Nuclear Test Ban

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Converting Political Visions to Reality

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Foreword by Maxime Verhagen, Jonas Gahr Støre and Carl Bildt

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Cover illustrations: Nevada Test Site. The subsidence craters in this area are caused by nuclear testing. Photo courtesy of National Nuclear Security Administration/Nevada Site Office
Atmospheric thermonuclear test explosion "Truckee". Photo from the Nuclear Weapon Archive.

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Foreword

Nuclear tests have caused public concern ever since the first such test was conducted, more than six decades ago. During the Cold War, however, conditions were not conducive to discussing a complete ban on nuclear testing. It was not until 1993 that negotiations on such a treaty finally got under way. From then on, things moved relatively quickly: in 1996, the United Nations General Assembly adopted the Comprehensive Nuclear-Test-Ban Treaty (CTBT). To date, the Treaty has been signed by 178 states and ratified by 144, though it has yet to enter into force, as nine out of 44 "Annex 2 states", whose ratification is mandatory, have not heeded the call. Nevertheless, the CTBT verification system is already provisionally operational and has proven its effectiveness. We commend the CTBT organisation in Vienna for its successful efforts to build a verification network.

This book is an excellent overview of the evolution of the CTBT and its verification regime. The authors are eminent scholars from the Netherlands, Norway and Sweden who have been intimately involved with the CTBT and its verification agency, the CTBTO Preparatory Commission, from their inception to the present day. They have written a thorough and engaging narrative of the long road that led to the CTBT. Their story will appeal to both the layman and the expert and provide useful lessons for future negotiations on disarmament issues.

We believe that the call for disarmament and non-proliferation is gaining renewed momentum in the 21st century. The proliferation of weapons of mass destruction is one of the main threats facing the world today. It should be prevented through a legally binding system of international treaties and enforcement mechanisms. The Nuclear Non-Proliferation Treaty (NPT), which was signed in 1968, aims not only to prevent the proliferation of nuclear weapons but indeed to eliminate them entirely. The CTBT supports the NPT in this respect. Further proliferation would be detrimental to our common security interests and the world as a whole. We all need to intensify our efforts to eliminate this threat.

The Netherlands, Norway and Sweden support a world free of nuclear weapons, though we realise that this will not happen overnight. A legally binding nuclear test ban will be an obstacle to nuclear proliferation and the

onset of a new nuclear arms race. We therefore call on the governments concerned to ratify this crucial treaty as an important step towards ridding the world of nuclear weapons and the threat these weapons pose to us all.

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May 2008

Preface

On July 16, 1945 the world changed and on August 6 the world knew. The "Trinity" nuclear test in the Alamogordo desert in New Mexico, USA and the destruction of the Japanese city of Hiroshima and that of Nagasaki three days later marked the beginning of the nuclear weapons era, an era when nuclear weapons dominated relations between the main powers and international security policy in general. More than 2000 nuclear test explosions have been conducted by eight States to support the development of a large number of nuclear weapon systems.

The fall of the Soviet Union and the 9/11 terror event in 2001 changed the focus, and the role of nuclear weapons in the security relations among States has diminished. Nevertheless, large numbers of nuclear weapons are still maintained, some on hair-trigger alert, and the issue of non-proliferation is high on the international agenda. The Non-Proliferation Treaty (NPT) and the Comprehensive Nuclear-Test-Ban Treaty (CTBT), together with a number of regional nuclear-free zone agreements, are key elements of the non-proliferation regime.

The signing of the CTBT, fifty years after the first initiatives to limit nuclear testing were taken, was an important political achievement. Not only is the CTBT an essential element in a global non-proliferation regime and a step towards nuclear disarmament, the conclusion of the Treaty also removed a longstanding hurdle en route to further steps towards nuclear arms control and disarmament.

The signing of the CTBT marked the end of a very long journey, but it also proved to be the beginning of another. The Treaty was opened for signature in 1996, but it is still not in force. Politically it was put on the back burner in 1999, when the USA failed to ratify it. Eight more States – China, Egypt, India, Indonesia, Iran, Israel, North Korea and Pakistan – also need to ratify before the Treaty enters into force.

Despite the political difficulties, implementation of the verification regime, the most elaborate ever created, is approaching its final stage. The aim of these verification measures is to give all States an equal and fair possibility to monitor compliance with the Treaty by providing high quality information to all States. The future CTBT Organization (CTBTO) does not, however, have the

authority to draw conclusions regarding the nature of the events that are observed. This political step rests with States Parties to the Treaty. To make the Treaty and its verification regime a truly global undertaking it is thus necessary to increase engagement to ascertain that the competence and resources needed are available to States Parties when the Treaty enters into force.

More than 300 monitoring stations in 89 countries around the world, together with an intrusive on-site inspection regime, are being implemented. Together, these not only create a high performance verification system, but also demonstrate that extensive verification arrangements can be established. This regime has now been under implementation over a period of more than ten years and, provided States allocate the necessary funds and that the CTBTO Preparatory Commission focuses its work on the remaining key elements of the system, we should by now have passed the time when there is any uncertainty about the system's readiness when the Treaty enters into force.

During its establishment the monitoring system has benefited from more than ten years of rapid development in science and technology. The dramatic development of information technology offers great potential to further upgrade the data analysis procedures and to improve the quality of the products provided to States. The verification system was regarded as adequate when the Treaty was signed. Developments since then have enhanced confidence in the verification system and its ability to provide data to allow States to adequately verify compliance with the CTBT.

The rapid developments of our societies over the last century are based on unprecedented achievements in science and technology, which have shaped our modern societies and have also been extensively used to enhance the capability of the military component of our security system. How can science and technology play an equally strong role in promoting security in this new, broad perspective? CTBT is a good example of the successful application of science and technology to global, non-military security issues: how do we carry this good example further into new domains?

As in the case of CTBT, verification arrangements might also in the future be both extensive and complex and would thus not be an element that could be added at the end of a negotiation. On the contrary, a credible verification regime might well be a prerequisite for an agreement. The scientific and technical preparatory work carried out by the Conference on Disarmament's (CD) Group of Scientific Experts during 1976–1996 greatly facilitated the negotiation and the implementation of the CTBT. Such international scientific and technical cooperation could also help create mutual confidence. In our view we should aim at creating international mechanisms by which technical and other non-political issues, related to our security agenda, could be explored at an early stage. The Intergovernmental Panel on Climate Change, IPCC, which shared the 2007 Nobel Peace Prize, is a good example of such a long-term scientific effort, on a global scale, to address a most important security issue.

The threat to our environment is an example showing that the security perspective of today and tomorrow is broader than that of yesterday. Until a

few years ago, a State's security was synonymous with a strong military defence, and ever since they were created States have invested heavily in the military component of their security regimes. The security concept is different today and requires new strategies, national and international, for investing in security.

This book is about investments in nuclear disarmament and non-proliferation through over half a century of efforts to ban the testing of nuclear weapons, the most deadly weapons ever invented. We feel that the time is becoming ripe to bring the Treaty back on track and we see an urgent need to inject new energy into the process of bringing the CTBT into force. This book is a modest contribution to this process.

We approach the CTBT and its implementation from three different perspectives; political, scientific and managerial. Our ambition is not only to describe what has happened and what we have witnessed over almost forty years of experience with the test ban issue, but also to comment and reflect and to identify lessons learned. Lessons that might prove useful not only in bringing the CTBT into force, but also when negotiating and implementing future disarmament and other security-related treaties. Our ambition is to provide a fair, unbiased description of what we have experienced. The comments and reflections are personal, colored by our profound engagement with the CTBT and by our belief that multilateral treaties are an important element in building global security.

This book is intended for professionals in the political, diplomatic, scientific and military areas, dealing with arms control and disarmament. It is also intended for NGOs and journalists seeking a deeper understanding of the nuclear test ban issue and of multilateral arms control and disarmament treaties in general. The book could serve as an introduction to diplomats and experts about to start working on the implementation of the CTBT or on the negotiation or implementation of other security-related, multilateral treaties. It could also be used as a textbook for training young diplomats and other experts in arms control and disarmament.

The book can be divided into four parts. Two, quite different initial background chapters first describe nuclear testing, nuclear weapons and earlier treaties in the nuclear area, followed by the seismological, hydroacoustic, infrasound and radionuclide monitoring technologies, which in the CTBT verification regime are integrated to form the most comprehensive global verification system ever created. Chapters 3 and 4 summarize and discuss the CTBT negotiations and the Treaty itself. The main part of the book, Chapters 5, 6, 7, 8, 9, 10, covers the implementation of the Treaty from different perspectives. A description of the work during ten years within the framework of the CTBTO Preparatory Commission is given in Chapters 5 and 6. Chapter 7 reviews important results on the capabilities observed during the testing of the system. Chapter 8 discusses efforts at a national level to support implementation. Chapter 9 gives our analysis of the CTBTO Preparatory Commission and its Provisional Technical Secretariat from an organizational and managerial perspective. In Chapter 10 we discuss the CTBTO Preparatory Commission in

relation to those international actors, in particular the States Signatories, with which it interacts. Finally, in Chapter 11 we provide our analysis of the experiences gained and of the lessons learned. Our assessments are made from political, scientific and managerial perspectives. Chapter 11 also includes some reflections on how to bring the CTBT back on track. As the CTBT is an excellent example of a non-military application of science and technology in support of global security, we finally briefly discuss the new security agenda and the need for a new strategy to invest in security.

The chapters are written so that later chapters build on explanations given in earlier ones. The link, however, is not too strong and it should be possible to read individual chapters of particular interest. The last chapter is self-contained and can be read independently of the others.

We have been closely engaged with the test ban issue for several decades. We were, for a long period of time, deeply involved in CTBT negotiations at the CD in Geneva and in its Group of Scientific Experts, tasked with developing a test ban verification system. During the implementation of the Treaty we have all been deeply involved with the CTBTO Preparatory Commission since its establishment in 1996.

During all these years we have been privileged to work with a large number of scientific colleagues and diplomats in Geneva and Vienna and at a number of research institutions around the world. They have all, in one way or another, influenced our thinking and contributed to this work. In particular we would like to mention our close friends in the Group of Scientific Experts at the CD in Geneva and in Working Group B on verification in the CTBTO Preparatory Commission in Vienna. We would also like to thank our friends and colleagues at the Provisional Technical Secretariat (PTS) of the CTBTO Preparatory Commission. Over the years we have enjoyed most stimulating interactions with Wolfgang Hoffmann, who served as the Executive Secretary of the CTBTO Preparatory Commission for most of the period covered by this book; and with his successor Tibor Tóth. Wolfgang Hoffmann has also provided valuable comments on the book. We would also like to thank Tibor Tóth and the PTS staff for generously providing illustrations and specific information on the PTS.

A number of colleagues and friends have made most valuable contributions to the book. Lars-Erik De Geer, an outstanding expert on radionuclide monitoring, has helped us out with those parts of the book. He has also contributed a large number of most valuable suggestions and comments on other parts. We deeply appreciate Lars-Erik's support, which goes far beyond what could be expected, even from a good friend.

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Many of our PTS friends have helped us out on a number of issues. Annika Thunborg, head of the PTS Public Information Section, has been instrumental in providing illustrations and photos used throughout the book. She has also provided most valuable comments on many parts of the book, based on her prior diplomatic experience. John Sequeira, Director of the Administrative Division, has provided material on personnel and financial matters and helped us to put this and some rules and regulations into the right perspective. He also provided a number of valuable comments on our text. Jerry Carter has commented on parts of the text, coordinated various contributions from the IDC Division, and provided information on services to States Signatories. Aili Bi, with the External Relation Section and with a background in the CTBT negotiations, has also suggested a number of improvements to the overall structure of the book. Mordechai Melamud has helped with important comments on aspects of the PTS work related to the on-site inspections regime. Other PTS employees have contributed valuable assistance in the form of information on specific issues, as well as support with illustration material. In this regard we appreciate contributions from Michael Akrawy, Arne Bell, Paola Campus, Luis Cella, John Coyne, Peter Hulsroj, Don Phillips, Stefka Stefanova, Todd Vincent and Lassina Zerbo.

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The responsibility for whatever errors or ambiguities that may remain rests solely with us. The views presented in this book are those of the authors and may not reflect, and do not represent, those of the institutions, organizations and national authorities with which the authors are or have been associated.

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