPOTS

To ensure swift delivery of services, the CTBTO is setting up regional depots, providing supplies and technical support in a timely manner.

Still, Brely and her team are mission control for the network, on standby to support its operators and their stations, prepared to send out a breakdown crew when there is no alternative.

"If the station operator can't fix a problem, we'll send a maintenance team," Brely said. However, the service comes with a condition. "One of our objectives is that a maintenance team won't travel twice to a station for the same problem. The station operator will need to be part of the repair mission so that she/he learn and can do it herself/himself the next time around."

Natalie Brely meets with Ilse Adonis (centre) from the South African Permanent Mission and Rael Sheti (left) from the IMS, to discuss the timely and cost free customs clearance of IMS equipment in South Africa.

Photo: Pablo Mehlhorn

SELF-RELIANCE

Self-reliance becomes even more of an issue for Brely regarding the 120 auxiliary stations in the system, which provide information only upon request. Under Treaty terms, they are the responsibility of the countries in which they are located.

The CTBTO can provide remote technical support and training for their operators, but otherwise Brely is limited to using moral suasion to ensure these operators and the host countries play their important role in the system.

"Our responsibility is limited to providing remote technical support, documentation and training. I can identify someone who needs more training but that is all I can do. The host country has to figure out how to do it by itself. It has to fund operations and maintenance – national implementation has been a huge issue that we are addressing."

Auxiliary stations have a vital role to play in ensuring compliance with the Treaty. They are required to help narrow the focus in an area suspected to have been the site of a concealed nuclear explosion. Then, after entry into force, the ultimate tool at the Treaty's disposal can be used, feet on the ground – an on-site inspection to provide further evidence that a test has taken place.

BUILDING OWNERSHIP

"We're continually trying to enhance local understanding, to create the sense of ownership that's required. This is a joint venture – we can't do it alone, we want the countries with auxiliary stations to take pride in them and encourage their operators to be proud as well. They need to put into place the necessary support structure to allow their operators to fulfill their role," Brely said.

"The station operator is our ambassador, our first line of defense. If the operators of auxiliary stations as well as all other CTBTO stations aren't treated properly, they won't be part of the solution."

More than two thousand years ago in the Han Dynasty, beacons were a feature of China's Great Wall. In 290 B.C. Ptolemy erected a 100-metre high lighthouse at the entrance to the harbour of Alexandria, which became one of the Seven Wonders of the classical world. In Iran in the Middle Ages large minaret lighthouses were erected beside the sea route at the mouth of the Persian Gulf.

Following the fall of the Roman Empire no new lighthouses were constructed in Europe until after the end of the so-called Dark Ages. Since 1945, nuclear weapons have imposed their own darkness from the threat that their use risked immolation of the planet.

The CTBT and its monitoring system represent a beacon for a new direction away from such dangers. Historians of the future may well view its verification network as the first signs of safety emerging from the perils of an era of nuclear weapons.

BIOGRAPHICAL NOTE

PETER RICKWOOD worked for most of his career as a journalist before joining the International Atomic Energy Agency (IAEA) as a press officer in 2001 where he worked for eight years. He has been working for CTBTO Public Information since October 2009.

Employment opportunities for women

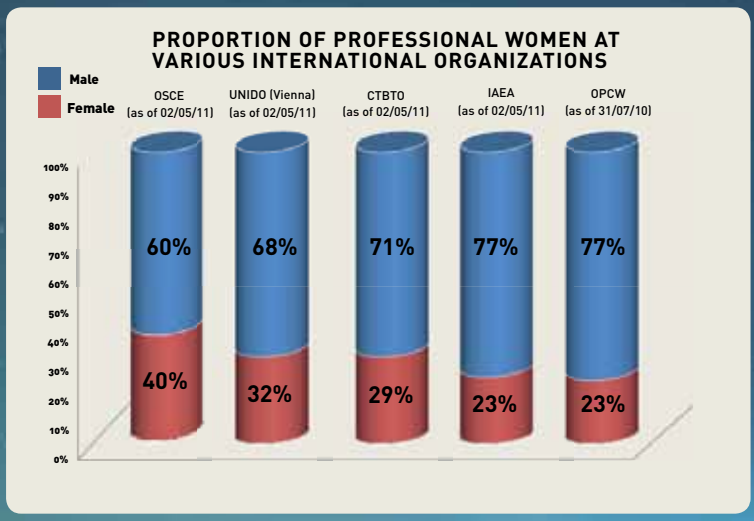
The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) is currently establishing a global verification regime to monitor compliance with the Comprehensive Nuclear-Test-Ban Treaty. Great progress has been made since 1996 thanks to the extensive skills and experience of the CTBTO's international workforce.

As we strive to reach our goal to end all nuclear explosions once and for all, we welcome applications from suitably qualified individuals committed to helping us achieve this objective. Qualified women candidates are highly encouraged to apply. Exciting opportunities exist for professionals in a range of disciplines, and we are particularly interested in candidates with strong scientific and technical backgrounds.

OUR STRENGTH LIES IN THE QUALITY OF OUR PEOPLE.

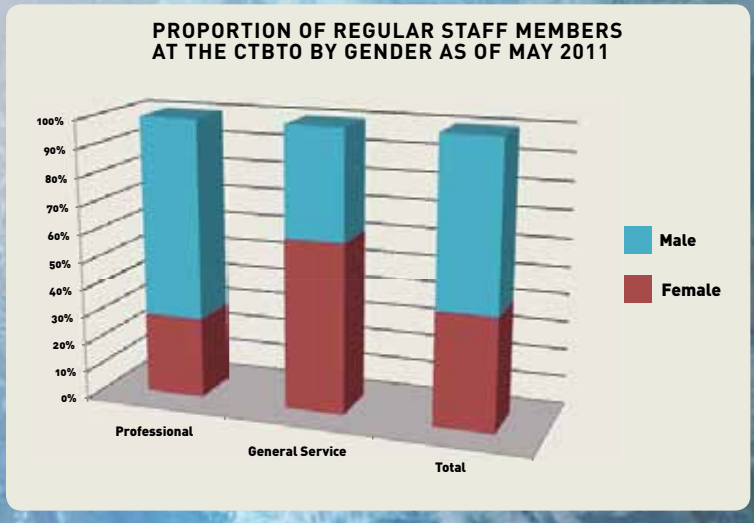
Visit our website now for more information. www.ctbto.org

At the beginning of February 2011, seven of the 37 senior management staff at the CTBTO were women. Back row – left to right: Natalie Brely, Lisa Tabassi, Regina Kusuma, Grace Okungu, Silvia Alamo. Front row – left to right: Hongmei Deng and Annika Thunborg.



IAEA – International Atomic Energy Agency
OPCW – Organisation for the Prohibition of Chemical Weapons
OSCE – Organization for Security and Co-operation in Europe
UNIDO – United Nations Industrial Development Organization

Celebrating International Women's Day at the CTBTO, 8 March 2011.



Making sense of it all

Three data analysts talk about the challenges and rewards of working at the International Data Centre

BY DENISE BRETTSCHNEIDER

Every day the global network of monitoring stations of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) transmits around 10 gigabytes of data to the International Data Centre (IDC) in Vienna. This vast amount of data needs to be reviewed by a team of highly trained analysts in order to help determine whether an ambiguous event has taken place and whether such an event may have been a nuclear explosion.

IDC analysts review an average of 30,000 waveform events a year, the majority of which are earthquakes, and analyze approximately 20,000 radionuclide spectra. Analyzing the data requires great technical expertise combined with considerable experience and careful judgment.

Of the 25 current analysts at the IDC, nine are women (temporary and regular staff) from a diverse range of countries, reflecting the commitment of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) to ensuring a wide and well-balanced geographical distribution of staff.

GEOPHYSICIST MARCELA VILLARROEL

IS PROUD OF HER WORK, HELPING TO MAKE THE WORLD A SAFER PLACE

I first came to the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) in 2001 to participate in a training course for analysts at the International Data Centre (IDC). After completing the course, I was offered a position as an associate analyst at the IDC where I remained for seven years. In 2008, I had a complete change of scenery when I moved to London to work for a company in the oil and gas industry. Although I had an interesting job there, I missed the international environment that I had become used to in Vienna and the work being carried out by the CTBTO.

»The magnitude 9.0 earthquake that struck Japan on 11 March was the fourth largest ever recorded and our workload increased by 600 percent in the period directly afterwards.«

By banning nuclear explosions in all environments, the CTBT is helping to make the world a more secure place. I am deeply committed to the goals of the CTBT, so when I was offered the opportunity to return to the IDC as a lead analyst in August 2010, I was very happy.

As a geophysicist, working as a waveform data analyst at the CTBTO is a unique and challenging experience: monitoring data are collected by more than 240 waveform stations worldwide and transmitted daily to the IDC in Vienna for analysis. No organization anywhere else in the world carries out similar work on this scale!

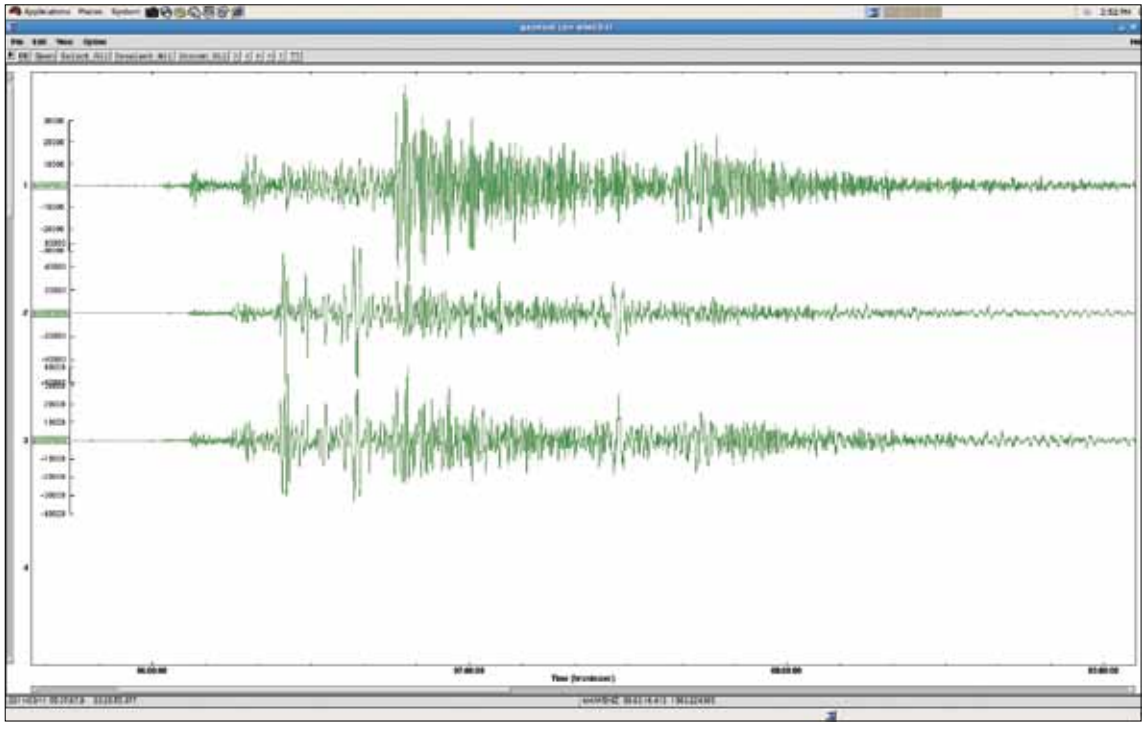
In order to perform interactive waveform analysis with a high degree of confidence, it's essential to have a strong geophysical background and many years of experience. It's really important that you're familiar with each one of the monitoring stations that are part of the IMS network as well as the global seismicity. This is because data collected at the stations will look different depending on a number of factors such as the source location, distance to the station, local structure around the station etc…and you need to understand all of this to be able to build valid events with minimum error. Considering that we cover the whole world and that we have a huge number of stations to look at, it means that it may take several years before you become a good analyst.

An average of 160 events are recorded every day, which the team of analysts here at the IDC will check and decide to validate so that they can either be included in the Reviewed Event Bulletin or discarded as bogus events.

You never know what's going to happen next in terms of seismicity. The magnitude 9.0 earthquake that struck Japan on 11 March was the fourth largest ever recorded and our workload increased by 600 percent in the period directly afterwards. Working as an analyst at the IDC can be stressful but I like the atmosphere within my team. We all support each other and we all work towards the same objective.

When I look around, I consider myself very lucky to be able to carry out technical work in an organization that provides women with equal opportunities. Vienna is also a nice and secure city to live in and I love the cultural diversity and the possibility of communicating in the many different languages spoken here. All in all I'm very proud to be part of the CTBTO family.

»Monitoring data are collected by more than 240 waveform stations worldwide and transmitted daily to the IDC in Vienna for analysis. No organization anywhere else in the world carries out similar work on this scale!«



Seismogram of the 11 March 2011 earthquake recorded at the IMS seismic station Mawson in the Antarctic.

SEISMOLOGIST JANE GORE

FINDS HERSELF AT THE CUTTING EDGE OF DATA ANALYSIS AFTER A CHANGE OF CAREER AND LOCATION

»By the end of February we had already analyzed the equivalent of about one-third of the events normally analyzed in a whole working year! «

I come from Zimbabwe where there are not that many women with PhDs in geophysics – people used to joke that I must be the only woman in the country to hold a PhD in Seismology. After completing my studies, I became a lecturer in the department of Physics at the University of Zimbabwe as well as a visiting lecturer in Geophysics at the University of the Witwatersrand in Johannesburg, South Africa. My previous jobs were very different to my current position at the CTBTO. As a lecturer I used to teach and conduct research. Now I analyze waveform data, lots of it!

It all started in 1999 in Washington DC when a colleague mentioned that she was applying to become an analyst at the CTBTO in Vienna. A couple of years later, looking for a career change, I contacted my friend who had been hired by the CTBTO upon completion of the International Data Centre (IDC) analysts' training course. She advised me to apply and I joined the organization in May 2007.

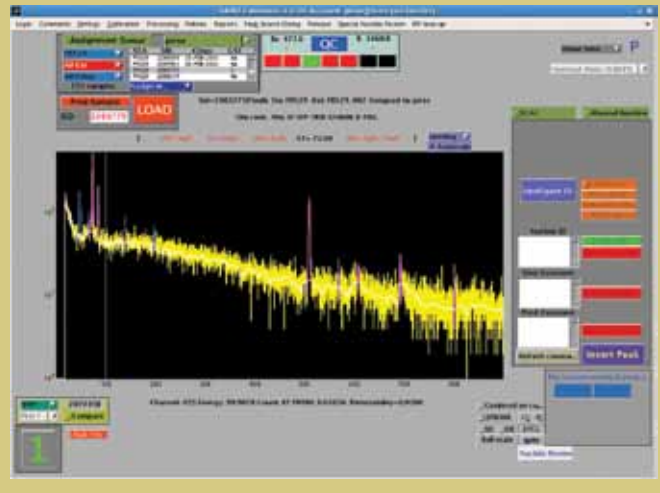
As a data analyst, I have to make sure that Member States receive a reviewed bulletin of all the events that have been detected by CTBT monitoring stations – an REB – within 10 days. So my job is challenging in that we are constantly chasing deadlines: we have to produce a high quality data bulletin for Member States in a timely manner which can mean working very long hours and at weekends, if necessary.

When Japan's massive earthquake struck the north-east coast of the country on 11 March and triggered a huge tsunami, the number of events we included that day in the REB increased to 816. And the following day there were 840 events. Considering that the average daily figure is 160 events, it meant that we had to work round the clock to make sure that Member States received the REB.

Even prior to 11 March, this year had been exceptionally busy. By the end of February we had already analyzed the equivalent of about one-third of the events normally analyzed in a whole working year! This was due to a particularly high number of events – mainly earthquakes – occurring after the Christmas break.

One of the most memorable days since I've been here was 25 May 2009. At 5 in the morning, my phone suddenly rang. It was the office. Some of my colleagues at the IDC had been following monitoring data which had been arriving in Vienna and indicated that there was a suspicious event located in the Democratic People's Republic of Korea, which could be a nuclear explosion. I was among the group of analysts who performed the initial analysis of the event. This event was well recorded by IMS stations around the world: 61 IMS seismic stations detected signals, with 59 of these stations contributing to the location of the event.

It's very rewarding to work for an organization which is committed to making the world a safer place by banning all nuclear explosions. I also enjoy the cultural diversity and the opportunity to meet people from every corner of the globe. It has been interesting to learn how other people relate to issues and solve problems.



Spectrum acquired from the IMS radionuclide noble gas station in Reunion in the Indian Ocean.

PHYSICIST CARLA PIRES

IS PART OF THE TEAM THAT HELPS DEVELOP RADIONUCLIDE MEASUREMENT CAPABILITIES

Before I joined the IDC, I worked mainly in the field of radiological protection and nuclear safety. After graduating in Physics in 1998, I spent three and a half years working in an environmental laboratory at the Instituto Tecnológico e Nuclear in Portugal. I also gained valuable knowledge in 2001 at the Radiation and Nuclear Safety Authority in Finland, such as learning about sample analysis and the type of software used in the laboratory. Then in June 2002, I was fortunate enough to be offered a position as an associate analyst in the Radionuclide Monitoring Unit of the IDC at the CTBTO.

Being an analyst has been a great opportunity to increase my knowledge in the field of gamma spectroscopy and related issues. The work is very different to my previous jobs as I'm far away from measuring systems. In 2003 I became responsible for testing new International Monitoring System (IMS) radionuclide particulate stations. This work has been fascinating and has allowed me to familiarize myself with radionuclide systems being used in a number of countries around the world. I've gained a wealth of knowledge and experience about the different types of spectra acquired by various detection systems and have learned more about the telltale signs of malfunctioning devices.

In July 2008, I was promoted to radionuclide lead analyst and in 2010 I started reviewing the radionuclide noble gas spectra from gamma and beta-gamma systems. My job mainly involves identifying the radiation emitters responsible for the peaks observed in the radionuclide spectra. I also helped test the first radionuclide noble gas station that was certified in August last year and I'm part of the team that tests radionuclide software and contributes to its improvement.

Over the last eight years, I've sometimes had to work very late or over the weekend as there are constant deadlines to be met. For example, the other evening I left work at 20:00 because I needed to finish checking the data sent by one of the IMS radionuclide laboratories, the eleventh laboratory due for certification this year. These laboratories provide independent analysis of radionuclide particulate samples – only samples with specific radionuclides are sent there for repeat measurements to confirm the presence of fission and/or activation radionuclides[1]. When the devastating tsunami disabled the emergency generators required to cool the reactors at the Fukushima nuclear power plant in Japan on 11 March, I had to cancel my trip to the laboratory and the testing of the radionuclide software was postponed.

The development of the global monitoring system informs people all over the world about radionuclide measurement capabilities in other countries. I'm honoured to be part of a team that has helped create a database of worldwide information. We have gained knowledge and experience which is possible thanks to the Treaty, CTBTO staff and the National Data Centres. I hope in the future more studies are conducted with our data to increase our expertise.

[1] Fission products are usually radioactive. Activation products are materials made radioactive by neutron activation.

RADIONUCLIDE LEVELS

The IDC categorizes samples measured by IMS facilities based on the radionuclides detected into the following levels:

LEVEL 1:
Only radionuclides from natural sources detected.

LEVEL 2:
Radionuclides from natural sources detected at anomalous concentrations.

LEVEL 3:
Radionuclides from manmade sources detected that are frequently observed by that particular station (e.g. from hospitals).

LEVEL 4:
One type of radionuclide that is relevant to CTBT verification detected.

LEVEL 5:
More than one type of radionuclide detected that are relevant to CTBT verification of which one is a fission product (such as Cs-137, I-131, Ba-140, La-140 or Te-132).

BIOGRAPHICAL NOTE

DENISE BRETTSCHNEIDER has been working for CTBTO Public Information since May 2008. She has a number of years of editorial experience working for international organizations in Nairobi, Kenya, including the United Nations Educational, Scientific and Cultural Organization.

ANALYZING DATA AT THE INTERNATIONAL DATA CENTRE

TWO MAIN TYPES OF DATA: WAVEFORM AND RADIONUCLIDE

Three of the technologies employed by the IMS - seismology, hydroacoustics and infrasound – are called waveform. Waveform stations monitor and record the movement of energy that is generated by certain events and propagates as seismic waves or acoustic waves through the Earth, the oceans or the atmosphere. As of 16 May 2011, almost 80 percent of these stations were operational and sending data to the IDC. Waveform data can help identify the location of an event and determine whether it was natural or manmade. Natural phenomena include earthquakes, submarine volcanic eruptions, meteorites, explosive volcanoes and storms, while manmade events can include mining and chemical explosions, aircraft, re-entering space debris, oil exploration, and military exercises.

The fourth technology employed by the IMS is radionuclide monitoring, which can confirm whether an event detected and located by the other technologies is indicative of a nuclear test. Radionuclide stations measure the abundance of radionuclides in the air. These include radioactive particles and noble gases such as xenon. As of 16 May 2011, 75 percent of the radionuclide stations were operational. Each radionuclide monitoring station sends a preliminary gamma ray spectrum to the IDC every two hours. The final spectrum which undergoes analysis at the IDC is a two-dimensional plot showing the type and number of radionuclides observed in a sample obtained from a filter that has been exposed to air for about 24 hours.

DATA PRODUCTS FOR MEMBER STATES

A number of products containing information about events recorded by IMS facilities are made available to CTBTO Member States in the form of automatically generated lists of all the events that have been detected followed by more refined lists that have undergone meticulous analysis.

1. STANDARD EVENT LISTS AND AUTOMATIC RADIONUCLIDE REPORTS

The first data processing occurs as soon as waveform data arrive at the IDC, resulting in the production of Standard Event Lists (SELs). These lists are generated automatically every 20 minutes throughout the year by specially designed computer programmes. SELs include location estimates for events formed from signals recorded at IMS waveform stations.

Improvements to the initial bulletin are made as more data arrive in Vienna and are processed. The IDC issues three SELs at different time intervals in order to provide progressively improved location estimates. The first list – SEL1 – is issued within two hours of 'real time', followed by SEL2 after about four hours and SEL3 after six hours.

The initial processing of radionuclide data is also automatic and the results are listed in the Automatic Radionuclide Report. After automatic analysis, the results are refined by IDC analysts during interactive review.

2. REVIEWED EVENT BULLETIN AND REVIEWED RADIONUCLIDE REPORT

In order to provide reliable and comprehensive information to Member States, every single event listed in SEL3 is reviewed by IDC analysts. During this process, analysts discard just over one-third of the automatically produced events. The confirmed and corrected events and signal measurements at each station that detected an event are listed in the Reviewed Event Bulletin (REB). The REB is produced daily and contains an average of 160 events.

Radionuclide data take much longer to be collected and analyzed so data analysis takes place on a different timescale. After reviewing the Automatic Radionuclide Report, analysts produce the Reviewed Radionuclide Report.

3. STANDARD SCREENED EVENT BULLETIN

The next bulletin is the result of an automatic screening process in which natural events such as earthquakes are discarded and manmade events remain. The Standard Screened Event Bulletin thus contains all events that are considered potentially suspicious in the CTBT verification context.

The findings of the screening process for radionuclide data are presented in the Standard Screened Radionuclide Event Bulletin.

SOME OF THE KEY RADIONUCLIDES

BARIUM-140 (Ba-140)
has a half-life of 12.8 days. The half-life is the time for half of the radionuclide's material to decay. Ba-140 decays into lanthanum-140 (La-140), which has a half life of 1.7 days. By analyzing the activity ratio of these two radionuclides, the time of a nuclear explosion can be established.

CAESIUM-134 (Cs-134)
has a half-life of 2.1 years. Only a small amount of Cs-134 is produced by nuclear weapon testing but it accumulates in nuclear reactors. It can therefore be used to distinguish between releases from nuclear weapon testing and nuclear power plants.

CAESIUM-137 (Cs-137):
has a half-life of 30.1 years. This is the most common radioactive form of caesium and is produced by nuclear fission. Cs-137 is one of the major radionuclides in spent nuclear fuel and radioactive wastes associated with the operation of nuclear reactors and fuel reprocessing plants. Large amounts of Cs-137 and other radioactive isotopes were released into the environment by atmospheric nuclear weapon tests between 1945 and 1980. Cs-137 did not occur in nature before nuclear weapon testing began.

IODINE-131 (I-131):
has a half-life of 8.0 days. I-131 is a radioactive isotope released into the environment mostly in gaseous form as a result of the atmospheric testing of nuclear weapons and accidents that have occurred at nuclear power plants (e.g. the Chernobyl nuclear power plant in 1986 and the Fukushima power plant in March 2011). It was a significant contributor to the effects on human health from atmospheric nuclear weapon testing and from the Chernobyl disaster.

TELLURIUM-132 (Te-132):
has a half life of 76 hours. It is produced by nuclear fission and is released in gaseous form in hot conditions after a nuclear power plant accident or nuclear test. It decays to iodine-132 (I-132), which has a half-life of 2.3 hours. I-132 contributes significantly to the effects on human health during the first few days after the nuclear reaction has stopped.

XENON-133 (Xe-133):
has a half-life of 5.2 days. It does not occur in nature but is released from nuclear power plants and nuclear weapon testing. As a noble gas, xenon-133 does not react with other materials and only poses a very small risk to human health when released into the atmosphere.

A New Link in the Data Chain

The Congo's National Data Centre is a model for the region

BY MISRAK FISSEHA

Misrak Fisseha trains an NDC analyst during the two-week Middle East and South Asia training course, December 2010 Photo: Pablo Mehlhorn

Over recent months, I've been responsible for organizing and conducting follow-up technical visits to National Data Centres (NDCs) in North and West Africa, as part of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization's (CTBTO) Capacity Building Project in Africa. The project provides technical assistance to Member States on the continent so that they can participate fully in and contribute to the implementation of the monitoring and verification system of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) .

The project includes Member States which have yet to ratify the Treaty. One of the countries covered is the Republic of the Congo in Central Africa. With an area of 342,000 sq km (which is slightly smaller than Germany), it's one of the most urbanized countries on the continent with around 85 percent of its estimated 3.7 million population living in the main cities.

In October 2010, I travelled to the capital, Brazzaville, in the southeast of the country to carry out a technical visit. The purpose was twofold: firstly, to provide selected personnel at the Ministry of Defence with the skills necessary to establish and improve their NDC capabilities; and secondly, to coordinate a two-day NDC Sub-Regional Development Workshop designed to enhance awareness of the CTBT and provide a forum for the exchange of experiences and expertise related to establishing an NDC. The visit was of particular importance because it was the first time that Congo had participated in any training course or workshop organized by the CTBTO. The Director of the International Data Centre (IDC) Division, Lassina Zerbo, played a key role in facilitating the activities when he previously travelled to Congo to meet with the national authorities.

IMPORTANCE OF HIGH-LEVEL SUPPORT

My colleague, Mario Villagran, flew to Brazzaville a week before me in order to install the necessary Capacity Building System equipment at the NDC. When I arrived in Congo on 6 October, my first assignment was to meet with the Minister of Defence, Charles Zacharie Bowao, and representatives from the national authorities. It's imperative to secure high-level backing for the training activities to succeed. Since many countries in sub-Saharan Africa are confronted with a number of pressing issues related to development, health and education, they need to understand why the CTBT is important.

The fact that Congo signed the CTBT on 11 February 1997 means that it has access to all monitoring data and analysis reports as well as to technical training courses offered by the CTBTO. During my discussions with the Minister, I explained that in addition to the verification regime's primary purpose of Treaty verification, CTBT monitoring data offer a range of potential civil and scientific benefits which can contribute to sustainable development, knowledge expansion and human welfare. In

NATIONAL DATA CENTRES IN AFRICA

A total of 23 countries in Africa (in green) hosted a National Data Centre as of 16 May 2011.

the case of Congo, for example, data could be used to help improve aviation safety by detecting volcanic explosions, for contributing to climate change research, or for maritime surveillance, which could be useful in view of Congo's short Atlantic coastline. I also stressed how the planned workshop would be a significant event for the whole of the Central African sub-region.

The Minister was clearly convinced of the importance of the CTBT and the capacity building activities as he provided the necessary support and concluded our discussion by saying: "La connaissance n'a pas de prix. C'est l'ignorance qui nous coûte cher." *[Knowledge has no price. It's ignorance that costs us a lot.]*

MAXIMUM INTERACTION DURING INTENSIVE TRAINING

Having secured the full backing of the Minister of Defence, I was able to proceed with the NDC training activity on 6 October. This was a five-day intensive programme for five personnel from the Ministry of Defence and the NDC manager. We restricted the number of participants in order to ensure maximum retention and interaction. Operating an NDC requires years of experience so intensive training provides personnel with the necessary basics for the day-to-day operation of an NDC and the use of the Capacity Building System, as well as the routine use of monitoring data and analysis reports.

OVERCOMING INFRASTRUCTURAL CHALLENGES

During my stay, I had to contend with a few infrastructural problems. For example, internet access is limited in Congo and there are intermittent power cuts. We overcame these problems by downloading seven gigabytes of data prior to the course so that it could be saved for training purposes. When I arrived at the Ministry, there were only two computers available for the course. For efficient training, each participant needs their own computer so one of my first tasks was to organize additional computers for all trainees, which was made possible with the assistance of the Ministry of Defence.

Congo's NDC, which was built from scratch, became operational during my visit, making it the first country in the Central African sub-region to have a fully established NDC.

The training went extremely well. Participants learned how to use monitoring data and analysis reports and how to operate the NDC-in-a-box software. I also informed trainees about the CTBTO, the Treaty and the verification regime and participants acquired a basic understanding about how the International Monitoring System and IDC operate, and the fundamentals of the four verification technologies used to verify compliance with the CTBT (seismology, infrasound, hydroacoustics and radionuclide monitoring).

In order to strengthen the training skills of the participants, I copied all of the presentations, e-learning modules etc. on to the local disk so that it can be used as a knowledge repository for

the Congo-NDC staff. The trainees can continue to practice using the materials at hand like e-learning courses in their own time. The participants were able to derive maximum benefit from the training since the programme was tailored to address the basic set of skills and was conducted in French, which is the official language of Congo.

It was a very rewarding experience that was made possible through the total commitment and support of the IDC Director and our Congo counterparts, including the Ministry of Defence. This allowed us to set up an NDC and carry out essential training in a relatively short period of time, despite the challenges.

UNIQUE OPPORTUNITY FOR PARTICIPANTS TO SHARE EXPERIENCES

Upon completion of the NDC training course, I helped coordinate a regional NDC workshop. This event was supported by the Ministry of Defense and took place at the Ministry of Foreign Affairs from 14 to 15 October. It was attended by 44 participants from six countries in the region: Benin, Chad, Central African Republic, Congo, Democratic Republic of Congo and Gabon, as well as CTBTO staff. Of these countries, Chad and Congo still need to ratify the Treaty and the benefits of ratification were highlighted during the workshop. Another aim of the workshop was to inform participants about the potential civil and scientific uses of monitoring data, and to foster cooperation between the CTBTO and representatives from the region.

It was the first workshop of its kind to be conducted in French and provided a unique opportunity for participants to exchange experiences and expertise related to the establishment and operation of NDCs.

The CONGO-NDC trainees were also able to demonstrate their newly acquired skills to fellow participants. The Congo-NDC became officially operational after the opening ceremony.

Misrak Fisseha (sitting) attends a high level meeting with the Minister of Defence, Charles Zacharie Bowao (head of the table), and his cabinet, 6 October 2010.

A MODEL FOR CENTRAL AFRICA

By the time my technical visit ended, it was clear that the Congo-NDC could be used as a model for other beneficiary Member States covered by the Capacity Building Project for Central Africa wishing to establish NDCs. Both the training, the workshop and Congo-CTBTO relations received considerable media attention.

The challenge for other States in the region will be to replicate the success of the Congo-NDC, which is now engaged in a long term commitment with the CTBTO. In order to ensure the NDC's sustainability and the increased use of CTBT monitoring data, bulletins and analyses, it is expected that this partnership will be consolidated by the experience gained by NDC staff and further training courses. It will also be important in the future to provide venues for the exchange of experiences with other institutions for both bilateral and regional cooperation.

BIOGRAPHICAL NOTE

MISRAK FISSEHA
works in Capacity Building and Training at the International Data Centre Division at the CTBTO. Under the Capacity Building Project, her work mainly involves extensive travelling to countries in North and West Africa to train National Data Centre staff, sharing the knowledge and expertise that she has accumulated over the decade she has worked for the CTBTO.

BACKGROUND

ACCESSING MONITORING DATA, BULLETINS AND ANALYSES

One of the unique features of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) is the real time provision of information directly to participating States. Member States have open, equal, timely and convenient access to all monitoring data, bulletins and analyses (these products are described on page 28). Currently, the Preparatory Commission for the Comprehensive Nuclear-Test-Ban-Treaty Organization (CTBTO) provides such products to 120 Member States and over 1,200 scientific and academic users. In addition to test-ban verification, the data and analyses can offer civil and scientific benefits such as for tsunami warnings and radiation monitoring. (For more information, please see www.ctbto.org).

DESIGNATING A NATIONAL AUTHORITY

The CTBT requires each Member State to designate a national authority to liaise with the CTBTO and other Member States. The national authority can facilitate the establishment and operation of a National Data Centre (NDC) to manage the exchange of data with the International Data Centre (IDC) in Vienna.

THE ROLE OF THE NATIONAL DATA CENTRE (NDC)

An NDC is an organization with technical competence in the CTBT verification technologies working under the guidance of a national authority.

The NDC provides technical advice to the national authority. Monitoring experts at the NDC review and refine the analysis results provided by the IDC, leading to the identification of ambiguous events. Based on these results, each Member State makes its own national assessment and final judgment regarding the nature of an event, in accordance with the Treaty.

The relationship between the IDC and the NDC is a two way process. A Member State can request the IDC to provide technical assistance to develop the NDC's capability to receive, process and analyze monitoring data. At the same time, NDCs are required to provide feedback to improve the quality of data bulletins and analyses and thus support the work of the CTBTO.

NDC TRAINING ACTIVITIES AND THE CAPACITY BUILDING PROJECT

Training sessions especially designed for NDC technical staff and station operators are offered to support the functions and operation of NDCs.

One of the courses offered by the IDC is the two-week NDC training course, which aims to:

1. Provide sufficient knowledge and assistance related to the establishment and strengthening of NDCs.

2. Train participants in the retrieval and analysis methods of monitoring data and IDC bulletins and analyses.

3. Show participants how to install and use the NDC-in-a-box software, which the IDC has developed to enable NDCs to receive, process and analyze monitoring data.

Courses and workshops are organized around the world on a regional basis and are open to all Member States. Such activities also provide a venue for regional bilateral or multilateral cooperation. More information about upcoming activities is available at www.ctbto.org.

To help Member States fulfil their verification responsibilities, the CTBTO launched a capacity building project in 2008 in cooperation with the European Union to help beneficiary States strengthen their NDC capabilities.

NDC FOLLOW UP TECHNICAL VISITS

Visiting NDCs for five working days to provide on-the-job training is one part of the technical assistance provided by the CTBTO to Member States. Interaction with the national authorities during the follow-up visit helps the CTBTO to understand the current needs, interests and perceptions of the State. The usage of data can be subsequently reviewed to assess how the NDC is building upon the knowledge acquired during the visit. Member States appreciate this type of training as it is customized to address the particular needs and interests of the NDC in its own working environment.

INTERVIEW

Portugal and the CTBTO: Going forward together

The importance of putting facility agreements in place

Portugal's Secretary of State João Gomes Cravinho (left) and Tibor Tóth, Executive Secretary of the CTBTO, after signing the facility agreement, Vienna, Austria, 17 February 2011. Photo: Pablo Mehlhorn

On 17 February 2011, Portugal became the 40th State to conclude a facility agreement with the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO).

After signing the agreement on behalf of the Government of Portugal, Secretary of State for Foreign Affairs and Cooperation, João Gomes Cravinho, spoke to Lisa Tabassi and Fanny Tonos Paniagua from the CTBTO Legal Services.

Could you describe Portugal's participation in the activities of the CTBTO?

Portugal has always been a strong supporter of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) and has been very active within the CTBTO. It is a member of the Conference on Disarmament, where the Treaty was negotiated. It has three stations in its territory, all of them located in Azores, thus making Portugal one of the few Member States hosting International Monitoring System (IMS) facilities in the middle of the North Atlantic. Portugal always participates in the meetings of different groups of the CTBTO, including, at present, the Advisory Group[1]. Portugal is represented at the CTBTO by highly qualified professionals who act entirely independently. We are always available to cooperate with the CTBTO, as our participation in different workshops has proved. Moreover, being a Member of the European Union we are also responsible for the approval of significant voluntary contributions to the CTBTO.

How do you think the conclusion of this facility agreement will further improve collaboration between Portugal and the CTBTO?

From the very beginning, we have been in favour of this kind of agreement which facilitates the development of good relations between Portugal and the CTBTO. With the agreement we have now signed, numerous problems that could have arisen in the development of the post-certification activities of the stations, namely bureaucratic ones, will be waived. We consider that there is still a long way to go regarding the remaining 49 States that have not yet signed a facility agreement and we commend the CTBTO for its work so far and fully endorse its continuation. With this agreement, relations between Portugal and the CTBTO, which were already excellent, will be sustained and developed. The facility agreement will ensure that our National Data Centre (NDC) will be able to accomplish its task as well, namely sending monitoring data to the International Data Centre (IDC) in Vienna and receiving data and analyses from the IDC.

There has been remarkable progress in the build-up of the IMS since the Treaty opened for signature in September 1996. Of the planned 337 IMS facilities, 264 are already operational and sending data to the IDC. At the same time, however, challenges remain.

[1] The Advisory Group advises the CTBTO and its subsidiary bodies on financial, budgetary and associated administrative issues.

FACILITY AGREEMENTS

WHAT IS A FACILITY AGREEMENT?

- A legal arrangement between the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) and each Member State that hosts an International Monitoring System (IMS) facility. The IMS is a global network of facilities being established by the CTBTO to monitor underground, the oceans and the atmosphere for evidence of a nuclear explosion.

- By signing facility agreements, Member States agree to cooperate with the CTBTO in establishing, testing, operating, upgrading and maintaining IMS facilities, even before the Comprehensive Nuclear-Test-Ban Treaty (CTBT) has entered into force.

WHY ARE THEY IMPORTANT?

Facility agreements help to address the following issues:

- **Political aspects**:
  By representing the formal commitment of a Member State to host the facility and cooperate with the CTBTO during the preparatory phase, the facility agreement helps to secure the collaboration of all relevant institutions at the national level for the installation and operation of the stations.

- **Legal aspects:**
  The CTBT stipulates that while IMS stations are owned and operated by the hosting State, they are under the authority of the CTBTO (meaning that they must adhere to regulations laid out in the CTBT and developed further by the CTBTO). Issues such as ownership transfer, the conclusion of subsidiary arrangements with local operators, and granting the necessary privileges and immunities to the CTBTO and its officials are provided for in facility agreements.

- **Technological aspects:**
  In order for the IMS to operate reliably, all facilities have to work in accordance with the requirements and procedures agreed on by the Treaty negotiators for the respective verification technologies (seismology, infrasound, hydroacoustics and radionuclide monitoring). Under facility agreements the host State undertakes to test, operate and maintain the facility, as well as to provide utilities and transmit monitoring data to the International Data Centre (IDC) at the CTBTO's headquarters in Vienna, in accordance with requirements and procedures.

- **Operational aspects:**
  Facility agreements help ensure coordination between the CTBTO and countries hosting IMS facilities with regard to technical visits by CTBTO staff, access to the station, the cooperation of local entities, assistance with imports and exports, notification and solving of problems, and the physical security of the facility.

HOW MANY FACILITY AGREEMENTS NEED TO BE SIGNED?

A facility agreement needs to be concluded with each of the 89 States hosting IMS facilities.

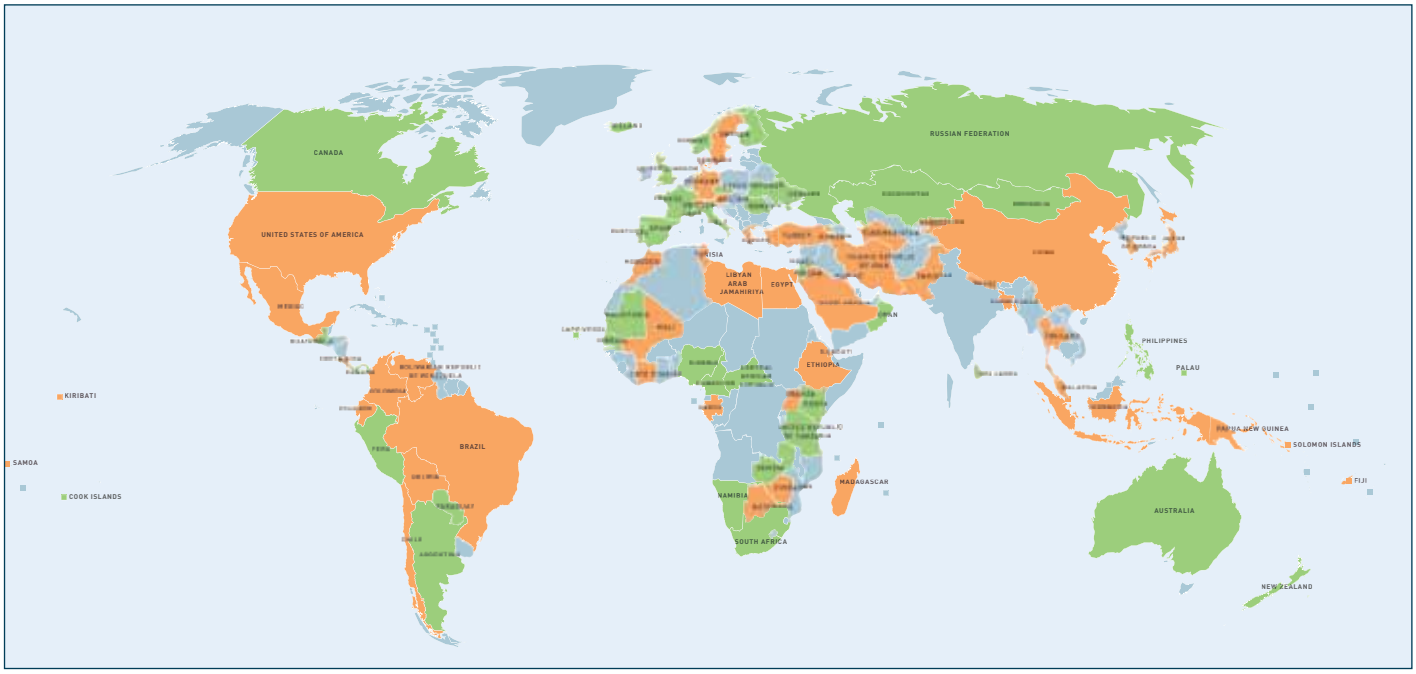
»The facility agreements are one of the best tools to make sure that States comply with their legal, administrative and technical obligations regarding the stations.«

Do you consider that further progress in the conclusion of facility agreements with other hosting States would support the work of the CTBTO in building up the verification regime and preparing for entry into force of the CTBT?

Undoubtedly. The facility agreements are one the best tools to make sure that States comply with their legal, administrative and technical obligations regarding the stations. However, that does not mean they will be enough to solve every problem. The reference to the operational manuals in the facility agreements reflects a successful attempt to make all of the principles and measures stated in the Treaty a coherent and efficient system for the implementation of the Treaty.

What are your Government's views on the role of the CTBT and its verification regime for the maintenance of international peace and security?

The verification regime of the CTBT is an extremely important element to make sure that the world can react in time to an event that may endanger



The 40 countries in green indicate those that have signed a facility agreement with the CTBTO. The 49 countries in orange indicate those that have yet to sign facility agreements (as of May 2011).

international peace and security. We must always bear in mind that the system has four components: the IMS, a consultation and clarification process, on-site inspections and confidence-building measures – which are equally important and they all deserve the same attention by the CTBTO. In the case of facility agreements, we consider that, apart from the advantages for the IMS, they are also a confidence-building measure, both for the State that signs it and for other Member States, as they serve as an example and clearly define rules and procedures. It is, however, mandatory that States fulfill their obligations arising from both the CTBT and the facility agreement.

Is there a role for Portugal in the Portuguese speaking world to encourage States that have signed but not ratified the Treaty to take the next step?

The CPLP – Comunidade de Países de Língua Portuguesa – is an organization that has been enlarging its scope because of the very good relations between its members. Defense is nowadays an area that also concerns CPLP. Within this context, but also bilaterally with its members, Portugal has always been supportive of all measures to enhance peace and security. We shall make extra efforts to help those States that have not finalized the procedures for Treaty ratification and we offer our collaboration to the CTBTO to accomplish this goal.

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WORD CLOUD

This word cloud depicts the frequency with which words have been mentioned in the articles featured in this edition of Spectrum: the larger the font, the more common the word.

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8 to 10 June 2011

Hofburg Palace
Vienna, Austria

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