Chapter 7

VERIFICATION, COMPLIANCE AND ENFORCEMENT

In the context of achieving and sustaining universal nuclear disarmament, verification, compliance and enforcement have been referred to as the "Golden or Bermuda Triangle of issues", depending on your perspective. As noted by Patricia Lewis, Research Director at Chatham House:

"The three issues are intertwined in a perpetual embrace. Without information provided by verification, the determination of compliance or noncompliance of nuclear disarmament treaties will rest solely in the hands of a few (...) national intelligence agencies. (...) Without law, without impartial evidence, there can be no chance of enforcement. And without enforcement, the whole web of verification deterrence against the spectrum of possible infringement would have little meaning and the rule of law would be undermined."[130]

The difficulties of verifying nuclear disarmament will be on a par with the complexity of the disarmament commitment and the level of confidence in compliance required. Significant progress has been made over the years in identifying and solving the technical issues involved in confirming comprehensive nuclear disarmament, i.e. the complete dismantlement of nuclear warheads, their delivery vehicles, the nuclear weapons infrastructure, including nuclear facilities and experimental capabilities, and the disposal of fissile materials. As such, there is an extensive body of experience to draw from in the pursuit of a verification and compliance regime for the achievement and maintenance of a nuclear-weapon-free world. Such a regime will need to be more stringent and effective, and build more confidence, than any disarmament regime so far envisaged if non-compliance is to be deterred.

Although this will not be an easy task, it is by no means an inconceivable one. For a start, such a verification and compliance regime will not have to be constructed from scratch. It will build on the practical experience of disarmament efforts undertaken so far, such as national, bilateral and

regional arms control agreements, cooperative verification studies and initiatives, and international disarmament treaties, as well as those to be undertaken as the goal of zero is approached.

In addition, the international community has access to a much wider range of technologies with much better measurement capacities than in the past, and is thus able to establish more robust on-site and remote systems, complemented by national intelligence gathering and much greater public access and release of formerly secret information on potential or actual nuclear-weapon programmes.

Importantly, the same conjunction of good relationships between major States that will permit the negotiation of a nuclear disarmament treaty will necessarily overcome many of the obstacles, which today seem insurmountable, to the construction of an appropriate verification and compliance system.

An important initial step in verification is greater transparency in nuclear weapon stockpiles. This includes information on numbers and types of nuclear weapons, both deployed and non-deployed, and the nuclear weapons budget. In 2010, the States Parties to the NPT made commitments "to apply the principles of irreversibility, verifiability and transparency in relation to the implementation of their treaty obligations",[131] and invited the UN Secretary-General "to establish a publicly accessible repository, which shall include the information provided by the nuclear-weapon States".[132]

The Model Nuclear Weapons Convention (NWC), circulated by the UN Secretary-General as a guide to comprehensive nuclear disarmament negotiations, covers:

- a range of systems requiring verification, including warheads, delivery vehicles, fissile materials and dual-use components;
- a number of tasks required for verification, including confirmation of baseline data, monitoring the destruction of existing stockpiles, ensuring the non-production of prohibited items and the proper use of dual-use components, and maintaining confidence in a nuclear-weapon-free world;
- a range of technologies and verification systems, including portal controls, remote sensors, data analysis, on-site inspections; and

- a range of verification arrangements, including bilateral agreements, multilateral agreements, international organizations and national technical means.

All States can play a role in the development of verification systems for a nuclear-weapon-free world. The success of the CTBTO Preparatory Commission in developing a global verification system for the global nuclear test ban demonstrates the positive role that non-nuclear weapon States can play together with nuclear-weapon-possessing States in developing verification systems.

Parliaments have a role to play in authorizing national measures and allocating funds to assist in developing such systems.

Good Practice — NWPS

Examples

A. Verification under Russia-US arms control treaties
From delivery systems to warheads

B. United States Cooperative Monitoring Center
Turning bomb-designing skills into disarmament support

C. The United Kingdom's Disarmament and Arms Control Verification Programme
Developing verification techniques for warhead dismantlement

A — Verification under Russia-US arms control treaties
From delivery systems to warheads

The 1987 INF Treaty marked the first time that the United States and the Soviet Union agreed to reduce their nuclear arsenals, abolish an entire class of nuclear weapons and accept previously inconceivable intrusive on-site inspections for verification. The States Parties' rights to conduct on-site inspections under the Treaty ended on 31 May 2001, but the use of surveillance satellites for data collection continues. The treaty is of

Verification under New START

"We have had boots back on the ground conducting inspections for almost a year now. The United States has conducted 16 inspections in Russia and the Russians have conducted 17 inspections here in the U.S.–we have been keeping pace with each other. Every year, we each have the right to conduct 18 inspections on the other's territory.

Negotiators worked hard to find innovative new mechanisms to aid in the verification of the Treaty and the results of that work are now evident. For the first time, we are receiving data about re-entry vehicle (warhead) loadings on Russia's missiles –and Russia, of course, receives the same data from us. The on-site inspection procedures under New START allow the United States to confirm the actual number of warheads on randomly selected Russian missiles. These verification tasks and inspection rights did not exist under the previous START Treaty.

We are constantly in communication with the Russians, exchanging over 1,700 notifications under the New START Treaty so far. These notifications help to track movement and changes in the status of weapon systems. For example, a notification is sent every time a heavy bomber is moved out of its home country for more than 24 hours.

In addition, every six months we exchange a comprehensive database. This gives us a full accounting of exactly where weapons systems are located, whether they are out of their deployment or operational bases and gone to maintenance, or have been retired. This semi-annual exchange, along with the mandatory treaty notifications that continuously update the information that each side receives, create a 'living document' that provides a comprehensive look into each other's strategic nuclear forces."

Rose Gottemoeller, "A 'New START' for Arms Control", The Hill's Congress Blog, 22 December 2011

unlimited duration, and thus the States Parties can convene the Special Verification Commission – the treaty-implementing body – at any time, and indeed continue to do so.

Under the 1991 START I, the two superpowers agreed to verification techniques that allowed each government to gain access to designated bases and observe the other country's nuclear missile programmes. START I placed strong emphasis on constant monitoring, including 12 types of

on-site inspections. In addition, it provided for regular data exchanges and extensive notifications on new nuclear developments. These measures were crucial to building mutual trust and enhancing transparency.

New START continues and expands such verification measures.

Although the verification measures associated with reductions in US and Russian nuclear arsenals have been most welcome, they have some significant limitations. Delivery systems have been the preferred treaty-limited items, while warheads themselves have been addressed only as an afterthought. Nevertheless, such arms-control agreements lay the foundation for pursuing further reductions, accompanied by more comprehensive verification schemes.

The development of verification measures by the United States is enabled by funding allocations from the US Congress.

B United States Cooperative Monitoring Center

Turning bomb-designing skills into disarmament support

The Cooperative Monitoring Center (CMC) was established in 1994 at the Sandia National Laboratories (one of the two US nuclear-weapon design centres) out of a special funding allocation from the US Congress to provide a forum for technical and policy experts from around the world to explore how unclassified, shareable technology could help implement confidence-building measures, treaties or other agreements.[133] The CMC encompasses a wide range of facilities and partnerships that enable all stages of international technical cooperation, including:

- training in technologies, procedures and approaches (e.g. on-site inspection, remote monitoring, imagery analysis, sensors, tags and seals);
- analysis of security issues and development of options for implementing solutions;
- testing and evaluation of technical approaches; and
- implementation and operation of technical measures.

The CMC organizes collaborative technical projects in the areas of border management, international export control, international nuclear safeguards, international science and technology engagement, non-proliferation studies and analysis, and confidence-building measures.

For example, it has run confidence-building workshops in the Middle East and South Asia focused on the use of technical monitoring tools and the sharing of information to facilitate regional arms control (and verification) agreements.[134] The CMC also became a key forum for pursuing the US-Russian laboratory-to-laboratory initiative that launched the technical engagement between US nuclear-weapon laboratories and their Russian counterparts. While the CMC continues to emphasize arms control measures to reduce the size of existing nuclear arsenals, much of its work today addresses the international challenges posed by the proliferation of weapons of mass destruction.

Verification in the 2010 US Nuclear Posture Review

The 2010 US Nuclear Posture Review, which establishes "U.S. nuclear policy, strategy, capabilities, and force posture for the next five years to ten years", includes a series of initiatives aimed to strengthen international and national verification schemes.

It lists as one of the Obama Administration's key objectives to initiate "a comprehensive national research and development program to support continued progress toward a world free of nuclear weapons, including expanded work on verification technologies and the development of transparency measures". Another objective is to "set a course for the verified elimination of all nuclear weapons and minimize risk of cheating and breakout, through increasing transparency and investments in verification technologies focused on nuclear warheads, rather than delivery vehicles".

In addition, the Nuclear Posture Review states that the Administration seeks to "strengthen International Atomic Energy Agency (IAEA) safeguards" by, among other measures, giving the IAEA "additional financial resources and verification authorities".

The Nuclear Posture Review is commissioned by the US Congress, undertaken by the Department of Defense, accepted by the President and then presented back to the US Congress.

C The United Kingdom's Disarmament and Arms Control Verification Programme

Developing verification techniques for warhead dismantlement

In accordance with the UK's 1998 Strategic Defence Review, and in response to the Thirteen Steps adopted by the 2000 NTP Review Conference, the UK Government instructed the Atomic Weapons Establishment (AWE)[135] to conduct "a small research programme to study techniques and technologies with the potential for application to the verification of any future arrangements for the control, reduction and ultimate elimination of nuclear weapon stockpiles".[136]

In the initial phase of the verification project, the AWE conducted research on verifying warhead dismantlement, including:

- authentication of warheads and components, to establish that an item declared to be a nuclear warhead or a component from a nuclear warhead is consistent with those declarations;
- dismantlement of warheads and their components;
- disposition of the fissile material, to ensure that it can no longer be used in nuclear weapons or other explosive nuclear devices; and
- monitoring the nuclear-weapon complex.

Interim reports on the programme's findings were presented at NPT Preparatory Committee meetings in 2003 and 2004 and at the 2005 NPT Review Conference.

Recommendations for Parliamentarians

- Encourage your government to pursue comprehensive verification schemes with other nuclear-weapon-possessing States (ideally accompanying weapons reduction), including verifying warhead dismantlement.
- Encourage your government to assist and bolster international monitoring and accounting by declassifying and making public its total number of nuclear weapons – active deployed, active and inactive reserves, and retired - and to submit this information to the UN repository.
- Develop, strengthen and support international and national verification measures, and increase funding for verification technologies and research.
- Pursue and expand transparency and confidence-building measures between nuclear-weapon-possessing States e.g. through collaborative technical initiatives.

Good Practice ALL STATES

Examples

A. Comprehensive Nuclear-Test-Ban Treaty verification regime
Ensuring compliance with the CTBT

B. United Kingdom - Norway Initiative
Cooperation on verification between a NWS and a non-NWS

A Comprehensive Nuclear-Test-Ban Treaty verification regime
Ensuring compliance with the CTBT

In order to monitor countries' compliance with the CTBT, its verification regime is designed to detect any nuclear explosion conducted on Earth – underground, underwater or in the atmosphere.[137]

The main task of the CTBTO Preparatory Commission is to build this regime and to ensure that it is operational by the time the Treaty enters into force.

The verification regime consists of the elements appearing below:

International Monitoring System (IMS) – consisting of 337 IMS facilities located around the world in accordance with the Treaty: 170 seismic, 11 hydroacoustic, 60 infrasound and 80 radionuclide stations and 16 radionuclide laboratories, which monitor the planet for any sign of a nuclear explosion. The IMS uses four complementary verification methods, utilizing the most modern technology available. Seismic, hydroacoustic and infrasound stations monitor beneath the Earth's surface, the large oceans and the atmosphere respectively. Radionuclide stations detect radioactive debris produced by atmospheric explosions or vented by underground or underwater nuclear explosions. Radionuclide laboratories help radionuclide stations identify these radioactive substances.

International Data Centre (IDC) – processes and analyses the data registered by the IMS, and communicates data bulletins to Member States for their evaluation and judgement. It also helps Member States

assume their verification responsibilities by providing capacity-building services.

Global communications infrastructure – transmits the data recorded at the IMS stations to the IDC, and data bulletins from the IDC to Member States.

Consultation and clarification – allows a State to request directly from another State or through the Executive Council a consultation and clarification process to resolve and clarify an alleged nuclear explosion (will be available to Member States after entry into force).

On-site inspection – to ascertain whether a nuclear explosion has occurred in violation of the treaty (will be available to Member States after entry into force).

Confidence-building measures – Member States can voluntarily notify the CTBTO Technical Secretariat of any chemical explosion using 300 tonnes or more of TNT-equivalent blasting material detonated on their territories.

Through the CTBTO's Preparatory Commission, the 183 Member States approve the Organization's programme of work and related budget. In

Environmental sampling during the CTBTO's Integrated Field Exercise in Kazakhstan, 2008.

October 2011, they agreed on a plan to boost its on-site inspection capabilities in the coming years. This is in line with the 2009 IPU resolution on nuclear non-proliferation and disarmament, which calls on "all States to maintain support for the CTBTO verification system until the CTBT enters into force". [138]

The nuclear weapon tests of 2006 and 2009 conducted by the Democratic People's Republic of Korea and detected by the CTBTO facilities posed a challenge to the Treaty and the Preparatory Commission on several fronts. Widespread condemnation of the tests demonstrated that the international community was serious about upholding the global nuclear test ban. Though not fully complete, the verification system functioned in a timely, integrated and coherent manner, demonstrating a high level of reliability and reinforcing the message that no nuclear test can go undetected.

In addition to its primary use in the context of verification, the monitoring system produces a wealth of data used in a variety of civil and scientific applications, including research on the Earth's core, monitoring of earthquakes and volcanoes, climate change research, atmospheric monitoring and biological research, and tsunami warning centres. As a result, the Commission has entered into agreements with a number of UNESCO-approved tsunami warning centres in Australia, France, Indonesia, Japan, Malaysia, the Philippines, Thailand, Turkey and the United States (Alaska and Hawaii). Additional arrangements were being made with Chile and Sri Lanka.

The tragic events that unfolded in the wake of the March 2011 earthquake off the coast of Japan were also a challenging "stress test" for the Commission and its verification regime. In responding to the events, the Commission mobilized its resources and made a major contribution to disaster mitigation efforts: it collected, promptly transmitted and carefully reviewed the relevant data, producing timely and high-quality analyses. It also became a reliable source of information for the media and the general public.

The CTBT verification system monitors the world for evidence of a nuclear explosion. In case of concerns, a consultation and clarification process sets in; however, it is only with the CTBT's entry into force that on-site inspections, a key provision of final verification, can take place. In the meantime, an action plan has been approved to provide a framework for developing the on-site-inspection regime.

B

United Kingdom - Norway Initiative

Cooperation on verification between a NWS and a non-NWS

At the 2005 NPT Review Conference, the United Kingdom and Norway indicated their interest in working together with other governments and state organizations in the field of nuclear arms control verification, in support of their commitment under Article VI of the NPT, which states that nuclear-weapon States and non-nuclear-weapon States alike should "pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a Treaty on general and complete disarmament under strict and effective international control".

Scholarship programme on verification

In parallel with the UK-Norway Initiative, the University of Oslo has taken an initiative to start a scholarship programme on disarmament verification. The programme is for young scientists in developing countries and encourages their involvement in disarmament-related issues, such as verification, fissile material disposition and elimination and proliferation-resistant technologies and materials. The programme has so far involved seven scientists from various countries, such as Azerbaijan, China, Egypt, Ghana and Pakistan, in addition to disarmament simulation exercises in 2011 (two such exercises are planned for 2012).

The programme takes the conclusions of the 2002 *United Nations Study on Disarmament and Non-Proliferation Education* as its starting point. The study emphasizes that education is a vital but underutilized tool for peace and disarmament and identifies "a pressing need to expand and improve disarmament and non-proliferation education and training in order to promote disarmament and non-proliferation and to strengthen international security and enhance sustainable economic and social development". It acknowledges that "a primary tool for fostering a culture of peace is the promotion of educational curricula on peaceful conflict-resolution, dialogue, consensus-building and active non-violence".

For more on disarmament education and the UN Study, **see Chapter 12. Disarmament education**.

In 2007, the United Kingdom and Norway, assisted by the NGO VERTIC, launched an initiative exploring technical and procedural challenges associated with a possible future nuclear disarmament verification regime – the first time a nuclear-weapon State and a non-nuclear-weapon State collaborated in this field of research. The initiative follows up on the verification research conducted by the UK's Atomic Weapons Establishment (see above, Good practice, NWPS).

The overarching consideration for the UK-Norway Initiative is that one of the main challenges for any verification system is to allow inspectors to gather adequate proof of treaty compliance, while simultaneously protecting sensitive or proliferative information in the host State's possession. In its three years of operation, the initiative has conducted research into two elements related to verification: how to give non-authorized personnel of an inspecting party from a non-nuclear-weapon State access to sensitive facilities of the host nuclear-weapon State (Managed Access[139]) and how to satisfy inspection demands while ensuring that sensitive or proliferative measurement data is not released to the inspecting party (Information Barriers[140]).

The lessons learned from the UK-Norway Initiative can offer other interested States the foundation and guidance they require to undertake their own collaborative or independent verification. The initiative demonstrates that nuclear-weapon States and non-nuclear-weapon States need not be on opposite sides of the disarmament debate, but instead can cooperate constructively.

Recommendations for Parliamentarians

- Promote regionally relevant collaborative initiatives between nuclear-weapon-possessing States and non-nuclear-weapon States on verification measures.
- Explore and develop verification technologies and methodologies for the achievement and maintenance of a nuclear-weapon-free world, including verification tasks (warheads, delivery vehicles, facilities, materials, R&D and know-how) and technologies (e.g. satellites, remote sensors, radiation detectors, tamper-indicating devices and radiation portal monitors).
- Develop, strengthen and support international and national verification measures, and increase funding for verification technologies and research.