Verification Yearbook

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acronyms

ABACC	Argentina–Brazil Agency for Accounting and Control of Nuclear Material
ABM	Anti-Ballistic Missile
ACV	Armoured Combat Vehicle
AHG	Ad Hoc Group
AOSIS	Alliance of Small Island States
APM	Anti-Personnel Mine
ASOC	Antarctic and Southern Ocean Coalition
ASSERT	Authentication of Stockpile Signature Evidence by Radiometric (and other) Technologies
AEAT	Atomic Energy Authority Technology
AWE	Atomic Weapons Establishment (UK)
BiH	Bosnia and Herzegovina
BNFL	British Nuclear Fuels Limited
BW	Biological Weapons
BWC	Biological Weapons Convention
CBM	Confidence-Building Measure
CC	Coordinating Committee (under the APW Convention)
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CCW	Convention on Certain Conventional Weapons
CD	Conference on Disarmament
CDM	Clean Development Mechanism
CFE	Conventional Armed Forces in Europe
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of the Parties
CSBM	Confidence- and Security-Building Measure
CSP	Conference of States Parties

CT	Composite Text
CTBT	Comprehensive Nuclear Test Ban Treaty
CTBTO	Comprehensive Test Ban Treaty Organisation
CWC	Chemical Weapons Convention
DOE	Department of Energy (US)
DRC	Democratic Republic of the Congo
EC	Executive Council
EI	Environmental Investigation Agency
EMERGE	Environmental Monitoring Evidence from Regional and Global Emissions
ERT	Expert Review Team
ETIS	Elephant Trade Information System
EU	European Union
FAS	Federation of American Scientists
FBiH	Federation of Bosnia and Herzegovina
FMCT	Fissile Material Cut-Off Treaty
FRY	Federal Republic of Yugoslavia
FYROM	Former Yugoslav Republic of Macedonia
GCI	Global Communications Infrastructure
GFA	General Framework Agreement (Dayton accords)
GHG	Greenhouse Gases
GICHD	Geneva International Centre for Humanitarian Demining
GPS	Global Positioning System
HEU	Highly Enriched Uranium
IAEA	International Atomic Energy Agency
ICBL	International Campaign to Ban Landmines
ICBM	Intercontinental Ballistic Missile
ICRC	International Committee of the Red Cross
ICRW	International Convention for the Prevention of Whaling
IDC	International Data Centre
IET	International Emissions Trading
IMS	International Monitoring System
INF	Intermediate-range Nuclear Forces

IPCC	Intergovernmental Panel on Climate Change
IRA	Irish Republican Army
IRBM	Intermediate-Range Ballistic Missile
ISC	Intersessional Standing Committee (under the APM Convention)
ISU	Implementation Support Unit
IUCN	World Conservation Union
IWP	Intersessional Work Programme (under the APM Convention)
IWRB	International Waterfowl Research Bureau
JCC	Joint Consultative Commission
JCIC	Joint Compliance and Inspection Commission
JI	Joint Implementation
KVM	Kosovo Verification Mission
LEU	Low-Enriched Uranium
LIDAR	Laser Radar
LULUCF	Land-Use, Land-Use Change and Forestry
LWR	Light Water Reactor
MEA	Multilateral Environmental Agreement
MIKE	Monitoring the Illegal Killing of Elephants
MilObs	Military Observers
MINATOM	Ministry of Atomic Energy (Russia)
MOD	Ministry of Defence (UK)
MOX	Mixed Oxide
MSP	Meeting of States Parties (under the Ottawa Convention)
NAAEC	North American Agreement on Environmental Cooperation
NAM	Non-Aligned Movement
NATO	North Atlantic Treaty Organisation
NDA	Non-Destructive Assay
NGO	Non-Governmental Organisation
NNWS	Non-Nuclear Weapon State

NPT	Non-Proliferation Treaty
NTM	National Technical Means
NWFZ	Nuclear Weapon-Free Zone
NWS	Nuclear Weapon State
OECD	Organisation for Economic Co-operation and Development
OPBW	Organisation for the Prohibition of Biological (Bacteriological) and Toxin Weapons
OPCW	Organisation for the Prohibition of Chemical Weapons
OPEC	Organisation of the Petroleum Exporting Countries
OSCE	Organisation for Security and Co-operation in Europe
OSI	On-Site Inspection
POE	Point of Entry
PPCM	Perimeter and Portal Continuous Monitoring
PrepCom	Preparatory Commission
PROCORE	Production Control Regime
PTS	Provisional Technical Secretariat
QA/QC	Quality Assurance/Quality Control
R&D	Research and Development
RENEW	Recovery of Nuclear Evidence on Warheads
RS	Republika Srpska
SBSTA	Subsidiary Body for Scientific and Technological Advice
SDR	Strategic Defence Review (UK)
SOPS	Standard Operating Procedures
SRCC	Sub-Regional Consultative Committee
START	Strategic Arms Reduction Treaty
SVC	Special Verification Commission
TETF	Tiger Enforcement Task Force
TRAFFIC	Trade Records Analysis of Fauna and Flora in Commerce
TS	Technical Secretariat (of the OPBW)
TTM	Treaty Technical Means
UAE	United Arab Emirates
UN	United Nations

UNDDA	United Nations Department for Disarmament Affairs
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
UNMAS	United Nations Mine Action Service
UNSCOM	United Nations Special Commission on Iraq
UNSG	United Nations Secretary-General
USEC	US Enrichment Corporation
VEREX	Ad Hoc Group of Governmental Experts to Identify and Examine Potential Verification Measures from a Scientific and Technical Standpoint
WCMC	World Conservation Monitoring Centre
WCO	World Customs Organisation
WTMU	Wildlife Trade Monitoring Unit
WWF	World Wide Fund for Nature

Preface

Mohamed ElBaradei

For multilateral arms control agreements, verification by an objective, technically credible and independent body is central to building mutual trust and confidence among parties, providing each state with the ability to demonstrate compliance convincingly. Over the past five decades, a broad variety of diplomatic and political strategies has been pursued in order to achieve the twin objectives of nuclear nonproliferation and disarmament. Verification has comprised an important component of these strategies, with the International Atomic Energy Agency (IAEA) playing a key role in validating the effectiveness of some accords through its nuclear safeguards system.

The 1970 Treaty on the Non-Proliferation of Nuclear Weapons (NPT)—for which the IAEA is entrusted with verifying the nonproliferation commitments of states parties—is the closest any arms control and disarmament agreement has come to achieving universal membership. With 187 states parties, it remains the most notable accomplishment of efforts aimed at multilateral nuclear arms control. Four nuclear weapon-free zone agreements have also been concluded—covering Africa, Latin America and the Caribbean, Southeast Asia and the South Pacific—to bolster, in a regional context, nonproliferation commitments made under the NPT. In each case, the IAEA has been assigned verification responsibilities.

The Agency's verification experience, however, has not been a positive one in all respects. Discoveries made in Iraq after the 1991 Gulf War, as well as later revelations involving North Korea, undermined the assumption that threats to the nuclear nonproliferation regime were external to this group of nations. These events underscored the fact that the IAEA verification system was neither sufficiently robust nor comprehensive, because of its narrow focus on declared nuclear activities and its limited rights of access to information and sites. (The system was designed in the 1970s following the conclusion of the NPT, and was intended to generate the required nonproliferation assurances.) This reality prompted the international

community to empower the Agency with improved verification tools. Important measures were incorporated into a model protocol—additional to safeguards agreements—that was approved by the IAEA Board of Governors in 1997.

Effective implementation of the protocols based on this model will greatly enhance the Agency's capability to offer effective assurances of compliance with nonproliferation commitments. This is because the Additional Protocol is designed to provide the IAEA with the tools to verify not only declared activities, but also possible undeclared ones. Such authority is essential if the Agency is to fulfil its responsibilities under the NPT and the four nuclear weapon-free zone agreements—responsibilities that are not limited to nuclear material actually declared by each non-nuclear weapon state party, but extend to all nuclear material in each state. The Protocol provides for the submission of a broader range of information about all aspects of each state's nuclear programme and nuclear-related activities, and grants IAEA inspectors broader rights of access to nuclear-related facilities and locations. Consequently, only when a state has both a comprehensive safeguards agreement and an additional protocol in force can the IAEA implement the verification requirements contained in Article III of the NPT in a comprehensive manner.

A current priority for the IAEA is the 'integration' of traditional safeguards activities with the strengthening measures under the additional protocols. 'Integrated safeguards' promise to usher in a new era of nuclear verification—a 'smart', non-discriminatory system that is designed to draw comprehensive conclusions about a state's compliance with its nonproliferation obligations. However, the effectiveness of this approach depends on the extent to which it is implemented worldwide—it can only be fully effective if required safeguards agreements and additional protocols are brought into force by all states that have committed themselves to do so.

Key to the implementation of an efficacious nuclear verification regime, though, is the level of available financial resources. The IAEA currently safeguards over 900 facilities in 70 countries on a regular budget of approximately US$80 million a year. While its responsibilities in this field have continued to grow, the safeguards budget has been restricted for over a decade by a 'zero real growth' policy, forcing a reliance on 'voluntary' funding for almost one-fifth of safeguards activities. Clearly, this situation must be rectified if the IAEA is to continue to provide credible verification assurances.

With regard to nuclear disarmament, meanwhile, the end of the Cold War led to good progress in the early and mid-1990s. However, the process slowed towards the end of the decade. Strategic Arms Reduction Treaty (START) I and START II—each with detailed bilateral verification provisions—introduced significant cuts in deployed strategic weapons. But START II has yet to enter into force. Efforts to end nuclear weapons development reached an important milestone with agreement on the Comprehensive Nuclear Test Ban Treaty (CTBT) in September 1996. Yet the reluctance of a number of key states to take the necessary steps to bring the CTBT into force, together with the ongoing debate on the validity of the 1974 Treaty on the Limitation of Anti-Ballistic Missile (ABM) Systems, has led to stagnation in arms control and disarmament.

This stagnation derives in large part from continuing reliance on nuclear weapons as a deterrent. Looking ahead, unless the international community is willing to tolerate a world with scores of nuclear weapon states, it must first find ways to bridge the divide between the 'haves' and the 'have-nots'. The present situation, as stated by the 1996 Canberra Commission on the Elimination of Nuclear Weapons, 'cannot be sustained, [because] the possession of nuclear weapons by any state is a constant stimulus to other states to acquire them'.

The feasibility of moving towards the elimination of current nuclear arsenals is dependent on the development of a credible alternative to nuclear deterrence—a security system that is functional and inclusive and one that all states can rely on with confidence. Ultimately, the greatest disincentive to acquiring nuclear weapons and other weapons of mass destruction will be a security system that is rooted in economic and social development, good governance, respect for human rights and an agreed process for the peaceful settlement of disputes. The existence of mechanisms for the credible and independent verification of arms control and disarmament agreements will be an essential component.

In considering existing and future means for verifying compliance with arms control agreements, a number of prerequisites and improvements must be emphasised. First, the verification organisation must have the authority to perform its tasks; all states parties to an agreement must provide it with the power to carry out its mission effectively. In the case of the NPT, this means that all parties must bring into force their safeguards agreements and additional protocols. Over the

past few decades, many countries have been willing to assume obligations relating to an increasing array of activities with international dimensions. Some states, however, clearly still have difficulty accepting the increased transparency that results from some of these new commitments.

Second, the verification organisation must have the required resources; the complexity of a mission must be recognised and the verification organisation provided with the necessary support—state of the art technology, qualified inspectors and analytical staff and appropriate funding. Policies imposed indiscriminately to cut or cap budgets, while simultaneously requiring that tasks of increasing volume and intricacy be carried out, will lead to diminished verification assurances.

And third, the verification organisation must be backed up by enforcement. The verification organisation should be relied on for verifying compliance with the agreement in question, but must be supported by enforcement mechanisms established by the parties or, if necessary, by the United Nations Security Council.

All of these enhancements will not be achieved overnight; they will only be attained through persistent effort and continued international dialogue. Non-governmental actors, such as VERTIC, have played—and will continue to play—a significant role in the field of verification research and training, as well as in disseminating information about the importance of verification in arms control and other agreements. Only by keeping the international community and civil society engaged can sustained progress be made towards the ultimate goal of establishing a safer and more humane world.

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I

Introduction: verification under challenge

Trevor Findlay

It was, overall, a bad year for verification. In the arms control and disarmament area the existing verification and compliance regimes suffered troubling setbacks, while support for new or additional verification measures for other internationally agreed bans or restrictions on weaponry dissipated in the face of opposition. The United States, even more than usual, played a seminal role in almost all verification issues. A past champion of verification, the US has, under the administration of President George W. Bush, unfortunately begun to play a spoiler role.

The most dramatic event was the ignominious collapse in July 2001 of the six-year attempt to negotiate a verification system for the 1972 Biological and Toxin Weapons Convention. The US withdrew its support both for a draft protocol to the convention and the entire negotiating process. Later in the year it ventured a motley collection of lame substitutes which collectively would fail to constitute an effective and efficient verification regime. Yet, none of the states purportedly in favour of strong biological weapons (BW) verification—among them Australia, Canada and the members of the European Union—stepped forward to champion the protocol and insist that negotiations proceed with or without the US. Even the United Kingdom, which had expended so much political capital and research effort in attempting to meet US concerns—which careened schizophrenically from desiring unrealistic verifiability to wanting minimal intrusiveness—slunk quietly away from the negotiating table. The treaty review conference in November was clueless about how to proceed.

Meanwhile, the verification regime for chemical weapons, for which the biological weapons regime was meant to be a companion, began to encounter financial and managerial difficulties. The system had been touted as the *crème de la crème* of

multilateral verification in the disarmament field. Negotiated during the 'honeymoon' period following the end of the Cold War, the 1993 Chemical Weapons Convention provides for a standing inspectorate, intrusive on-site inspections, an ambitious timetable for chemical weapon destruction and continuous monitoring of some sections of chemical industry. Its successes to date are unassailable: the Organisation for the Prohibition of Chemical Weapons, located in The Hague in the Netherlands, has established a unique verification system that is global in its reach and in many respects a model of effectiveness. In 2001 it conducted its 1,000th inspection. Nonetheless, if the difficulties it has begun to encounter, some the fault of member states rather than of its own making, are not remedied quickly, the whole reputation of multilateral verification might be tarnished, giving succour to those who oppose the enterprise as an unwarranted and costly intrusion into the sovereignty of the nation-state.

Another verification regime which has been showing great promise, despite the fact that the treaty it is intended to serve has not yet entered into force, is that being established by the Preparatory Commission for the Comprehensive Nuclear Test Ban Treaty Organisation. Based in Vienna, Austria, a Provisional Technical Secretariat has made impressive advances in putting in place an International Monitoring System and an International Data Centre for verifying the absence of nuclear tests. Again it is the US which has sought to curtail the regime, in this instance by announcing that it will withhold the proportion of its assessed financial contribution that would be devoted to preparing the on-site inspection arrangements. The US delegation has also withdrawn from negotiations on the Operational Manual for such activities. These measures represent a compromise between those in Washington who wish to totally disassociate the US from a treaty that Bush says he will not ratify and those who see value in test ban verification work regardless of the US stance on ratification. While the verification community should perhaps be thankful that more drastic cuts were not made, the withholding of part of an assessed contribution on political grounds is not only illegal but sets a poor example to other states. A number of other countries, like China and Iran, would like to see the verification system weakened on political grounds. Other countries, like Argentina and Brazil, seek to absolve themselves, because of their economic circumstances, of their legal responsibility to help fund the system. Although the immediate

impact on the implementation of the test ban verification regime will be manageable, over the long term the American position is unsustainable.

Two verification situations where the US would justifiably like to see movement have, to Washington's chagrin, remain stymied. The United Nations Monitoring, Verification and Inspection Commission (UNMOVIC), which was intended in 2000 to assume the role of detecting Iraqi attempts to reconstitute their nuclear, chemical, biological or long-range missile programmes, remains confined to headquarters in New York doing desk studies, examining the lessons of its predecessor, the United Nations Special Commission (UNSCOM), and planning for the day when it will be allowed to conduct on-site inspections in Iraq. To date, Iraq has been uncompromising in its refusal to admit UNMOVIC to its territory, despite the attempt to woo it with a less punitive sanctions regime. The United Nations Security Council, largely due to France and Russia, remains shamefully deadlocked over how to deal with Iraq, despite Baghdad's flaunting of the Council's legally-binding demands and its successful torpedoing of UNSCOM.

In the case of North Korea, despite an apparent warming of relations with South Korea and a charm offensive by North Korean President Kim Jong-Il, there has been no notable progress towards Pyongyang meeting its legal obligations to account for all of its nuclear activities and materials as it is obliged to do under its full-scope safeguards agreement with the International Atomic Energy Agency (IAEA). As a result, the deal that was done in the 1994 Agreed Framework to provide North Korea with civil nuclear power plants in return for a renewed, verifiable commitment not to acquire nuclear weapons, faces a crisis in the not too distant future. Adding further complexity, the US has now insisted that North Korean missile activities also be subject to verification before further political progress can be made. Although the Iraqi case and the 11 September terrorist attacks on the US have tended to overshadow the North Korean situation, this verification problem could yet produce a confrontation in North East Asia that will command the world's attention.

The 1997 Ottawa Convention, which bans anti-personnel landmines, will also face a credibility problem with regard to its verification and compliance mechanisms if steps are not taken soon. In 2000 and 2001 the first credible evidence of states parties violating the treaty since it entered into force were raised at annual

meetings of the parties, albeit by a civil society monitoring coalition known as Landmine Monitor. The public insouciance with which the allegations against Uganda and Zimbabwe were greeted by most states parties and the lack of a decision on how to proceed henceforth is of concern for the future of the treaty.

This catalogue of woes does not mean that there were no encouraging verification developments during the year. The IAEA continued to work on ways to strengthen a nuclear safeguards system that Iraq and North Korea had shown to be so wanting. Although the rate at which states are signing and ratifying additional protocols to their safeguards agreements is slow, pioneering work to improve the system is being done by the IAEA and those states, like Australia and Canada, which have been early converts to the additional protocol process. Work on integrated safeguards, both to achieve efficiencies and better target the verification effort, is continuing. For the first time in 10 years the agency has been relieved of the burden of zero-growth budgeting.

Another encouraging development for multilateral verification occurred in 2001 when Russia and Belarus both ratified the 1992 Open Skies Treaty, making entry into force of the agreement likely in early 2002. The treaty will open the entire territory of its parties to aerial observation by unarmed fixed-wing aircraft, using an agreed suite of sensors. Eventually any country will be able to accede to the treaty, paving the way for a global verification regime than can be used to monitor any agreement. Also in 2001, the 13-year on-site inspection regime for the 1987 Intermediate-range Nuclear Forces Agreement (INF) was successfully terminated, while Ukraine verifiably destroyed the last of its nuclear silos under the first Strategic Arms Reduction Treaty (START) of 1991.

Behind the headlines, of course, the implementation of the verification provisions of a wide number of other arms control and disarmament agreements continues to proceed smoothly. Besides the START and INF agreements, the Conventional Armed Forces in Europe Treaty, the Dayton sub-regional and regional agreements for the Balkan states, and the Vienna Documents which the Organisation for Security and Co-operation in Europe (OSCE) helps implement, are all achieving their objectives effectively and verifiably. Indeed, it is easy to forget that the vast majority of states parties to bilateral and multilateral arms control and disarmament agreements abide by their obligations, co-operate fully with their reporting, moni-

toring and verification requirements and thereby demonstrably contribute to the building of international security. Most pay their dues fully, as well as contributing personnel, technology and resources to the monitoring and verification effort, often in an unheralded fashion.

In the environmental arena, the political agreement reached in Bonn, Germany, in July 2001 on outstanding implementation issues related to the 1997 Kyoto Protocol to the 1992 Climate Change Convention paves the way for finalising and beginning implementation of the protocol's complex compliance arrangements. That progress was made despite the decision of the Bush administration to reject the Bonn agreement—and, in a foretaste of what was about to befall the biological weapons protocol, the Kyoto Protocol itself—was a heartening boost for multilateralism. Other environmental treaties, such as the 1973 Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), are seeing a continuing quiet evolution of their compliance systems towards greater transparency and more robust responses to non-compliance. CITES parties are particularly impressive in venturing to impose sanctions for non-compliance on non-parties. Monitoring of implementation of the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer has, meanwhile, revealed a major environmental success story: the hole in the ozone layer is beginning to close as a direct result of near universal compliance with the treaty.

With regard to the monitoring and verification of peace agreements, the presentation of the so-called Brahimi Report to the UN Security Council and UN General Assembly in 2000 raised hopes that these neglected aspects of peace operations, along with many others, would receive due political and financial support from the organisation and member states. Initial substantial increases in funding and staffing resources for the UN Department of Peacekeeping Operations augur well. It remains to be seen what impact these developments will have in the field, where monitoring of compliance has always been a Cinderella undertaking, a world away from the strict verification and compliance measures applied to multilateral arms control and disarmament agreements. The OSCE, for its part, established an Operations Centre in Vienna to professionalise its monitoring missions, while deploying a substantial new operation in Macedonia in 2001. Israel continued to reject international monitoring in its ongoing conflict with the Palestinians. But

Northern Ireland witnessed an historic breakthrough when a substantial act of verified disarmament—in Irish parlance 'putting weapons permanently and verifiably beyond use'—occurred in October 2001 under the auspices of the International Independent Commission on Decommissioning. Other lesser known missions, such as the International Peace Monitoring Team in the Solomon Islands, and the UN mission in Ethiopia and Eritrea continued to chalk up successes.

It is by now, even a couple of months after the tragic events of 11 September in New York and Washington, DC, a truism to describe them as having affected everything. Yet while the full impact of the attacks and the subsequent 'war on terrorism' are still being played out, it seems that the field of verification may be one of those that is little changed. There had been hope that having been cruelly reminded of the need for multilateral co-operation in fighting terrorism and having received the overwhelming support of the international community in doing so, the Bush administration would conclude that multilateralism was essential in other areas like arms control and disarmament and the environment. Those of us involved in the verification 'business' hoped that, in turn, the value of effective and efficient verification in all fields of multilateral endeavour would now be self-evident. Alas, this seems not to be the case.

Although the US decision to reject the BW and Kyoto protocols came before 11 September, there has subsequently been no evidence that the events have changed US policies. The US remains outside the Kyoto Protocol and shows no sign of reconsidering its position, despite an explicit call from British Prime Minister Tony Blair for it to do so as a result of the new need for multilateralism. US proposals for tackling the threat of biological weapons—made frighteningly real by the anthrax attacks that followed 11 September—are pitifully inadequate compared with a legally-binding and suitably intrusive international verification agreement. It seems that the September events, unprecedented though they have been, have not been enough to overcome the strong opposition of the US biodefence establishment and biotechnology industry to verification.

Perhaps the greatest verification irony came in November 2001 with the agreement in Crawford, Texas, between Russian President Vladimir Putin and George W. Bush to seek to lower the levels of strategic nuclear weapons to fewer than 2,200 for each country. In a reversal of President Ronald Reagan's concern to

'Trust but verify' in the face of Soviet opposition to intrusive verification, it was the American president who was prepared to settle for the equivalent of an international 'handshake', while Putin pressed for effective, co-operative verification of the cuts. The US administration appeared to have given little thought to the possibility that future disputes may arise over the precise size of the smaller nuclear arsenals envisaged or that the current progression towards cosier US–Russian relations may not be linear. US accusations about the existence of tactical nuclear weapons in Kaliningrad, contrary to a long-standing Russian unilateral undertaking that such weapons would all be withdrawn to Russia (matched by a comparable US unilateral undertaking), illustrate the dangers.

In the light of the negative developments witnessed recently it is more important than ever that those involved in advocating, designing, researching, establishing and implementing verification and monitoring regimes not remain mute about the undoubted value of verification. Decades of experience with multilateral regimes has demonstrated that verification does work, that it does permit confidence between states to grow (the success of the bilateral nuclear verification arrangement between Argentina and Brazil being just one glowing example) and that it can detect non-compliance in a timely fashion (the IAEA did detect North Korean non-compliance with its nonproliferation commitments). This is not to ignore the eternal difficulty of verification: that it cannot prove a negative. It therefore remains subject to accusations, often politically motivated, that it is ineffective because 'one can never know what one does not know'.

There remains much to be done in the verification endeavour. First, efforts need to be made to hold the line against those who seek to roll back or hobble the existing regimes, such as those relating to nuclear testing, nuclear safeguards or chemical weapons. Particularly insidious are attacks made on verification systems in the guise of exaggerated concerns about finance, confidentiality or sovereignty. Verification systems need to be lean and mean, but not so cash-strapped that verification faulters, thereby undermining its credibility. Confidentiality concerns are legitimate, but they should not be misused to erect impenetrable international bureaucracies. Sovereignty is important, but states constantly trade away bits of it in return for collective benefits, so verification should not be portrayed as unique in this respect. Verification may strengthen sovereignty by enhancing security.

New verification modalities, techniques and technologies need to be pursued. Some of these will help relieve states' anxieties about verification by delivering reduced costs, more secure data and less intrusiveness. Others will undoubtedly mean greater intrusiveness but will thereby provide greater reassurance where it is required. Long-range thinking about verification is also required, as currently being initiated by the UK in relation to future nuclear disarmament scenarios. Other technologically advanced states, especially those with nuclear weapons, need to become more engaged in such work. Advance preparation for verifying agreements that have not yet seen the light of day has been beneficial in the past, not just in laying the groundwork for treaty implementation but in encouraging the negotiators to conclude their work. Verification advances can hasten political progress. A prime candidate for such verification work in the arms control field is the long-awaited fissile material control treaty, while in the environmental area much work remains to be done to ensure that even adequate verification of compliance with the Kyoto Protocol, especially its greenhouse gas trading mechanisms, is possible. In peace missions monitoring, almost all areas require attention. The emerging co-operation between international organisations and non-governmental organisations in verification matters is, in this respect, a trend to be encouraged. Indeed, the technology revolution and the increasing accessibility of verification-relevant information to anyone who wants it may be the ultimate guarantor of states' compliance with their legally-binding treaty obligations.

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arms control and disarmament

2

Verifying nuclear arms control and disarmament

Edward M. Ifft

The period between 2000 and mid-2001 was a slow one in multilateral arms control.[1] Essentially, no progress was made in the Conference on Disarmament (CD) in Geneva, Switzerland, since delegates failed to agree a Programme of Work. Efforts to initiate negotiations on a Fissile Material Cut-off Treaty (FMCT) stalled because some members insisted on a linkage with more controversial parts of the CD agenda, such as arms control in outer space.[2] An FMCT would add a binding multilateral commitment to existing constraints on nuclear weapons material. The US stopped producing fissile material for nuclear weapons in 1992, and Washington and Moscow signed a bilateral agreement in 1994 to halt plutonium production for nuclear weapons. Russia and the UK announced in 1995 that they had ceased production of fissile material for use in nuclear weapons, and France made a similar statement in 1996.[3]

The situation regarding Nuclear Weapon-Free Zones (NWFZ) also did not change markedly. The treaties of Bangkok, Pelindaba, Rarotonga and Tlatelolco create one contiguous zone in most of the Southern Hemisphere. Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan are seeking to establish a NWFZ in Central Asia.[4] The United Nations General Assembly (UNGA) welcomed and encouraged the initiative at its 2000 session. Mongolia, while a single state and thus not meeting the general definition of a 'zone', declared its 'nuclear weapon-free status' in 1992.[5] In November 2000, the UNGA again adopted a resolution calling for the creation of a NWFZ in the Middle East.[6]

In view of the scant progress made in multilateral and regional arms control, this chapter focuses primarily on the nuclear agenda of the US and certain countries that used to be part of the Soviet Union. An important milestone was reached in 2001, as the five implementing states parties to the 1987 Intermediate-range Nuclear

Forces (INF) Treaty successfully completed the 13 years of on-site inspections and monitoring specified by the accord. Meanwhile, the ambitious and frequent inspections and monitoring provided for under the Strategic Arms Reduction Treaty (START) continued without change.

In January 2001 the administration of US President George W. Bush assumed office and initiated a comprehensive review of the US approach to international security, including nuclear arms control. A new emphasis on ballistic missile defence and a renewed interest in less formal methods of controlling nuclear arms were apparent which could have profound effects on the future course of arms control and disarmament. The government also made clear its intention to carry out further reductions in nuclear weapons, a move supported by many countries.

The INF Treaty

A major development in 2001 was the conclusion of the INF inspection and monitoring regime. Under the terms of the agreement, which entered into force on 1 June 1988, the states parties agreed that inspections would continue for 13 years, ending by 31 May 2001. The five implementing parties hosted final inspections—Belarus in February, Ukraine in March, Kazakhstan in April and Russia and the US in May 2001—and held appropriate closing ceremonies.

These events brought to an end a remarkable chapter in arms control verification. During these 13 years a total of 851 inspections were conducted. US inspectors carried out approximately 60 percent of them at 130 sites in Belarus, Kazakhstan, Russia and Ukraine. Around 40 percent were conducted by the other parties at 31 sites in the US and in the five Western European INF basing countries (Belgium, Germany, Italy, the Netherlands and the UK).[7] The inspections were of five types:

- **Baseline inspections** Conducted from July–August 1988 to help verify data on items prohibited by the treaty.
- **Closeout inspections** Carried out at eliminated facilities to verify that all activities related to INF had ceased. Closeout inspections were completed in August 1991.
- **Elimination inspections** To confirm that missiles, launchers and associated support equipment had been destroyed according to specified procedures. All of the required eliminations were completed by May 1991, the former Soviet

Union and the US eliminating 1,846 and 846 missiles respectively. The total numbers of items eliminated during this three-year period were 5,439 for the former Soviet Union and 2,332 for the US.

- **Quota or short-notice inspections** To confirm the number or absence of items banned by the treaty at a site. For the first three years, 20 inspections per treaty year were permitted for the US and the four successor states (aggregated) of the former Soviet Union—Belarus, Kazakhstan, Russia and Ukraine. This fell to 15 per treaty year for the next five years and 10 for each treaty year between 1 June 1996 and 31 May 2001.
- **Inspections by means of continuous monitoring** Allowed at one former missile assembly facility in the Soviet Union and one in the US to determine that prohibited missiles were not being produced and shipped. The US site was the former Pershing II production facility at Magna, Utah, while the site in the former Soviet Union was the former SS-20 final assembly facility at Votkinsk, Russia. Up to 30 inspectors could be permanently stationed outside each facility to monitor items leaving the plant. INF operations at both sites ceased on 31 May 2001. However, US personnel remain at the Votkinsk site in accordance with START I, since Inter-Continental Ballistic Missiles (ICBMs) for mobile launchers are still produced there.

The hundreds of inspections that took place demonstrated that, for the first time, highly intrusive inspections of very sensitive facilities could be successfully carried out in a manner that protects the legitimate interests of the inspecting and the inspected party. In many important respects, the procedures stipulated in the INF treaty became the model for inspection regimes in later agreements, such as the Conventional Armed Forces in Europe (CFE) Treaty and the START accords.

The INF treaty is of unlimited duration, so the legal obligations remain in force for the US and the 12 successor states of the former Soviet Union (the three Baltic states were not considered parties to the accord). The parties now rely on national technical means (NTM) and notifications for monitoring and verification. The Special Verification Commission (SVC) will continue to meet as required to resolve any questions relating to compliance and to agree on such measures as may be necessary to improve the viability and effectiveness of the agreement.

The START Treaty

Inspections continue under the START treaty. In general, these are more intrusive and elaborate than those under the INF accord. Given that the latter eliminated an entire class of weapon systems, inspectors only had to confirm the absence of these systems—at least for the period after 1991. START, though, reduces and otherwise constrains a variety of strategic weapon systems. Monitoring the quantity and technical characteristics of hardware is a complex undertaking.

The treaty provides for 12 distinct types of inspections.[8] At present, each side is conducting approximately 25–30 inspections per year, comprising: up to 15 Data Update Inspections at declared facilities to monitor the status of treaty-limited items; up to 10 Re-entry Vehicle Inspections to verify that the number of re-entry vehicles on deployed ballistic missiles does not exceed the amount allowed for that type of missile; up to three Formerly Declared Facility Inspections to determine that closed-out facilities remain consistent with treaty requirements; as well as other types of occasional inspections. In addition, a significant number of notifications are exchanged on a daily basis between the parties' Nuclear Risk Reduction Centers in accordance with treaty requirements.

Because the treaty specifies a numerical limit on the number of ICBMs for mobile launchers of ICBMs, as many as 30 US personnel are allowed to conduct Perimeter and Portal Continuous Monitoring (PPCM) at the Votkinsk Machine Building Plant, where final assembly of such missiles takes place.[9] Whereas the task of INF monitors was to confirm that Intermediate-Range Ballistic Missiles (IRBMs) were not leaving the plant, START monitors have the simpler job of counting the number of ICBMs for mobile launchers of ICBMs. The treaty gives the four successor states of the former Soviet Union the right to carry out a similar function at the Thiokol Plant in Promontory, Utah, where the first stage of the Peacekeeper (MX) missile was produced. This right has not been exercised and the aforementioned production has ended.

Compliance with the treaty appears to have been very good. Yet, as might be expected under a verification regime as complex as START, Russia and the US have different views on how the other side has implemented certain treaty requirements. They continue to pursue these matters in the Joint Compliance and Inspection Commission (JCIC), which generally meets twice a year in Geneva.[10] Discussions

START I aggregate numbers of strategic offensive arms

Country	Cat.1[1]	Cat.2[2]	Cat.3[3]	Cat.4[4]
Belarus	0	0	0	0
Kazakhstan	0	0	0	0
Russia	1,198	5,858	5,232	3,563.6
Ukraine	13	130	130	52.65
FSU total	1,211	5,988	5,362	3,616.25
US	1,299	7,013	5,695	1,795.2

NOTES 1 Deployed ICBMs and their associated launchers, deployed SLBMs and their associated launchers, and deployed heavy bombers; 2 Warheads attributed to deployed ICBMs, deployed SLBMs and deployed heavy bombers; 3 Warheads attributed to deployed ICBMs and deployed SLBMs; 4 Throw-weight of deployed ICBMs and deployed SLBMs (MT). Levels to be attained by 5 December 2001 in the four categories are 1,600, 6,000, 4,900 and 3,600, respectively.

SOURCE US Department of State, Fact Sheet, 1 October 2001.

in the JCIC and the SVC are classified and thus further analysis of specific compliance issues is not possible here.

Progress made by the sides in reducing their strategic offensive forces as required by the treaty is illustrated in the table above. The treaty requires that reductions be completed by 5 December 2001, when the seven-year reduction period, which began at entry into force on 5 December 1994, comes to an end. As shown in the table, by 31 July 2001 the two sides had already reduced below required levels in certain categories. It is important to note, however, that, although all nuclear warheads were removed from Ukraine several years ago, certain systems (ICBM launchers and heavy bomber airframes) remain accountable under the treaty. This is due to the fact that START I limits, for example, 'deployed missiles and their associated launchers'. Under the counting rules in Article III, a deployed launcher is considered to contain a deployed ICBM until it is eliminated according to agreed procedures. What are actually empty launchers are thus counted against the deployed missile and warhead aggregates until eliminated (analogous provisions apply to heavy bomber airframes). These eliminations are proceeding under the Co-operative Threat Reduction Program between Ukraine and the US.

START II

Russia and the US signed START II on 3 January 1993. It reduces by two-thirds the strategic nuclear arms of the two countries allowed before START I[11] came into effect, and contains important qualitative stabilising features. START II, as written, cannot exist without START I, since it relies heavily on the latter's definitions, counting rules and verification. It does, however, provide for additional types of on-site inspection to the 12 noted above.

The parties signed a protocol to START II on 26 September 1997, extending the implementation period to 31 December 2007 in order to grant Russia extra time to carry out the reductions. A subsequent joint statement and an exchange of letters between them in June 1992 further clarified the parties' undertakings.[12] The US Senate gave its advice and consent to ratification of the basic treaty on 26 January 1996. The protocol, however, has not been submitted to the Senate. Russia ratified the treaty and the protocol in April 2000, but placed conditions on entry into force. Russia would only exchange its instruments of ratification with the US if Washington ratified not just START II and its protocol, but also a set of agreements signed by the Russian and US foreign ministers in New York on 26 September 1997. These are: a Memorandum of Understanding, which would define the successor states to the former Soviet Union for the purposes of the 1974 US–Soviet Anti-Ballistic Missile (ABM) Treaty; an agreement on confidence-building measures related to theatre missile defence; and two 'demarcation agreements' that address the problem of how to distinguish between theatre and strategic ballistic missile defence systems. These conditions are unacceptable to the US and, as a result, START II faces an uncertain future.

START III and beyond

At the Helsinki summit in 1997, former US and Russian Presidents Bill Clinton and Boris Yeltsin agreed an ambitious framework for a possible START III treaty. It included an understanding on the establishment, by 31 December 2007, of lower aggregate levels of deployed strategic nuclear warheads for each side, to between 2,000 and 2,500. The framework also called for 'measures relating to the transparency of strategic nuclear warhead inventories and the destruction of strategic nuclear warheads and any other jointly agreed technical and organisational measures, to

promote the irreversibility of deep reductions including prevention of a rapid increase in the number of warheads'. Consequently, the new framework would move beyond monitoring nuclear warheads actually deployed on strategic missiles and heavy bombers, as under START I. It would now deal with non-deployed warheads—the warheads by themselves being smaller items that are more difficult to monitor. The sides also agreed to consider issues related to transparency in nuclear materials and to explore, as separate matters, possible measures pertaining to nuclear long-range sea-launched cruise missiles and tactical nuclear systems, including appropriate confidence-building and transparency initiatives.[13] Scientists in several countries are tackling the formidable verification challenges posed by such possibilities. It is clear that, as deployed systems are reduced, non-deployed systems and the fissile material removed from them become increasingly important. This is not only because of the verification requirements of any agreements themselves, but also because of nonproliferation and environmental concerns. It would be premature to render a judgement on the extent to which the technical and political problems can be solved, but the significance is obvious. It should be noted that, regardless of the fate of START II and a possible START III, these matters will have to be addressed.

The world community demands that continuing progress be made in this area. The consensus document issued at the end of the 2000 Nuclear Non-Proliferation Treaty (NPT) Review Conference contains 'an unequivocal undertaking by the nuclear-weapon States to accomplish the total elimination of their nuclear arsenals leading to nuclear disarmament to which all States Parties are committed under Article VI'.[14] Some observers considered this language to be the strongest commitment ever made by the five nuclear weapon states, although substantively it differs little from previous formulations. The document also urged the early entry into force and full implementation of START II and the conclusion of START III as soon as possible, in addition to addressing the ABM treaty.

Meanwhile, a reduced role for nuclear weapons was apparent in the new Strategic Concept of the North Atlantic Treaty Organisation (NATO) released in April 1999. It noted that the circumstances in which any use of nuclear weapons might be contemplated are 'extremely remote'. NATO drew attention to: its dramatic reduction in sub-strategic forces, including the elimination of all nuclear artillery and ground-

launched short-range nuclear missiles; a significant relaxation of the readiness criteria for forces with nuclear roles; and the termination of standing peacetime nuclear contingency plans.[15] Following up on these points, the Alliance called, in December 2000, for greater transparency and openness with Russia on nuclear weapon and safety issues. Specific areas identified by NATO include an enhanced dialogue on matters related to nuclear forces and their state of readiness, plus exchanges of information on the safety features of nuclear weapons and on US and Russian sub-strategic forces. The mechanism for such an enhanced dialogue would be the NATO–Russia Permanent Joint Council.[16] One benefit of these measures would be to enhance transparency about, and knowledge of, the size of US and Russian sub-strategic stockpiles. This could help to clarify uncertainties regarding implementation of the 1991–92 Presidential Nuclear Initiatives (see below).

For its part, Russia called for reductions in strategic nuclear arms even below START III levels. However, the new Russian Military Doctrine, promulgated in January 2000 by the government of Russian President Vladimir Putin, also used a new formulation in describing the circumstances in which Russia asserted the right to use nuclear weapons. This was widely interpreted as placing greater reliance on tactical nuclear weapons as a means of compensating for the deterioration of the country's conventional forces.[17]

An interesting question concerns the extent to which further progress will take the form of legally binding agreements, less formal parallel unilateral actions or even independent moves by individual states. The Bush administration has shown a strong interest in less formal means of making nuclear reductions and of enhancing international security. In a speech on 1 May 2001, Bush suggested that the US would 'lead by example' and stated a goal of moving quickly to reduce nuclear forces.[18] The range of possibilities was highlighted by US Secretary of Defense Donald Rumsfeld, when he told NATO's North Atlantic Council in June 2001 that: 'Moving to lower numbers could be done in a number of ways, including reciprocal approaches, arms control, unilateral initiatives—or some combination'.[19]

The final document of the 2000 NPT Review Conference addressed these issues in general terms and appeared to want it both ways. On the one hand, the conference endorsed the principle of 'irreversibility' as applied to nuclear arms control measures and called for 'the further development of the verification capabilities that will

be required to provide assurance of compliance with nuclear disarmament agreements . . .'. On the other hand, it endorsed 'further efforts by the nuclear-weapon states to reduce their nuclear arsenals unilaterally'.[20]

A useful precedent exists in the Presidential Nuclear Initiatives taken by former US President George Bush, former Soviet President Mikhail Gorbachev and former Russian President Boris Yeltsin in 1991–92.[21] These led, for example, to the withdrawal of large numbers of tactical nuclear weapons from Europe, the cancellation of certain nuclear weapon programmes and changes in the operational practices of Russia and the US.[22] These initiatives were achieved quickly and were widely acclaimed. Yet, because they were unilateral actions without verification measures, questions have been raised regarding the extent to which Russia has implemented some of them. The possible movement of nuclear weapons into the Kaliningrad enclave on the Baltic is a case in point. Although INF inspections (while they were being conducted), or inspections under the CFE treaty, might help to clarify such a situation, these regimes were not designed to deal with unilateral commitments.

The verification aspects are complicated. Less formal arrangements do not generally contain the strict verification requirements that were thought necessary at the formal level. But they offer more flexibility and could be achieved much faster than formal treaties, which tend to involve long and extensive negotiations and ratification procedures. It may also be true that the greater trust and openness that has accompanied the end of the Cold War makes more rigorous verification no longer necessary. One could argue, though, that uncertainty, or outright cheating, will increase when levels begin to get very low, and, therefore, that there is even more need for effective verification. Perhaps the creative use of transparency—through declarations, data exchanges, periodic visits and a variety of *ad hoc* arrangements—could combine the advantages of both approaches.

Another uncertainty regarding the future of verification regimes arises from indications that Russia might pull out of existing arrangements if the US withdraws from the ABM treaty. In an interview with the German newspaper *Welt am Sonntag* on 11 June 2000, Putin stated that 'destruction of that Treaty would make further reduction of strategic offensive arms under START I impossible . . . The START II Treaty could not enter into force and it would become impossible to conclude the START III Treaty'. More recently, in an interview with US journalists in Moscow,

Putin is reported to have said that both START I and II would be negated by a US decision to build missile defences in violation of the ABM accord. He added that such a step would eliminate verification requirements, reviving an era in which Russia would hide its abilities and intentions.[23] However, in the second half of 2001, Russia appeared to be moving toward a compromise on this issue.

Disposing of highly enriched uranium

In February 1993 Russia and the US signed a bilateral agreement on the disposition of highly enriched uranium (HEU) from Russian nuclear weapons.[24] In January 1994 they signed an accord calling for the US Enrichment Corporation (USEC) to purchase, over a 20-year period, 500 metric tonnes of HEU from dismantled Russian nuclear weapons. This would be enough material for approximately 20,000 nuclear weapons, using International Atomic Energy Agency (IAEA) determinations of the minimum amount of fissionable material needed to produce a nuclear weapon. The HEU is diluted in Russia to low-enriched uranium (LEU), and then delivered to the US for use in the manufacture of fuel for commercial reactors. The fuel prepared from the more than 10,000 metric tonnes of LEU could generate a quantity of electricity equal to that used by the entire world for almost three years.

Verification is achieved through 'transparency rights', assuring the US that the Russian LEU is derived from HEU and assuring Russia that the US is not using the LEU to produce weapons-grade uranium. The US Department of Energy (DOE) and the Russian Ministry of Atomic Energy (MINATOM) worked out these transparency rights. The DOE maintains a presence at Novouralsk, Russia, where the HEU is blended down to LEU. Up to four US monitors are afforded daily access to the facilities and to material related to the conversion process. Other monitors are allowed access over a five-day period up to six times a year to the three other Russian plants involved in this activity (Mayak, Seversk and Zelenogorsk). At each facility, a low-resolution gamma spectrometer is used to determine the level of enrichment of HEU, which arrives from Russian dismantlement facilities in sealed containers.[25] Although these monitoring arrangements are impressive, confidence would be increased if the monitors were permitted to begin the tracking process directly at the dismantlement sites, since this would provide greater confidence in the provenance of the HEU.

For their part, the Russians have a permanent presence at the gaseous diffusion plant at Portsmouth, Ohio, where the LEU has been sent since shipments began in 1995. They also make periodic visits to the five US facilities where the LEU is fabricated into fuel assemblies and review documentation on the distribution of the LEU to commercial power plants.[26]

Unforeseen economic issues have complicated the HEU purchase programme. The USEC, a government agency when the original agreement was signed, was privatised in 1998, introducing commercial considerations into the equation that are not necessarily consistent with US national security or Russian economic interests. Before privatisation, the USEC entered into a five-year fixed-price contract with Russia under which its LEU would be bought at a price below its resale value. With the expiration of the original contract in 2001 and changes in market conditions, the USEC has reportedly pressed for even lower prices and sought agreement to sell some commercial nuclear fuel along with the LEU. Russia has reportedly sought to bring the new prices closer to market levels. It is important to resolve this issue, since the flow of fuel from Russian nuclear weapons has become essential to the 100 US nuclear power plants that supply more than 20 percent of US electricity. In addition, the cash flow from the programme is very important to nuclear nonproliferation efforts in Russia. Possible solutions could include government subsidies to the USEC or the involvement of additional US partners to promote competition.[27]

The Trilateral Initiative

A verification initiative that is potentially important whether or not START III is ever negotiated is the Trilateral Initiative, launched in 1996.[28] The initiative involves three parties—Russia, the US and the IAEA—in examining the technical, legal and financial implications of Russia and the US going beyond their voluntary offer agreements with the Agency and verifying the status of fissile material removed from dismantled nuclear weapons. Under this arrangement, the IAEA would verify that such material was not returned to weapons use and that other fissile material declared surplus to defence programmes was not diverted. Russia and the US would submit such material to IAEA verification, and procedures and methods would be devised to allow the Agency to draw credible and independent conclusions

about whether or not the verification objectives had been met. Russia has already declared that 40 percent of the plutonium removed from its nuclear weapons will be stored under IAEA supervision at the Mayak facility in Ozersk, Russia. The US storage site will be at the K-area Material Storage Facility at the Savannah River site in South Carolina. Under its Voluntary Offer Agreement with the IAEA the US already has some such materials under safeguards.[29]

Any arrangement devised for such a verification scheme would have to take into account the fact that Article I of the NPT requires that the Agency does not gain access to information relating to the design or manufacture of nuclear weapons—especially because it uses inspectors from non-nuclear weapon states. The two countries may also have their own concerns about revealing sensitive information and about not violating their nonproliferation commitments under Article I of the NPT. Good progress has been made on finding possible technical solutions to the problem. The approach that is emerging involves the use of gamma spectrometry to detect the presence of plutonium, high-resolution gamma spectrometry to detect the presence of weapons-grade plutonium, and neutron multiplicity counters to determine the presence of plutonium of at least an agreed threshold mass. All of this must be carried out without revealing attributes that could contain weapons design information. A key element of this approach is 'information barriers': a computer uses algorithms that evaluate the validity of the data, but the result is displayed only in a yes/no format. More detailed information regarding the sample does not leave the 'black box'. In addition the information is not stored in the computer (or elsewhere) and is automatically purged after the authentication process is complete. Technical requirements for the system have been provisionally agreed. US scientists have demonstrated their approach to Russian and IAEA experts at the Los Alamos National Laboratory in California. Russian scientists discussed a similar approach of their own at a meeting in Vienna, Austria, in January 2001.[30]

Substantial progress has been made towards finalising a Model Verification Agreement as the basis for bilateral agreements between the Agency and each country. A draft will possibly be submitted to the IAEA Board of Governors in 2002. The question of who will pay for the verification is one that still needs to be resolved. The consensus final document of the 2000 NPT Review Conference

underlined the importance of the Trilateral Initiative and called for its completion and the implementation of its conclusions.[31]

The plutonium disposition agreement

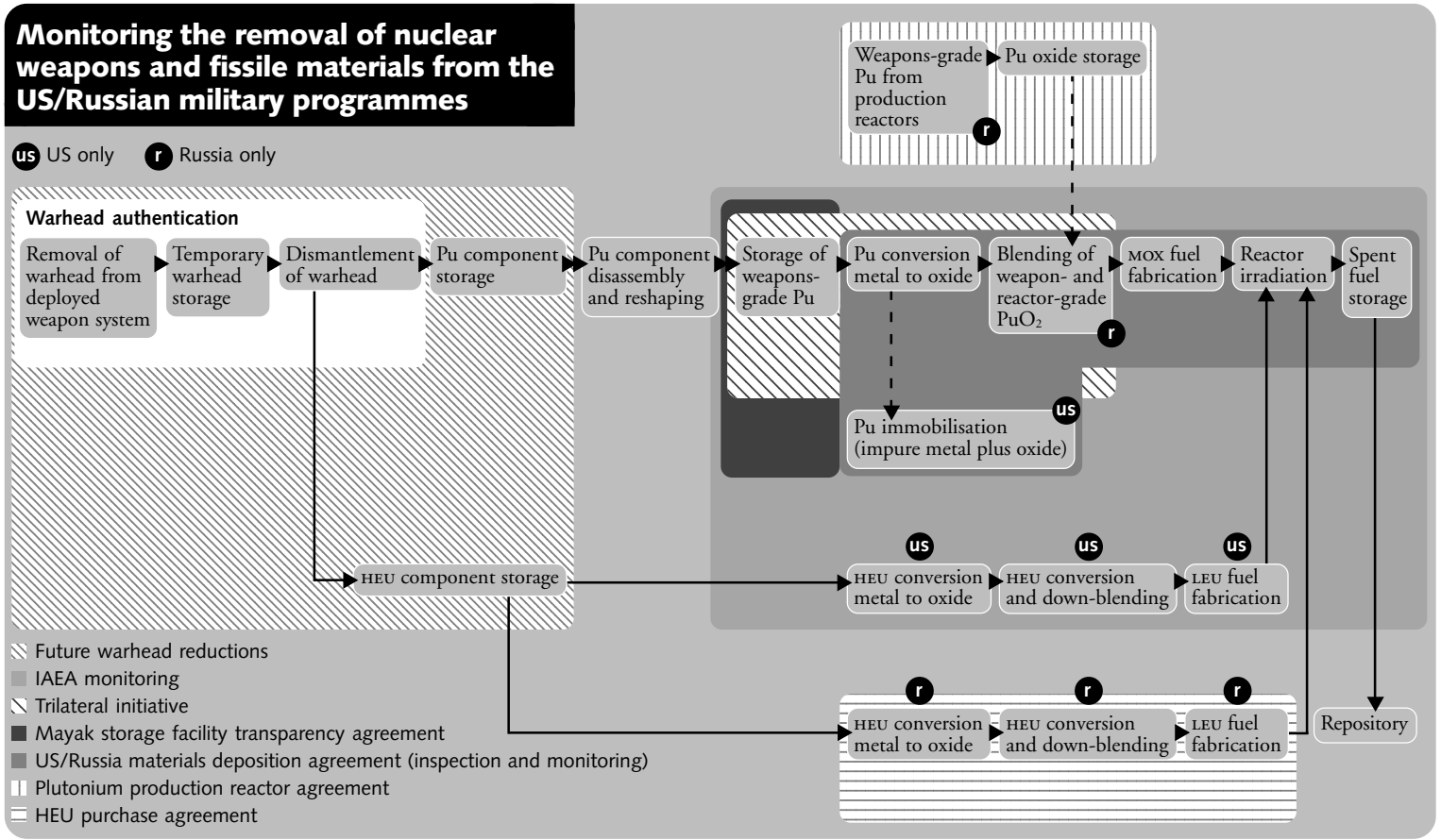
A further development occurred on 1 September 2000 when the United States–Russian Federation Plutonium Management and Disposition Agreement was signed and provisionally applied. Under this deal, each side will dispose of 34 metric tonnes of plutonium withdrawn from their weapons programmes, either by irradiating it as fuel in reactors or by immobilising it with high-level radioactive waste, rendering it suitable for geologic disposal. The agreement sets 2007 as the target date to begin operating the new facilities needed to convert and fabricate two metric tonnes of plutonium per year into mixed-oxide fuel (MOX) in both countries and to immobilise some of the US plutonium. The procedures in the agreement will ensure that this plutonium is never used for military purposes. Both the processes and the end products will be monitored, raising a number of technical problems.

To ensure that there is funding for Russia's involvement, G-8 leaders at their 2000 summit in Okinawa, Japan, called for the development of an international financing plan.[32] Since 1992 the US has allocated more than US$5 billion to Kazakhstan, Russia and Ukraine to facilitate nuclear disarmament and nonproliferation, and other countries have also made significant contributions. The Bush administration's proposed budget for fiscal year 2002 contained cuts of about US$100 million in areas that would have an impact on nonproliferation initiatives in Russia. But the possibility of changes in the budget, as well as of re-allocating existing funds, make the situation fluid.

The chart overleaf illustrates the process envisioned for monitoring the removal of nuclear weapons and fissile material from US and Russian military programmes.[33]

Future work and unsolved problems

In addition to the programmes discussed above, there remains the issue of monitoring nuclear reductions and disarmament. At present, monitoring involves only Russia and the US. Eventually, however, one could expect all states with nuclear weapons to be engaged in the process. In the INF and START agreements, the former


Monitoring the removal of nuclear weapons and fissile materials from the US/Russian military programmes
US US only
r Russia only
Warhead authentication
Removal of warhead from deployed weapon system
Temporary warhead storage
Dismantlement of warhead
Pu component storage
Pu component disassembly and reshaping
Storage of weapons-grade Pu
Weapons-grade Pu from production reactors
Pu oxide storage
Pu conversion metal to oxide
Blending of weapon- and reactor-grade PuO2
MOX fuel fabrication
Reactor irradiation
Spent fuel storage
Pu immobilisation (impure metal plus oxide)
HEU component storage
HEU conversion metal to oxide
HEU conversion and down-blending
LEU fuel fabrication
HEU conversion metal to oxide
HEU conversion and down-blending
LEU fuel fabrication
Repository
Future warhead reductions
IAEA monitoring
Trilateral initiative
Mayak storage facility transparency agreement
US/Russia materials deposition agreement (inspection and monitoring)
Plutonium production reactor agreement
HEU purchase agreement

Soviet Union and the US developed quite intrusive and quite effective techniques for monitoring rather large and well-defined military objects, such as ballistic and cruise missiles and their launchers, deployed warheads and heavy bombers. In addition to further reductions in these traditional weapon systems, there is a need to begin dealing with smaller items related to nuclear weapons, including non-deployed warheads separated from their delivery vehicles and various forms of fissile material. The fact that such materials give off heat, gamma rays and neutrons allows, in principle, for their detection and characterisation. Yet a host of technical and political problems immediately arise. One problem is that neither the US nor Russia (nor, presumably, any other nuclear weapon state) currently has a dismantlement facility that could be dedicated exclusively to operations monitored by other states or by the IAEA. This means that dismantlement might have to be conducted at a facility that was simultaneously engaged in sensitive non-treaty operations, thereby greatly complicating or restricting the monitoring activities that were feasible. In the US, the most likely facility would be the Pantex plant in Texas. Russia would presumably designate one of its plants used for weapons assembly and disassembly (Avangard, Penza-19, Zlatoust-36 or Sverdlovsk-45).[34]

A comprehensive solution will require effective methods to monitor storage and dismantlement facilities, the processes by which fissile material is changed into other forms and disposed of, and the chain of custody during changes in location. Tags and seals, PPCM, remote sensing, remote monitoring, on-site inspection, and various types of data exchange and notification can all play a part. Key objectives of such monitoring would be: to provide a high level of confidence that declared warheads were being dismantled; to increase accountability in relation to fissile material; to prevent classified data from being compromised; to conduct activities at a reasonable cost and with a minimal impact on facility operations; to meet facility safety and security requirements; and to minimise the need for the presence of inspectors.

As discussed above, work is proceeding in many of these areas.[35] A major issue will be whether states will be able to grant sufficient verification access to sensitive facilities to enable other countries to have confidence that what is taking place is as agreed. Another issue is who will do the verifying or monitoring—and whether and to what extent a verification regime might be established? Depending on the

verification goals, should it be a bilateral, multilateral or an international organisation? Finding the proper balance between 'trust' and 'verify' will have a major impact on how these problems are resolved.

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Endnotes

[1] The views expressed are those of the author and do not necessarily reflect US government policy.
[2] 'Deadlocked and waiting at the UN Conference on Disarmament—an interview with Ambassador Robert T. Grey, Jr.', *Arms Control Today,* December 2000, pp. 3–8.
[3] *Fissile Material Cutoff Treaty,* US Department of State Fact Sheet, 29 June 1999.
[4] Zachary S. Davis, 'The spread of nuclear-weapon-free zones: building a new nuclear bargain', *Arms Control Today,* February 1996, pp. 15–19.
[5] 'Mongolia's nuclear-weapon-free status', available at www.opanal.org.
[6] 'Disarmament Resolutions and Decisions of the Fifty-Fifth Session of the United Nations General Assembly', UN Department for Disarmament Affairs, October 2000, pp. 7–9, 34–37, 57–59, 72–73 and 105–106.
[7] Office of Public Affairs, Defense Threat Reduction Agency, Washington, DC.
[8] These are explained in Annette Schaper, 'Verifying nuclear arms control and disarmament', *Verification Yearbook 2000,* Verification Research, Training and Information Centre (VERTIC), London, 2000, p. 60.
[9] Whereas in the INF treaty, PPCM is considered a form of on-site inspection, in the START accord, PPCM is a system of monitoring separate from the 12 types of on-site inspection in the treaty.
[10] US Department of State, *Annual Report to Congress on Activities in Arms Control, Nonproliferation, and Disarmament*, Washington, DC, 2000, p. 44.
[11] START became known as START I only after START II was negotiated.
[12] *Arms Control-Related Material from the Summit Meeting between US President Bush and Russian Federation President Yeltsin*, Washington, DC, 16–17 June 1992, US Department of State Fact Sheets.
[13] *Joint Statement on Parameters on Future Reductions in Nuclear Forces*, White House Press Release, 21 March 1997.
[14] '2000 NPT Review Conference Final Document', *Arms Control Today,* June 2000, p. 31.
[15] *The Alliance's Strategic Concept*, NATO Press Release NAC-S(99)65, 24 April 1999, p. 25.
[16] *Report on Options for Confidence and Security Building Measures (CSBMs), Verification, Non-Proliferation, Arms Control and Disarmament*, NATO Press Communiqué M-NAC-2(2000)121, 14 December 2000.
[17] 'Russian Federation military doctrine', *Nezavisimaya Gazeta,* Moscow, 22 April 2000. For English translation, see 'Russia's military doctrine', *Arms Control Today*, May 2000.
[18] *Remarks by the President to Students and Faculty at National Defense University,* White House Press Release, 1 May 2001.
[19] Donald H. Rumsfeld, Prepared Remarks to NATO North Atlantic Council, 7 June 2001.
[20] See endnote 14.
[21] *Presidential Initiative on Nuclear Arms*, White House Fact Sheet, 27 September 1991; President Gorbachev's Reply to President Bush's Nuclear Initiative, Soviet television, Moscow, 5 October 1991. See also Fact Sheet, Office of the White House Press Secretary, 27 September 1991 and Fact Sheet, Arms Control Association, Washington, DC, December 1991.
[22] Note that France and the UK also made significant unilateral reductions in their nuclear forces during the 1990s (see endnote 13, pp. 6–9).
[23] Patrick E. Tyler, 'Putin says Russia would counter US shield', *New York Times,* 19 June 2001, p. 1.
[24] 'Agreement Between the Government of the United States of America and the Government of Russia Concerning the Disposition of Highly Enriched Uranium Extracted from Nuclear Weapons', Washington, DC, 18 February 1993.
[25] *Megatons to Megawatts*, US Department of Energy, UCRL-TB-133506, July 1999. See also James E. Doyle, 'New Requirements for Monitoring Nuclear Materials', Los Alamos National Laboratory, LA-UR-01-2037.
[26] The five facilities are Westinghouse Nuclear Fuel, Columbia, South Carolina; Global Nuclear-Fuel

Americas, Wilmington, North Carolina; Framatome Cogema, Lynchburg, Virginia; ABB Combustion Engineering, Hematite, Missouri; Siemens Power Corporation, Richland, Washington.

[27] Thomas L. Neff, 'Decision time for the HEU deal: US security vs private interests', *Arms Control Today,* June 2001, pp. 12–17. See also 'Clinton protects Russian HEU deal assets', *Arms Control Today,* July–August 2000, pp. 34–36, and the response by the United States Enrichment Corporation in *Arms Control Today,* September 2000, p. 35.

[28] *IAEA Verification of Weapon-Origin Fissile Material in Russia and the United States,* IAEA Press Release, 19 September 2000. See also *The Control of Nuclear Proliferation: Future Challenges,* address by Mohamed ElBaradei to the Swedish Institute of International Affairs, 23 April 1998.

[29] ElBaradei (see endnote 14).

[30] Doyle, pp. 16–17.

[31] See endnote 14, p. 31.

[32] See endnote 10, p. 4.

[33] Chart courtesy of James E. Doyle, Applied Monitoring and Transparency Laboratory, Los Alamos National Laboratory. It reflects a notional view of process steps that may be monitored under the proposed agreements based on current open source descriptions. Some of these agreements are under negotiation. The process steps subject to monitoring may change if and when these agreements are finalised.

[34] Doyle, p. 6.

[35] More detailed discussions of these issues are found in *Confidence, Security and Verification: the challenge of global nuclear weapons arms control,* United Kingdom Atomic Weapons Establishment (Aldermaston, UK), April 2000; Kenneth N. Luongo, 'The uncertain future of US–Russian cooperative nuclear security', *Arms Control Today,* January–February 2001; Matthew Bunn, *The Next Wave: Urgently Needed New Steps to Control Warheads and Fissile Material,* Carnegie Endowment for International Peace, March 2000; James W. Tape, *How to Deal With Monitoring and Verification Challenges in a World with Low Numbers of Weapons and Large Stocks of Nuclear Material?,* Los Alamos National Laboratory, LA-UR-00-5543; James E. Doyle, *New Requirements for Monitoring Nuclear Materials,* Los Alamos National Laboratory, LA-UR-01-2037.

3

Test ban verification: technical progress confronts political uncertainty

Trevor Findlay and Oliver Meier

Over the past year political progress towards entry into force of the Comprehensive Nuclear Test Ban Treaty (CTBT) has slowed, even as the establishment of the treaty's verification system progresses.[1] Since 1997, when the Provisional Technical Secretariat (PTS) for the future Comprehensive Test Ban Treaty Organisation (CTBTO) commenced its work in Vienna, Austria, major technical milestones in implementing the system have been reached. The groundwork for the International Monitoring System (IMS) has been laid and the system in increasingly being put in place. The nascent Organisation is evolving rapidly into an effective and efficient international verification body.

But the CTBTO Preparatory Commission (PrepCom), which oversees the work, still has to overcome several political, financial and technical hurdles before its mission is accomplished. Some of these are simply a result of the novelty of the undertaking that the PrepCom is engaged in—the establishment of a global, multilateral treaty monitoring regime that will be on round-the-clock lookout for the tell-tale signs of a clandestine nuclear test. There are, however, now more ominous signs that uncertainty about entry into force is beginning to affect the PrepCom's work. Not only are there several states that are essential to entry into force which have not yet even signed the treaty—namely India, North Korea and Pakistan—but the US, under President George W. Bush's administration, has declared that it will not ratify the treaty in the near future. Moreover, the US has announced that it will no longer participate in non-IMS activity, most significantly the crucial preparations for on-site inspection, and will reduce its funding of the PrepCom commensurately. These set bad precedents for a preparatory process that has hitherto enjoyed uniquely strong political, financial and technical support from participating states.

Ultimately, effective verification of the CTBT will depend on the interplay between the official verification system, the additional scientific resources available to the international community that are able to provide data relevant to monitoring the test ban, and national technical means operated by states parties, including their own seismic and other remote monitoring systems as well as satellite imagery and intelligence gathering. This chapter focuses on progress being made in respect of the official, treaty-based verification system, although the other elements that will contribute to verifiability will be mentioned where relevant to the official system.[2]

Progress in establishing the CTBT's verification regime

The three components of the CTBT's verification regime are the IMS, the International Data Centre (IDC) and the on-site inspection (OSI) arrangements.

The International Monitoring System

The IMS will consist of 321 monitoring stations and 16 radionuclide laboratories located in some 90 countries. Four types of station are to be established—seismological, infrasound, hydroacoustic and radionuclide.

The seismic network will form the core of the system. Seismic waves generated by earthquakes, explosions or other phenomena will be detected using 50 primary and 120 auxiliary seismic stations distributed worldwide. Sixty land-based infrasound stations will use sonar to detect atmospheric tests. In addition, 11 underwater hydroacoustic stations are being set up while 80 radionuclide stations will measure radioactive particles in the atmosphere from atmospheric nuclear tests or underground tests that vent. Sixteen radionuclide laboratories will analyse filters from the stations, as well as samples taken by inspectors.

After a slow start during the early years, when the legal and political foundations for the new system were being established, the completion of the IMS is now making good progress. The PTS was able to achieve most of its targets for 2000. By August 2001, 291 IMS facilities in 70 countries were covered by some kind of legal arrangement.[3]

As of mid-2001, 258 site surveys for IMS stations had been completed. Construction was under way or a contract under negotiation for 113 stations. Forty-one stations belonging to the primary network and 62 auxiliary stations had been

Status of IMS station installation programme

Station type	Certified[1]	Complete[2]	Underway	Pending[3]	Not started
Primary seismic	5	20	9	0	21[4]
Auxiliary seismic	0	60	8	5	47[5]
Infrasound	1	7	16	6	31
Hydroacoustic	0	2	3	0	6
Radionuclide	5	9	15	18	38

NOTES 1 Meets PTS technical requirements; 2 Substantially meets specifications; 3 Contract pending; 4 Thirteen of these stations are operational but require upgrades. The remaining eight do not yet exist; 5 Twenty-five of these stations exist but require a major upgrade. The remaining 22 do not yet exist. Information correct as at 31 December 2000.

SOURCE CTBT/PC-14/1/Annex III, 24–26 April 2001, pp. 2–4.

completed or substantially completed. In some cases, the surveying of station sites and the resulting correction of locational co-ordinates was taking longer than expected. By August 2001 the PrepCom had still not reached agreement on changing the co-ordinates for eight stations.[4] Slow progress in station certification is a continuing problem. By July 2001 only 12 stations had been certified as eligible to become part of the IMS.[5] Because of practical difficulties in bringing stations up to the standard required for certification, the PTS had to adjust its projections: in mid-2000 it had projected that around 80 stations would be certified by the end of 2001, but a year later this had fallen to just 32.[6]

The International Data Centre

All information from IMS stations is transmitted to the IDC via the Global Communications Infrastructure (GCI). The IDC receives the data, processes it and distributes it to the national authorities that member states are required to establish. All CTBT states parties are entitled to receive raw data and/or filtered information as they wish.

Waveform data from the seismic, infrasound and hydroacoustic stations is processed automatically. It is the IDC's responsibility to screen out events which are clearly of natural origin. A large percentage of earthquakes, for instance, occur at depths at which it is impossible to conduct clandestine nuclear tests. By applying

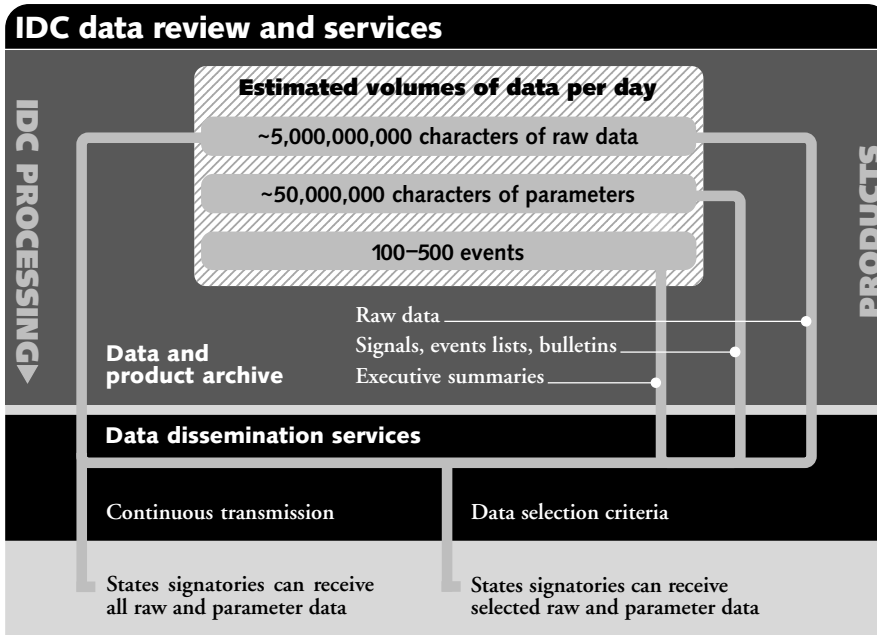
screening criteria to the vast amount of data received, the number of potentially suspicious events can be reduced. The product—so-called Standard Event Lists—are reviewed by human analysts, who produce Reviewed Event Bulletins (REBs). Because radionuclides take much longer to be collected and analysed, this takes place on a different timescale.

The IDC will issue Standard Event Bulletins which will indicate the degree to which each detected event meets specific screening criteria.[7] States without significant national technical and analytical means will naturally look to the IDC for more precise information if suspicions are aroused concerning a particular event. The IDC is expected to assist any state party in the technical analysis of IMS data as well as of data provided by other states parties.[8]

Since 21 February 2000, when the IDC took over from the provisional IDC (PIDC) in Arlington, US, its products have been produced regularly, although only on the basis of data from a few stations and with delays and gaps in reporting. As of August 2001 the centre was receiving about five gigabytes of data per day from IMS stations. Member states received, on average, 21,000 segmented data and product deliveries per month from the IDC.[9] The REB reported, on average, 52 events a day.[10] Over the course of 2000, 74 IMS stations were sending data to the IDC, but only 16 were transmitting data over the GCI. Data availability for all stations at the end of the year reached an average of 80 percent, but was higher (about 91 percent) for stations transmitting via the GCI.[11]

As more stations deliver data to the IDC on a near real-time basis, the centre will distribute data and products to member states on a larger scale. This has raised the question of whether the IDC, prior to entry into force of the treaty, should be expected to provide services to member states on a 24-hour, seven-days a week basis, thereby fulfilling the requirements for a fully operational IDC.

Three releases of IDC applications software, which filters and screens IDC data, have been successfully installed and tested at the IDC, the last one after some delay in June 2000.[12] One setback for the IDC is that, in line with the US decision in August 2001 to cut back its involvement in the non-IMS parts of the PTS' work (see below for details), the PIDC will no longer provide the software that it has been developing for the IDC, beginning with the so-called fourth release. However, the PTS has begun to set up a Software Integration Unit and budgeted US$1.8 million



SOURCE Preparatory Commission for the CTBTO, *Annual Report 2000*

in 2001 for external contracts for the development, maintenance and documentation of IDC software.[13]

In August 2000 the PrepCom took the unprecedented step of commissioning an external expert evaluation of the IDC's work to date. Led by Ian Kenyon, former Executive Secretary of the Preparatory Commission for the Organisation for the Prohibition of Chemical Weapons (OPCW), six international experts spent two weeks in Vienna examining the Centre's operations. Aspects considered by the evaluation team included the implementation of PrepCom guidelines; the overall state of the IDC and the GCI; the interaction between the IDC and other parts of the PTS, states signatories and the broader scientific community; and possible improvements in the scientific methods and software used by the IDC.

The report commended the IDC for the quality of its staff and its work, but identified some areas of concern. Specifically, the experts recommended that:

- the IDC reform its policy and planning procedures in order to plan its work better;
- the IDC (and the PTS as a whole) institute procedures to better assess the skills and performance of its staff (such as self-assessment exercises);

- the PTS create the position of 'verification czar' responsible for the operational management, integration and strategic planning of the verification function as a whole;[14] and
- the CTBTO strive to be an open organisation, co-operating with other national and international organisations to the make the most effective use of its resources, both to verify compliance with the treaty and for the common good.[15]

The review team's recommendations continue to be discussed in the PrepCom's Working Group B. A similar external review of the IMS by six outside experts is planned for late 2001.

On-site inspections

OSIs may be mandated by the Executive Council of the CTBTO to clarify suspicious events detected by the IMS or on the basis of information from national technical means (NTM) submitted by states parties.[16] The CTBTO will not have a standing OSI inspectorate but will draw on a pool of trained inspectors nominated by member states. This pool needs to be geographically representative and large enough to supply a team of up to 40 inspectors within six days.

OSI teams will be permitted to spend up to 130 days in an inspected state's territory and will therefore require significant in-country support. Substantial amounts of portable equipment will also be needed, including geophysical, radionuclide, drilling and communications equipment.

In November 1999, realising that development of this component of the verification system was lagging behind, the PrepCom took steps to speed up the development of OSI procedures. Consequently, the budget for developing an OSI capacity was doubled. However, the process remains problematic. Preparing for on-site inspections has several, interrelated aspects:

- the development of an Operational Manual (OpsMan);
- the selection and training of future inspectors; and
- the procurement of equipment.

The Operational Manual

The OpsMan is to be a guide for on-site inspectors, detailing the rights and obligations of both the team and the inspected party. To draft a text for the manual, a

group of Friends of the OSI Programme Co-ordinator was established in November 1999, open to participation by all treaty signatories. This process did help identify contentious issues, but was unable to deliver a usable manual. An Initial Draft Rolling Text of more than 1,000 pages was compiled from all of the proposals received. By the end of 2000 it covered about 75 percent of the elements that need to be covered, but some crucial ones were still missing. For other issues, competing language was included. Delegations began discussing this text in June 2001 but were unable to reach compromises on key areas of dispute.

The drafting process faces several fundamental difficulties. First, there is no agreed understanding of the scope and purpose of the manual. Israel, which is wary of intrusive OSIs because they might reveal details of its particularly opaque nuclear weapons programme, favours a minutely detailed manual that explains the purpose, methodology and parameters of the activities to be undertaken by inspectors. Others, including the US, prefer a manual that outlines the general responsibilities of the inspectors but leaves room for flexibility and is within the spirit of the treaty's OSI provisions.[17] A second difficulty is the dependence of the drafting process on papers provided by national delegations rather than impartial technical contributions, including from the PTS.

To speed up the process, discussions on the OpsMan were brought into the PrepCom's Working Group B. In addition, in late 2000 the new position of Task Leader for the OSI Operational Manual was created. Since February 2001, Dutch Ambassador Arnd Meerburg has occupied the position. Moving the OpsMan discussions to Working Group B did not speed them up, however; on the contrary, by increasing the political salience of the negotiations it led to their becoming further politicised. The new Task Leader, moreover, was not able to convince delegations to move beyond line-by-line negotiations. Even though it would make it harder for some of the smaller delegations in Vienna to participate, some form of work on the OpsMan between sessions of the PrepCom is likely to be required.

The greatest threat to the development of a balanced, technically sophisticated and effective OSI regime came, however, in August 2001, when the US, in addition to announcing that it would no longer fund non-IMS activities, served notice that it would withdraw from the OpsMan deliberations. The comparatively large US delegation had contributed many crucial elements to the existing draft. Without

the US, the influence of those states that want to limit the freedom of inspectors to actively investigate suspicious events will grow. The US withdrawal is counter-productive even from the perspective of the treaty's opponents in Washington, since it delays the development of a mechanism that could produce the 'smoking gun' needed to prove that an illicit nuclear test has been conducted. Unless pro-verification states fill the gap left by the US, the result could be a regime that is less able to clarify suspected violations of the test ban.

Exercises and training

Meanwhile, the PTS is continuing to conduct exercises and mock OSIs to help develop the OSI regime. Two tabletop exercises have been conducted to test procedures for fielding an inspection team. The second of these, held from 29 November to 1 December 2000, also involved the OSI Operations Support Centre, based at the PTS.[18] Slovakia will host an experimental mock OSI in October/November 2001.[19] Another trial, the timing and location of which remain confidential, will take place at a later stage.[20] Such trials have been successfully used in the development of the OSI arrangements for other regimes and have helped dispel exaggerated fears of the loss of confidential information.[21]

Training courses have also been conducted, including an OSI Experimental Advanced Course in Snezhinsk, Russia, which was used to further develop the training programme. By the end of August 2001, 170 experts had participated in introductory training courses, some of whom will be trained in advanced courses and participate in OSI exercises.[22]

Procurement of equipment

The slow progress of discussions on the OpsMan is hindering the procurement of OSI equipment. As long as the procedures for OSIs are unclear, the PTS can only procure certain types of equipment, including for passive seismic measurements, still and video photography, visual observation and position-finding, and low-resolution gamma search. But the procurement of other instruments, such as that for high-resolution gamma spectrometry and xenon detection, has been delayed because of disagreements about requirements.[23] For example, some states insist that certain equipment be 'blinded' so that it will only reveal data indicative of a nuclear explosion. Further, they insist that these limitations be incorporated

into the equipment's hardware (rather than simply encoded in the software). Such specifications are expensive and will unnecessarily prolong the procurement process.

The PTS has also started looking at the logistical requirements for future OSIs, for example, the facilities and arrangements at Vienna International Airport, for ensuring the rapid dispatch of on-site inspectors and equipment.

Challenges faced by the Preparatory Commission

The PrepCom for the CTBTO, which consists of representatives of states which have signed or ratified the CTBT, oversees the work of the Provisional Technical Secretariat. The Commission and its two working groups (Working Group A on finances and Working Group B on verification) each meet three times a year. It faces numerous challenges in fulfilling its mandate.

Entry into force

Five years after the CTBT was opened for signature, the completion of the verification system is overshadowed by the uncertain prospects of entry into force. This political uncertainty means that the PrepCom and the PTS are working against a shifting deadline, further complicating their already difficult task. At the same time it will become increasingly difficult to maintain political support for full establishment of the verification system if entry into force of the CTBT does not appear imminent.

As of 27 September 2001 an impressive roster of 161 states had signed and 81 had ratified the CTBT. However, 13 of the states listed in Annex 2 of the treaty as being required to ratify it before it can enter into force have still to do so. Three of the listed states, India, North Korea and Pakistan, have not even signed the treaty.

The key to entry into force is the US. Despite the longstanding involvement of the US in the negotiation of the CTBT, President George W. Bush, after a policy review, announced in February 2001 that his administration would not ratify the treaty in the near future. The administration has also taken several other steps to distance the US from the test ban, including:

- seeking legal advice on a possible withdrawal of the US signature: the State Department's advice was that the CTBT remains before the Senate despite the failed ratification vote on 13 October 1999.[24] Yet parts of the Republican leadership in Congress and in the administration still want to renounce US signature;[25]

Status of the 44 Annex 2 states

The ratifiers

Argentina, Australia, Austria, Bangladesh, Belgium, Brazil, Bulgaria, Canada, Chile, Finland, France, Germany, Hungary, Italy, Japan, Mexico, Netherlands, Norway, Peru, Poland, Romania, Russia, Slovakia, South Africa, South Korea, Spain, Sweden, Switzerland, Turkey, Ukraine, UK

The signatories

Algeria, China, Colombia, Democratic Republic of the Congo, Egypt, Indonesia, Iran, Israel, US, Vietnam

The non-signatories

India, North Korea, Pakistan

NOTES **As of 12 September 2001. Up-to-date information on signatures and ratification can be found at pws.ctbto.org.**

- sounding out US allies on their reaction to a US withdrawal: fortunately the reaction was apparently uniformly negative; and
- taking steps to shorten the lead time necessary for a resumption of nuclear testing at the Nevada Test Site.[26]

The US position has taken the pressure off other countries which are reluctant to sign or ratify. This is most obvious in the case of India and Pakistan, which have both stated that they will not stand in the way of entry into force but have taken no measures themselves to become state parties. A second conference of states signatories and ratifiers designed to encourage movement towards entry into force is to be held in November 2001 but is unlikely to have much practical effect.

All of this increases the uncertainty about the timing of entry into force and complicates the Prepcom's planning and work. The PTS has developed a Programme Option Memorandum for 2002–06 which describes several timelines for completion of the verification system. It has made 2005 the target date for completion of at least the IMS, even though this is not necessarily a realistic date for entry into force to be achieved.

Several states, including China and some Latin American countries, have begun to make a connection between the completion of the IMS and entry into force, especially with regard to costs. As stations are increasingly incorporated into the IMS, the PTS must absorb their operational and maintenance costs. Some delegations have therefore floated the idea of 'mothballing' part of the system until entry into

force. From a verification point of view, such proposals are short-sighted. Monitoring stations need to be maintained and operated continuously if they are to be ready for entry into force. In most cases a halt to the operation of stations would necessitate re-certification and only add to the costs of setting up the IMS.

Behind these questions looms the larger issue of what exactly will be required for the verification regime 'to be capable of meeting the verification requirements' of the CTBT at entry into force.[27] The bottom line among delegations seems to be that the completion of the three operational manuals—for the IMS, the IDC and OSIS—is necessary. But how much of the IMS itself needs to be operational is unclear. Although it is unlikely that all 321 stations will be ready in the near future, this should not prevent entry into force and will not be necessary to verify the CTBT with sufficient confidence. While this is not yet an urgent issue, developing realistic expectations of the system will make it easier to tailor the work of the PrepCom to the eventual political requirements.

Funding

The 2000 PrepCom budget was US$79.9m, compared with US$74.7m in 1999 and US$58.4m in 1998. The collection rate for assessed contributions to the budget was approximately 97 percent for the 2000 budget and more than 84 percent for the 2001 budget.[28] This is a good record compared with most international organisations and indicates a high level of continued international political support for the CTBT.

This hitherto impressive record is, however, threatened by the US announcement on 21 August 2001 that it 'will continue to participate in and fund only those

PrepCom 2001 budget [US$83.5m]

- US$43m for establishing or upgrading IMS stations
- US$12.9m for the IDC
- US$10m for establishing the global communications infrastructure
- US$2.3m towards developing an on-site inspection capacity
- US$15.2m on administration

SOURCE CTBT/PC-13/1/Annex V, 20–21 November 2000, p. 8

PrepCom activities directed to establishing and supporting the International Monitoring System including, to the extent required for IMS support, the International Data Centre and Global Communications Infrastructure'.[29] This new policy will apparently result in a 4.5 percent reduction in the US contribution, or US$900,000 annually, starting in 2002.[30]

The US move sets a worrying precedent for arms control and disarmament verification regimes generally because states normally do not attempt to dictate how their individual assessed contributions are spent. There is, moreover, traditionally an unstated understanding among signatories to any treaty which mandates the establishment of a new organisation prior to entry into force that in spite of the apparent tenuousness of their legal obligations they will work co-operatively on their joint endeavour. This includes providing the necessary financial support. The new US attitude disturbs this understanding. Failure to pay its assessed contributions in full and on time puts the US in technical non-compliance with its political, if not legal, commitments as a treaty signatory. Should the US allow its underpayments to accumulate, it runs the risk of losing its vote in the PrepCom.[31]

Other developments on the financial front are also of concern, including the questioning by some developing countries of the assumptions previously made about the funding levels required prior to entry into force. Debate appeared to be triggered by the agreement reached among UN member states in January 2001 on a new scale of assessment for financial contributions to the UN and its associated agencies from 2002. The new scale pegs the US contribution at 22 percent and redistributes the reduction among other countries.[32] Some states have argued that the PrepCom should continue to use the old scale of assessment or apply the scale of assessment for UN peacekeeping operations, which sets the US contribution of 25 percent.

Meanwhile, despite the questions raised by some states, the PTS continues to project the need for substantial budget increases over the next few years to fund both the operation of existing certified stations and the installation of new ones. These discussions are taking place while the PTS tries to establish the legal and financial rules for the operation and maintenance of IMS stations already certified. Like so many PrepCom issues, this is uncharted territory. No international organisation has ever operated such an elaborate network of monitoring stations. Working

Group B has, however, made some initial recommendations for the provisional operation and maintenance of IMS facilities.[33]

One controversial issue is whether the PTS should shoulder the operating and maintenance costs of the 120 auxiliary seismic stations envisaged. These stations will normally be used for non-IMS purposes but will transmit data to the IDC when there is a need to clarify a suspicious event. Some developing countries want the PTS to pay for the operation of these stations in the same way that it pays for the primary stations.[34] Papua New Guinea is the first state to have made a specific request in this regard. The emerging approach to this problem within the PrepCom is to deal with such requests on a case-by-case basis.

Growth and continuity

The PTS has grown consistently over the years and, as of June 2001, employed 254 staff from 68 countries, including 156 professionals. While the eventual size of the Organisation is not yet clear, by mid-2001 the PrepCom had approved the filling of 280 posts.[35]

The CTBTO was intended to be a non-career organisation and contracts were supposed to be limited to seven years. In 2004 the first contracts will expire and the PTS could lose key staff who in its infancy. If the PrepCom wants to avoid the loss of institutional memory and experience, it will soon have to initiate discussions about adjusting its tenure policy. In addition, the PTS is having problems in achieving gender balance. As of August 2001, 27 percent of all staff employed were women, but this percentage was much lower at senior levels.

Creating a transparent organisation

For a number of years the use of IMS data for purposes other than test ban monitoring has been a contentious issue in the PrepCom. IMS data could be used for a variety of other purposes, including scientific and humanitarian. Data from the seismic network are of interest to seismologists in improving their ability to predict earthquakes and other natural phenomena.[36] Hydroacoustic stations could give early warning of tsunamis, while infrasound stations could warn of volcanic eruptions.

Some states, including China, argue that the confidentiality provisions of the treaty imply that the distribution of IMS data should be restricted to states parties.

Some Western states and others favour a more open policy, arguing that IMS data have little relevance to national security. Indeed, unlike other verification regimes, IMS data are not confidential information provided by governments but scientific data collected and analysed by the international organisation itself. The US urges the immediate and complete release of all IMS data.[37] While the treaty itself obliges the Technical Secretariat to 'make available all data, both raw and processed, and any reporting products, to all States Parties', it also states that 'the provisions of this Treaty shall not be interpreted as restricting the international exchange of data for scientific purposes'.[38]

In order to test the confidentiality rules, the PTS has been planning a phased release of certain types of data to a limited number of non-state recipients. Thus, humanitarian organisations could receive IMS data promptly for disaster relief operations, while others would only have delayed access. The proposed test of a delayed release of certain types of IMS data beyond states parties' national data centres has not begun because of the continued resistance of more than one state party.

The evolution of the CTBTO as an open organisation is supported by the external review team that evaluated the IDC.[39] Such a development would not only enable the CTBTO to exchange information freely with the scientific and non-governmental community, but might also provide another political *raison d'être* for the IMS in addition to monitoring for nuclear explosions. It will in any case be difficult to prevent leakage of IMS data, since the data centres of all CTBT parties will have direct access to it.[40]

Conclusion

The PTS and the IDC have already demonstrated that, in principle, they will be able to fulfil their assigned role in verifying compliance with the CTBT. Completing the IMS and designing procedures for OSIS should not be technically difficult, given the necessary political, financial and technical support from states signatories and parties.

The fate of the CTBT's verification system is, however, ultimately dependent on the decisions of states that have not yet signed and ratified the treaty, since it cannot be truly operational until the treaty enters into force. Paradoxically, continu-

ing progress in completing the system may hasten entry into force by demonstrating its increasingly powerful capabilities, even when partially complete, thereby challenging the considerable scepticism that exists in some quarters, especially in the US. Demonstrable progress in establishing the system will also symbolise the political importance that the overwhelming majority of states attach to the CTBT. What is needed at this critical juncture, then is for such states to demonstrate their continuing commitment by increasing their political, financial and practical support for the earliest implementation of the treaty's unparalleled verification system.

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Endnotes

[1] For background on the evolution of the Treaty's verification system, see Oliver Meier, 'Nuclear Test Ban Verification: Work in Progress', in Trevor Findlay (ed.), *Verification Yearbook 2000,* Verification Research, Training and Information Centre (VERTIC), London, December 2000, pp. 25–41; and Oliver Meier, 'The CTBT Verification System: Entering Rough Waters?', *Briefing Paper 01/04*, Verification Research, Training and Information Centre, London, September 2001.

[2] For an argument in favour of exploiting the synergies between these different verification resources, see 'Report of the Independent Commission on the Verifiability of the CTBT', London, October 2000, www.ctbtcommission.org; and 'Findings and Recommendations Concerning the Comprehensive Nuclear Test Ban Treaty', Report by General John Shalikashvili (US, Ret.), Special Advisor to the President and Secretary of State, submitted 5 January 2001, Washington, DC, www.state.gov.

[3] Private communication.

[4] CTBT/PC-15/1/Annex II, 21–23 August 2001, pp. 27–28.

[5] See 'Background Document by the Provisional Technical Secretariat of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization prepared for the Conference on Facilitating the Entry into Force of the CTBT (New York, 2001)', CTBT-Art.XIV/2001/3, 5 July 2001, pws.ctbto.org.

[6] Peter Basham, 'The Current Status of the CTBTO International Monitoring System', background paper for the Independent Commission on the Verifiability of the CTBT, www.ctbtcommission.org.

[7] Protocol to the CTBT, Part I, Section F, para. 18.

[8] Protocol to the CTBT, Part I, Section F, para. 20.

[9] See pws.ctbto.org.

[10] CTBT/PC-14/1/Annex III, 5–16 February, 2001, p. 7.

[11] Preparatory Commission for the CTBTO, Provisional Technical Secretariat, *Annual Report 2000*, Vienna, April 2001, pp. 11–12.

[12] One positive effect of this development is that IDC staff now have the opportunity to alter and modify software according to their needs (private communication).

[13] Private communication.

[14] This recommendation, not universally endorsed by the PTS, was triggered by the apparent lack of communication between the staff operating the IMS and the IDC. The IMS and IDC directorates are now meeting monthly to improve co-ordination. See CTBT/PC-15/1/Annex III, 21–23 August 2001, p. 4.

[15] 'Report of the External Evaluation Team (Peer Review) on the International Data Centre', 2000, p. 3.

[16] Such data must be obtained, according to the Treaty, 'in a manner consistent with international law', implying that information obtained by espionage would be unacceptable.

[17] See Mordechai Melamud, 'Background Paper on On-Site Inspections (OSI) Main Elements and Expectations', submitted to the Independent Commission on Verifiability of the CTBT, www.ctbtcommission.org.

[18] CTBT/PC-14/1/Annex III, 5–16 February 2001, p. 15.

[19] This exercise will involve the testing of some equipment, such as the Seismic Aftershock Monitoring System (SAMS) seismometers as well as some of the procedures for dispatching an inspection team. See 'Government of Slovakia hosts On-Site Inspection Field Experiment and Equipment Testing Exercise', pws.ctbto.org.

[20] CTBT/PC-15/1/Annex III, 21–23 August 2001, p. 8.

[21] See John Hart, 'On-Site Inspections Across Arms Control and Disarmament Regimes', *Verification Matters,* no. 3, VERTIC, London, 2001, forthcoming.

[22] 'Background Document by the Provisional Technical Secretariat' for the Conference on Facilitating the Entry into Force of the CTBT, pws.ctbto.org, op. cit.

[23] CTBT/PC-14/1/Annex I, 24–26 April 2001, p. 14.

[24] Tom Shanker and David E. Sanger, 'Bush to Drop Nuclear Pact', *International Herald Tribune,* 9 July 2001, p. 3.

[25] In a letter dated 12 March 2001, the then Chairman of the Senate Committee on Foreign Relations, Jesse Helms, told Secretary of State Colin Powell that it 'is time for the Executive Branch to articulate a new policy on nuclear testing, to withdraw the US signature from the CTBT, and to terminate funding to CTBT organizations' (Jonathan S. Landay, 'Jesse Helms Pushes for U.S. Pullout of Nuclear Test Ban Treaty', *Knight Ridder Newspapers,* 29 March 2001, www.krwashington.com). On 4 April 2001, 10 Republican Senators publicly called on Secretary of Defense Donald Rumsfeld to end Defense Department efforts to implement the CTBT (see Letter from Senator Jon Kyl and nine other Senators to Secretary Rumsfeld against CTBTO, 4 April 2001).

[26] C. Bruce Tarter, the director of the Lawrence Livermore National Laboratory in California, said in an interview that US nuclear weapons scientists are looking at 'what it would take to do various kinds of tests on various time scales'. See Jonathan S. Landay, 'Bush Asks Scientists for Input on Resumption of Nuclear Tests', *Knight Ridder/Tribune News Service,* 28 June 2001.

[27] CTBT, Article IV.1.c.

[28] CTBT/PC-15/1/Annex IV, 21–23 August 2001, p. 4.

[29] Statement of the US representative, delivered at the 15th session of the Preparatory Commission for the CTBTO, Vienna, 21 August 2001.

[30] Phillip C. Bleek, 'White House to Seek Partial CTBTO Funding; Plans to Drop Support for On-Site Inspection', *Arms Control Today,* 31 August 2001, www.armscontrol.org.

[31] Paragraph 5 of the Resolution Establishing the Preparatory Commission (CTBT/MSS/Res/1), Annex, adopted on 19 November 1996 obliges all signatory states to annually meet their share, based on the UN scale of assessment, of the PrepCom. The resolution states that a 'State Signatory which has not discharged in full its financial obligation to the Commission within 365 days of receipt of the request for payment shall have no vote in the Commission, until such payment is received'.

[32] General Assembly Resolution A/RES/55/B-F, 22 January 2001.

[33] CTBT/PC-14/1/Annex II/Appendix V, 24–26 April 2001, p. 32.

[34] The Treaty states that the Technical Secretariat shall agree and co-operate to establish, operate, upgrade, finance and maintain monitoring facilities and radionuclide laboratories. Protocol to the CTBT, Part I, para. 4.

[35] CTBT/PC-15/1/Annex III, 21–23 August 2001, p. 3; private communication.

[36] The American Geophysical Union (AGU) and the Seismological Society of America (SSA) in September 1999 adopted a joint statement that called for all IMS data to be available without any restriction or delay. The International Union of Geodesy and Geophysics (IUGG) and one of its member associations, the International Association of Seismology and Physics of the Earth's Interior (IASPEI), passed resolutions in July 1999 requesting that 'open, free, and undelayed access be guaranteed' to all waveform data from the IMS. The expectation of free access to IMS data stems partly from the scientific community's involvement in the design and development of the IMS, which has been provided 'with the clear expectation that the data will be available not only for treaty monitoring, but also for scientific research and hazards mitigation'. See Letter of Gregory van der Vink (Director of Planning, IRIS Consortium), Terry Wallace (Professor, University of Arizona), Ann Meltzer (Professor, Lehigh University) and John Orcutt (Director, IGPP, Scripps Institution of Oceanography) to Dr. Vigdor L. Teplitz, National Security and International Affairs Division, Office of Science and Technology Policy, Executive Office of the President, 14 September 2001.

[37] US policy, adopted under the Clinton Administration, is to distribute IMS data without restriction. The US seeks the agreement of other signatories to make their data freely available to the public. See Gregory van der Vink and Terry Wallace, 'Open Data, International Law, and the Nuclear Test Ban Treaty,' *Seismological Research Letters,* vol. 70, no. 6, November/December 1999, pp. 663–665.

[38] CTBT, Article IVparas 14.e and 10.

[39] 'Report of the External Evaluation Team (Peer Review) on the International Data Centre', p. 3.

[40] In mid-2001, 340 users in 48 signatory states had access to IMS data. 'Background Document by the Provisional Technical Secretariat of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization prepared for the Conference on Facilitating the Entry into Force of the CTBT (New York, 2001)', CTBT-Art.XIV/2001/3, 5 July 2001, pws.ctbto.org.

4

Nuclear safeguards: developments and challenges

John Carlson

For most states the commitment not to acquire nuclear weapons has been carefully made and is strongly held. Observance of their legal obligations under the 1968 Nuclear Non-Proliferation Treaty (NPT) or other treaties which foreclose the nuclear weapon option does not depend on the deterrent effect of verification activities. Nonetheless, it is an important maxim of international arms control to 'trust, but verify'. The establishment of a credible verification mechanism—in this case safeguards applied by the International Atomic Energy Agency (IAEA)—to provide confidence that all parties are honouring their treaty obligations plays a vital part in reinforcing such commitments.

Traditionally, IAEA safeguards have been primarily concerned with verifying nuclear activities declared by the state—that is, determining the *correctness* of states' declarations. Failure to address adequately the possibility of *undeclared* nuclear activities being conducted—the issue of the *completeness* of states' declarations—has, since the 1990–91 Gulf War, been recognised as a serious shortcoming in the classical safeguards system. As a consequence, IAEA safeguards are undergoing a major transition towards greater emphasis on information collection and analysis, diversity of verification methods, incorporation of more qualitative judgements and improved efficiency. These changes present considerable challenges to the IAEA and the international community, but the result will be a more effective safeguards system.

A successful reform of 'classical' safeguards will bolster global confidence in compliance with NPT commitments, and is therefore a crucial element in support of efforts to prevent the spread of nuclear weapons.

The system of safeguards[1] developed to give effect to full-scope safeguards commitments under the NPT is commonly described as the 'classical' system. It is characterised by:

- an emphasis on the verification of nuclear materials accountancy, using containment and surveillance as complementary measures; and
- a focus, inherited from pre-NPT safeguards, on the concept of diversion. This means that the removal of nuclear material from *declared* facilities or locations needs to be detected.

Before the strengthened safeguards reforms were initiated, the IAEA had not been expected to look for *undeclared* nuclear activities, unless these were revealed through the agency's detection of diversion. While the IAEA has the right of *special inspection,* which can be applied to undeclared as well as declared locations, this right had never been exercised. It was generally considered that it should not be invoked unless there was substantial evidence of a safeguards breach.

The discovery of Iraq's clandestine uranium enrichment and nuclear weapons programme, however, indicated the more likely course for a proliferator: not only is diversion of safeguarded material unattractive because of the likelihood of detection, but there are limited opportunities to divert *weapons grade* materials because these are unusual in civil programmes. Accordingly, in most circumstances a state pursuing a weapons programme would need to establish nuclear upgrading capabilities—enrichment or reprocessing. If the state is able to do this clandestinely, it is unlikely to risk detection by diverting nuclear material covered by safeguards.

Strengthening the safeguards system

One of the lessons learned from the Iraq experience is that, if safeguards are to continue their key confidence-building role, it is essential that the issue of detection of undeclared nuclear activities be addressed. At the same time, safeguards must become more efficient so that the IAEA is able to manage an expanding workload within budget constraints.

Shortcomings in classical safeguards

The principal weakness in standard safeguards agreements (INFCIRC/153 agreements[2]) is the limitation they place on the IAEA's access for routine safeguards inspections. Only declared nuclear facilities (and certain *locations outside facilities*) may be inspected, and even within facilities only defined *strategic points* are open to inspection. Iraq was able to take advantage of this restriction: it was discovered

Some facts and figures

In 2000 there were 71 states, plus Taiwan, with significant nuclear activities.[A] Seventy of these states have safeguards agreements with the IAEA:[B]

- 61 have comprehensive safeguards agreements[C] pursuant to the NPT, or its equivalent, applying safeguards to all existing and future nuclear activities and material
- four states (Cuba, India, Israel and Pakistan) have 'INFCIRC/66'-type safeguards agreements,[D] applying safeguards only to designated facilities and material (in the case of Cuba, safeguards apply to all existing nuclear facilities and material, and the country has concluded an Additional Protocol for the application of strengthened safeguards)
- the five nuclear weapon states (NWS)[E]—China, France, Russia, the UK and the US—have 'voluntary offer' agreements applying safeguards to designated facilities and material

A further 70 states have concluded safeguards agreements with the IAEA but have no significant nuclear activities. Fifty-four NPT parties have not yet concluded NPT safeguards agreements, as required by the treaty,[F] although three of these have other forms of comprehensive safeguards agreements, for example, under the 1967 Treaty of Tlatelolco. As at 31 December 2000 the following were under IAEA safeguards:

- 902 facilities and 'locations outside facilities'
- 726 tonnes of plutonium—72 tonnes were unirradiated, including 3.3 tonnes in fresh MOX[G] fuel; the amount of spent fuel discharged from safeguarded power reactors in 2000 was 37 tonnes
- 21.8 tonnes of highly enriched uranium (HEU), including 14.4 tonnes of unirradiated HEU
- 48,974 tonnes of low enriched uranium (LEU)
- 91,686 tonnes of source material (mostly natural uranium)

In 2000 the IAEA had 217 safeguards inspectors. The total staff of the IAEA's Department of Safeguards was 507. In addition there were 59 temporary staff and 20 experts provided free by member states. The IAEA performed 2,467 inspections at 584 facilities and locations outside facilities, representing 10,264 person-days of inspection effort in the field.

In 2000 the IAEA continued to operate with a zero real growth regular budget allocation. The safeguards expenditure from the regular budget was US$70.6 million (around 36 percent of the IAEA's total budget). In addition, member states contributed extra-budgetary funds of US$10.3m, bringing overall safeguards expenditure to US$80.9m.[H]

NOTES

A Significant nuclear activities are defined by the IAEA as comprising a research reactor and/or other nuclear fuel cycle activities.

B A further state, Georgia, has an NPT safeguards agreement which has been signed but not yet brought into force. Georgia's only nuclear facility, a research reactor, was shut down some years ago.

C 'Comprehensive safeguards' is synonymous with 'full-scope' safeguards.

D So called because the model text is set out in IAEA Information Circular 66 of 1965.

E The NWS are those recognised by the NPT as possessing nuclear weapons prior to 1 January 1967 (Article IX.3 of the NPT).

F Article III.4 of the NPT requires the conclusion of safeguards agreements within 18 months of accession.

G Mixed oxide—fuel comprising a mixture of plutonium and uranium oxides.

H In US dollar terms the 2000 safeguards budget was some 11 percent less than that of 1999 due to exchange rates, specifically the strong dollar relative to the Austrian schilling, the currency in which the IAEA operates (its headquarters are located in Vienna).

after the Gulf War that some clandestine activities had been undertaken at safeguarded sites away from the strategic points where agency inspectors were able to go. A related deficiency was the lack of any mechanism through which the body of information which was accumulating regarding Iraq's interest in nuclear weapons could trigger additional verification activity.

Addressing these shortcomings

Since the early 1990s the IAEA, with the assistance of member states, has been engaged in a major undertaking to strengthen and streamline the safeguards system. From the outset, it was recognised that under a strengthened safeguards system the IAEA would need:

- greater rights of access, both at declared nuclear sites and to other places in the state—but, unlike special inspections, on a non-accusatory, hence non-confrontational, basis;
- greater capabilities to acquire and analyse information; and
- deployment of new technologies, particularly environmental analysis.

The principal objectives of this work are to:

- shift the focus from declared inventories and flows of nuclear material at individual facilities towards safeguards approaches based on evaluation of the state as a whole;
- provide credible assurance of the absence of undeclared nuclear material and activities in the state; and
- diversify the methods of detection, resulting in a more robust safeguards system.

By 1995 the IAEA and member states had developed a detailed outline of strengthened safeguards measures. There was general acceptance that certain of the measures proposed (termed 'Part 1' measures) could be carried out under existing safeguards agreements. The IAEA Board of Governors endorsed the implementation of these in March 1995, in time for the NPT Review and Extension Conference in April.

For certain other measures (termed 'Part 2' measures), additional legal authority was necessary and a new legal instrument, complementary to existing safeguards agreements, was negotiated. This took the form of a model Additional

Protocol, to serve as the basis for each state to conclude an individual protocol additional to its safeguards agreement with the agency. The text of the model Additional Protocol (designated INFCIRC/540) was agreed by the Board of Governors in May 1997.

Advances in safeguards technologies

The development of new techniques and equipment for safeguards falls under three broad headings: the introduction of entirely new technologies; improvements in existing technologies; and the application of new technologies to established tasks. Major areas of development include:

Environmental sampling This technique is based on the fact that nuclear activities release small particles of material and/or gases. These releases can be detected at some distance from their point of origin. Samples for analysis can be obtained from swiping building surfaces, such as the walls of laboratories, or from the natural environment—air, water, soil and vegetation. Environmental analysis proved to be highly effective in unravelling Iraq's clandestine nuclear programme, and since then analytical capabilities have substantially improved.

While the IAEA is currently using environmental sampling on a location-specific basis, studies are being undertaken into the feasibility of 'wide-area' environmental sampling, looking for indications of nuclear activities over extensive areas, for example, through sampling the air and river water. Practical experience has been gained with this technique in Iraq. At present, there are technical aspects to be overcome, including cost, but this could be a valuable technique for the future, either generally or in particular regions.[3]

Satellite imagery The IAEA is studying the use of commercially available satellite imagery, *inter alia* as a means of confirming information provided by states (for instance, in the Expanded Declaration: see below), and indeed has begun the routine use of imagery. It is receiving expert assistance from several states and is establishing its own imagery unit. Satellite imagery has considerable potential for the detection of undeclared facilities. As satellite techniques become more widely used for commercial and scientific purposes the costs are decreasing substantially.

Remote monitoring This technique involves the transmission of surveillance images (for example, from video cameras) or other data (for example, from electronic seals and sensing instruments) in digital form directly to IAEA headquarters via the public telephone network, the Internet or satellite. Use of remote monitoring can result in substantial reductions in inspection effort, as well as making safeguards information available on a much more timely basis (in real time or near-real time).

The strengthened safeguards system

Key aspects of the strengthened safeguards regime, of which the Additional Protocol is a central element, are as follows: the IAEA is to receive considerably more information on nuclear and nuclear-related activities, including through an Expanded Declaration by each state and widened reporting requirements; IAEA inspectors have rights of complementary access to any part of a nuclear site, and to a wide range of other locations, as discussed below; and the IAEA can employ environmental sampling, initially on a 'location-specific' basis, but the Additional Protocol recognises the possibility of using 'wide-area' environmental sampling once its efficacy has been established.

State evaluation

Central to the strengthened safeguards concept is the state evaluation, a comprehensive analysis by the IAEA of all the information available to it regarding the nuclear programme of each state. A substantially increased amount of information is available to the IAEA as a result of implementing strengthened safeguards measures, including: information supplied by the state itself, under its safeguards agreement and its additional protocol, and voluntarily; information from the IAEA's verification activities, including inspections and complementary access, and information from other areas of the IAEA; open-source and related information; and information such as export data provided by third parties.

Through the state evaluation process the IAEA seeks to establish a thorough understanding of a state's nuclear and nuclear-related activities, including the consistency of declared activities with the nuclear programme as a whole, and whether there are questions and inconsistencies requiring further explanation. The analytical framework includes the use of a 'physical model' of the nuclear fuel cycle, which characterises all the processes for converting nuclear source material to

weapons-usable material and identifies indicators for each process, in terms of the equipment and the nuclear and non-nuclear material involved. An 'acquisition path analysis' is undertaken of the means available to the state for acquiring fissile material. All these matters are taken into account in reaching a conclusion about the absence of undeclared nuclear material and activities in the state.

Evaluations for each state are performed by the responsible state evaluation group, which is headed by a member of the relevant Operations Division and also has experts from support divisions. Completed state evaluation reports are reviewed by the interdepartmental Information Review Committee. Each state evaluation is the subject of ongoing review—the initial analysis is used to identify areas requiring further clarification, including through the conduct of safeguards activities such as complementary access and environmental sampling, and the results of these activities are fed back into the evaluation process.

Additional information

The Additional Protocol requires additional reporting, both initially in the Expanded Declaration and subsequently through regular updates. The goal is to have a more comprehensive picture of each state's fuel cycle, including the front end and back end of the fuel cycle. Principal matters covered include:

- detailed information on activities (past and present) at nuclear sites;
- capacity and annual production of uranium mines and uranium and thorium concentration plants;
- holdings, imports and exports of uranium or thorium which has not reached the composition and purity suitable for nuclear processing;
- holdings and uses of nuclear material exempted from safeguards;
- nuclear fuel cycle-related research and development (R&D) not involving nuclear material—examples might include development of laser isotopic separation technology using stable isotopes, or development of components for enrichment equipment;
- the manufacture of: components for enrichment equipment; zirconium tubes; nuclear-grade graphite; flasks for irradiated fuel; construction of hot cells; and manufacture or upgrading of heavy water; and
- the import and export of specified equipment and non-nuclear material.[4]

While these items go beyond the scope of standard (INFCIRC/153-type) safeguards agreements—which apply to nuclear material which has reached 'the starting point of safeguards'[5]—they are clearly highly relevant to nonproliferation commitments, and the information gleaned is important for establishing the absence or otherwise of undeclared nuclear material and activities. The inclusion of this information addresses significant omissions from the coverage of classical safeguards.

Complementary access

Complementary access—that is, access by IAEA inspectors to places not covered by safeguards inspections—is a measure introduced through the Additional Protocol to safeguards agreements, and is an essential part of the strengthened safeguards regime. The Additional Protocol provides for complementary access:

1 as of right, on a 'selective basis', to establish the absence of undeclared nuclear activities at nuclear sites, and certain nuclear-related locations such as uranium mines and concentration plants, and holdings of uranium and thorium and exempted nuclear material;
2 where necessary to resolve a question relating to the correctness and completeness of information, or to resolve an inconsistency relating to that information, at certain other nuclear-related locations (such as those involving R&D without nuclear material or the production of nuclear-related materials and components) and other places in the state.

In the event of a question or inconsistency (at locations encompassed by 2 above), the IAEA must give the state the opportunity to resolve the matter before requesting access, unless delay would be prejudicial. The protocol provides that if the state is unable to provide access it shall make every reasonable effort to satisfy IAEA requirements by other means.

Guidelines have been developed for the exercise of complementary access, covering the selection of locations covered by 1 above, and to determine whether access is warranted in the event of questions and inconsistencies (2 above). In either case, complementary access is regarded as a routine aspect of additional protocol implementation. As a formal matter, complementary access is initiated by a written request from the relevant Operations Division Director.

Integrated safeguards

The next major stage in the evolution of IAEA safeguards is 'integrated safeguards'. These do not represent a separate safeguards system, but rather a rationalisation of classical and strengthened safeguards measures—the optimum combination of all safeguards measures available to the IAEA, under comprehensive safeguards agreements and additional protocols, which achieves the maximum effectiveness and efficiency within available resources. The efficiencies possible under integrated safeguards are essential to fulfilling the commitment of the IAEA Secretariat that the strengthening of safeguards will be budget-neutral over time.[6]

Under classical safeguards, the level of verification effort is determined on the assumption that clandestine nuclear activities may exist. Thus, the determination of timeliness for the detection of diversion of spent fuel incorporates the assumption that an undeclared reprocessing plant may exist for processing diverted material immediately after diversion. Thus, the inspection frequency for spent fuel at light water reactors (LWRs)—three months—corresponds to the time required to reprocess spent fuel and manufacture the separated plutonium into weapon components (the 'conversion time').

The basis of integrated safeguards is that classical and strengthened safeguards are mutually reinforcing and some classical safeguards measures may become redundant when strengthened safeguards are fully implemented. As strengthened safeguards establish credible assurance of the absence of undeclared nuclear activities, a corresponding reduction is possible in the intensity of classical safeguards effort. For example, if there is credible assurance that a state has no undeclared reprocessing plant, the time required for conversion of diverted spent fuel will be extended by the very considerable time required to establish such a facility, and this can be reflected in a reduced inspection frequency for spent fuel, from once every three months to, say, once every year.

The state-level approach

A key feature of integrated safeguards is the application of a state-level approach. Both evaluation and (particularly) safeguards implementation are undertaken on the basis of the state as a whole. This is in contrast to classical safeguards which proceed on a facility-by-facility basis, in which inspection effort is a consequence

of the categorisation and amount of nuclear material at each facility. Integrated safeguards allow for greater cost efficiency by taking account of state-specific circumstances. Rather than treat all types of facility identically regardless of the state in which they are located, facilities can be considered in their broader contexts, such as the place of each facility in the state's fuel cycle and the possible fissile material 'acquisition paths' available to the state.

Conditions for the introduction of integrated safeguards

The IAEA has determined that the introduction of integrated safeguards can be considered if there are positive results from the implementation of both classical and strengthened safeguards activities. For each state, therefore, progress to integrated safeguards involves two stages, the first of which is to meet the requirements of strengthened safeguards.

A positive result—an initial conclusion that undeclared nuclear material and activities are not present in a state—would be based on the following conditions:

- the state has concluded an additional protocol;
- the state has complied in a timely manner with the requirements of its safeguards agreement and additional protocol;
- the IAEA has conducted a comprehensive state evaluation;
- the IAEA has concluded that declared nuclear material has not been diverted;
- the IAEA has implemented complementary access as necessary, to resolve questions and inconsistencies identified during the information review process, and to assure the absence of undeclared nuclear material at sites and other locations specified in the protocol, and has found no indications of undeclared nuclear material or activities.

This conclusion would be maintained, and should be enhanced, by ongoing implementation of the additional protocol and continued satisfactory resolution of any questions and inconsistencies.

Implementation of integrated safeguards

As of mid-October 2001, the IAEA has introduced integrated safeguards in only one state, Australia, which was the first to bring an additional protocol into effect,

in December 1997. Australia was also the first to pass through the requisite evaluation cycle to qualify for integrated safeguards. Integrated safeguards have been in effect in Australia since January 2001. The development of integrated safeguards is an iterative process, and experience gained in Australia can be expected to be useful in the implementation of integrated safeguards elsewhere. The first application of integrated safeguards to a large-scale nuclear programme is expected to be in Japan.

Challenges ahead

The evolution of safeguards is entering a period of substantial change, from a mainly quantitative system, which provides a high degree of assurance about declared nuclear activities, to a more qualitative system, which is addressing a much less tangible area—the absence of undeclared nuclear activities.

The greatest single challenge—critical to the credibility of the safeguards system—is to address the issue of undeclared nuclear activities effectively. It is vital that the IAEA is able to present authoritative conclusions about the absence of such activities in a state. If states have no clear conclusions from the IAEA, they may act on unsupported suspicions about the perceived proliferation activities of others. Such a situation could be detrimental to the nonproliferation regime.

How realistic is it to expect the IAEA to be able to detect undeclared nuclear activities? This is a much less definitive goal than the verification of declared material, and the level of assurance which can be provided will be less. The difficulties encountered in Iraq in the 1990s, where there was a very intrusive verification regime following the Gulf War, show that this is not easy. On the other hand, compared with individual states, the IAEA has considerable advantages to build on in pursuing this task. In addition to its expertise, the agency will have comprehensive information bases, extensive access rights (the ability to 'get under the roof'), and increasingly sophisticated verification methods. It is most important for the agency's work to be complemented through states making available information obtained through national means, including intelligence activities.[7]

Other essential elements in the success of this work will be the transparency of states and their willingness to co-operate with the IAEA. Since the great majority of states will wish to co-operate, the whole-of-state evaluation should thus be easier

and in the final analysis more credible. On the other hand, it can be expected that refusal to co-operate, especially obstructing the exercise of access rights, will be viewed seriously by the international community.

For states to derive the necessary degree of confidence from the IAEA's new safeguards activities, they need to be satisfied that the IAEA has done all that is reasonable and prudent in each situation. Important factors are likely to include: a clearly established methodology for collecting and analysing information, the extent to which the agency pursues specific matters, and the way it exercises its inspection and complementary access rights; a quality assurance process to ensure a satisfactory standard of performance across the inspectorate; a rigorous evaluation process which would not only take into account safeguards performance but put this in a wider context, looking at all information available to the IAEA relating to the state's nonproliferation credentials; and the documentation of all these matters in guidelines available to member states.

It is essential that the IAEA's conclusions be reported to the international community in a sustainable way. In this regard the agency is exercising due caution. Its conclusions for 2000 included the judgement that:[8]

> In respect of seven States,[9] the Secretariat—having evaluated all the information obtained through activities pursuant to these States' comprehensive safeguards agreements and additional protocols as well as all other information available to the Agency—found no indication either of diversion of nuclear material placed under safeguards or of the presence of undeclared nuclear material or activities in those States. On this basis, the Secretariat concluded that all nuclear material in those States had been placed under safeguards and remained in peaceful nuclear activities or was otherwise adequately accounted for.

Some cultural change will be needed in safeguards practice. Classical safeguards have led to a rather mechanistic approach to safeguards implementation. Now inspectors need encouragement to be more inquisitive, but in a structured, disciplined way so that the international community can have confidence in their findings. Appropriate training will be an essential part of this change.

Conclusion of Additional Protocols

Although the IAEA can implement some aspects of strengthened safeguards without reliance on the Additional Protocol, the document is central to efforts to establish more effective safeguards, and it is imperative that it be brought into general application without delay. Only in states with the basic NPT safeguards agreement *and* an additional protocol can the IAEA provide comprehensive and credible assurance

Status of Additional Protocols

States with Additional Protocols and date of entry into force

Australia 12 December 1997 **Azerbaijan** 29 November 2000 **Bangladesh** 30 March 2001 **Bulgaria** 10 October 2000 **Canada** 8 September 2000 **Croatia** 6 July 2000 **Ecuador** 24 October 2001 **Ghana** provisional **Holy See** 24 September 1998 **Hungary** 4 April 2000 **Indonesia** 29 September 1999 **Japan** 16 December 1999 **Jordan** 28 July 1998 **Lithuania** 5 July 2000 **Monaco** 30 September 1999 **New Zealand** 24 September 1998 **Norway** 16 May 2000 **Peru** 23 July 2001 **Poland** 5 May 2000 **Romania** 7 July 2000 **Slovenia** 22 August 2000 **Turkey** 17 July 2001 **Uzbekistan** 21 December 1998

NOTES IAEA also applies protocol measures in Taiwan. Information correct as of 31 October 2001.

States with Additional Protocols plus date of signature, or approval by the IAEA Board of Governors [not yet in force]

Andorra 9 January 2001 **Armenia** 29 September 1997 **Austria**[A] 22 September 1998 **Belgium**[A] 22 September 1998 **China** 31 December 1998 **Cuba** 15 October 1999 **Cyprus** 29 July 1999 **Czech Republic** 28 September 1999 **Denmark**[A] 22 September 1998 **Ecuador** 1 October 1999 **Estonia** 13 April 2000 **Finland**[A*] 22 September 1998 **France**[A] 22 September 1998 **Georgia** 29 September 1997 **Germany**[A*] 22 September 1998 **Greece**[A*] 22 September 1998 **Ireland**[A] 22 September 1998 **Italy**[A] 22 September 1998 **Latvia** 12 July 2001 **Luxembourg**[A] 22 September 1998 **Mongolia** 11 September 2001 **Namibia** 22 March 2000 **Netherlands**[A*] 22 September 1998 **Nigeria** 20 September 2001 **Philippines** 30 September 1997 **Portugal**[A*] 22 September 1998 **Russia** 22 March 2000 **Slovakia** 27 September 1999 **Spain**[A*] 22 September 1998 **South Korea** 21 June 1999 **Sweden**[A*] 22 September 1998 **Switzerland** 16 June 2000 **Ukraine** 15 August 2000 **UK**[A*] 22 September 1998 **US** 12 June 1998 **Uruguay** 29 September 1997

NOTES A EU states intend to bring the protocol into effect simultaneously. Countries marked with * have fulfilled their internal processes for entry into force. Information correct as of 31 October 2001.

States with significant nuclear activities[A] **that have not signed Additional Protocols**

Algeria Argentina[B] **Belarus Brazil**[B] **Chile Colombia Democratic Republic of the Congo Egypt India**[C] **Israel**[C] **Iran Jamaica Kazakhstan Libya Malaysia Mexico North Korea Pakistan**[C] **South Africa Syria Thailand Venezuela Vietnam Yugoslavia**

NOTES A Significant nuclear activities encompass research reactors or other nuclear fuel cycle facilities; B Argentina and Brazil intend to bring the protocol into effect in conjunction with the regional safeguards authority, the Argentine–Brazil Agency for Accounting and Control of Nuclear Material (ABACC); C Non-NPT parties. Information correct as of 31 October 2001.

about the fulfilment of nonproliferation commitments. Clearly, the more widespread the Additional Protocol becomes, the more out of step with NPT commitments will be those states that remain outside strengthened safeguards.

To date the conclusion of additional protocols has been disappointingly slow. As at the end of October 2001 there were only 23 protocols in force. (In addition the IAEA is implementing additional protocol measures in Taiwan). A further 35 protocols had been signed, or approved by the Board of Governors.[10] It is of particular concern that there are 21 non-nuclear weapon states parties to the NPT with significant nuclear activities that have not yet even signed an additional protocol, much less implemented it.

The slow progress has been due in part to the need of many states to introduce complex legislation and administrative arrangements. But some states have not even expressed an intention to adopt a protocol. A number of Middle Eastern states have said that they will conclude additional protocols only when Israel does. This overlooks the fact that strengthened safeguards are an important confidence-building measure that could make a major contribution to reducing tensions between states in the region. The whole process of developing strengthened safeguards was prompted by Iraq's attempt to acquire nuclear weapons and now, in the same region, there are concerns about Iran's future intentions. It is essential to instil in these states an understanding that their national interests are best served by an effective international nonproliferation regime, not by a nuclear arms race. This should make the Middle Eastern states strong supporters of the Additional Protocol.

Some state-specific issues

There have been two serious challenges from within the nonproliferation regime—from Iraq and North Korea—which remain unresolved.

There is no indication that the present Iraqi regime will refrain from attempting to restart its nuclear weapons programme if it has the opportunity. The IAEA is able to perform (annual) routine safeguards inspections, but cannot carry out broader verification activities, as would be permitted under an additional protocol.

North Korea has yet to come into compliance with its safeguards agreement. This is an essential step for the provision of light water reactors (LWRs) under the

1994 Agreed Framework.[11] Currently the IAEA is able to carry out verification activities to monitor the 'freeze' in North Korea's nuclear programme pursuant to the Agreed Framework. However, for the country to come into compliance with its safeguards agreement will require co-operation with the IAEA in establishing the 'initial inventory' of nuclear material to be declared under the agreement. The IAEA successfully conducted a similar exercise in 'nuclear archaeology' when South Africa joined the NPT. It is to be hoped that as North Korea establishes closer relations with the international community it will appreciate the benefits of working with the IAEA on this exercise.

Safeguards resource issues

Budget pressures on IAEA safeguards activities are a continuing problem. The quantities of nuclear material and the number of facilities under safeguards continue to grow, and more of the material and facilities are in the 'sensitive' category (plutonium, enrichment and reprocessing). The trend towards IAEA reliance on extra-budgetary funding (now almost 13 percent of total safeguards expenditure) is continuing. Extra-budgetary funds, to which the US is the largest contributor, have helped alleviate shortages of safeguards equipment and facilitated the replacement of some obsolete equipment. Much of this equipment is essential for improving safeguards effectiveness and clearly should be funded from the regular budget. However, the regular budget allocation for safeguards is insufficient to cover all essential expenditures. Further, although it is hoped that strengthened safeguards can be cost-neutral in the longer term, initially there will be a substantial expenditure 'hump' until the conditions are satisfied for reductions in classical safeguards effort under integrated safeguards approaches.

The safeguards budget allocation is a complex issue, affected by the policies of member states towards the financing of United Nations organisations (most governments have adopted a policy of supporting zero real growth, which at least allows for inflation, or zero nominal growth, which is effectively a diminishing budget), and by the insistence of developing countries that a balance be maintained between the IAEA's expenditure on safeguards and expenditure on technical co-operation. The situation of the safeguards budget is particularly frustrating, considering that the IAEA's safeguards activities benefit the national security of every state. Yet its

safeguards expenditure (US$80.9 million in 2000) is insignificant compared with the funds which governments around the world allocate to national defence.

A further key resource issue, to some extent (although not entirely) caught up with the budget, is the maintenance of a qualified and experienced safeguards inspectorate. Here the issues of methodological and cultural change—the introduction of new and less mechanistic work practices ('detectives, not accountants')—are complicated by age factors: over the next few years a substantial proportion of senior and experienced inspection staff is due to retire. This presents a major challenge, but also a great opportunity to introduce new thinking.

Conclusions

The development of strengthened safeguards measures and even more the development of integrated safeguards are very much work in progress. In fact this is an iterative process—inevitably the approaches developed will require refinement in the light of practical experience.

Major issues being addressed include how to ensure that the verification activities undertaken by the IAEA are sufficient to credibly verify the absence of undeclared nuclear activities. This involves both establishing the appropriate methodology and ensuring that it is applied at an appropriate quality standard. An important set of issues concerns how to implement integrated safeguards in a flexible manner, based on state-specific factors, incorporating the expert judgement of the agency, in a way that avoids discrimination and delivers the required credibility.

Safeguards serve a vital confidence-building role—by assisting states which recognise that it is in their own interests to demonstrate to their neighbours and the international community that they are honouring their treaty commitments, and by enabling them to gain assurance that others are doing likewise. Thus safeguards operate in a political environment, giving expression to political undertakings as well as legal commitments. Safeguards should not be considered in isolation from this environment.

As a mostly technically-based system, safeguards are often viewed narrowly by critics who question their ability to prevent proliferation. Clearly safeguards must be credible. While this requires that they be technically sound, credibility ultimately involves political as much as technical judgements. Maintaining and enhancing

credibility is a complex matter and will be the underlying theme of safeguards development for some time.

The task of safeguards is not prevention as such, except in so far as risk of discovery may act as a deterrent to a would-be proliferator—the IAEA is not an international policeman. Rather, safeguards serve an essential political objective by exercising a positive influence on the behaviour of states. Safeguards do this by: providing assurance to reinforce nonproliferation commitments; and deterring non-compliance through the risk of timely detection.

Safeguards make a major contribution to prevention by: raising the level of difficulty for the would-be proliferator to proceed undetected—hopefully dissuading it from the attempt; and providing the international community with timely warning and the opportunity to intervene through detection of proliferation programmes.

Ultimately, however, the prevention of proliferation depends on the will of the international community. In 1992 the Security Council declared that: 'The proliferation of all weapons of mass destruction constitutes a threat to international peace and security'. It pledged, furthermore, that 'the members of the Council will take appropriate measures in the case of any violations notified to them by the IAEA'.[12] Without a strong political commitment by the international community there is a limit to what safeguards can achieve. It is vital that the Security Council, and especially its permanent members, be prepared to uphold their declaration and take the necessary action if and when cases of proliferation arise.

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Endnotes

[1] For a detailed account of the development of the safeguards system and the NPT see David Fischer, in Trevor Findlay (ed.), *Verification Yearbook 2000,* Verification Research, Training and Information Centre (VERTIC), London, December 2000, pp. 43–56.

[2] IAEA *Information Circular 153* (INFCIRC/153/corrected), June 1972.

[3] Under the Additional Protocol, use of wide area environmental sampling requires the approval of the Board of Governors (Article 9).

[4] The equipment and non-nuclear material specified in Annex II of the Additional Protocol correspond to the Nuclear Suppliers Group 'trigger list' items.

[5] The 'starting point of safeguards' relates to nuclear material which has reached the purity or composition suitable for fuel fabrication or enrichment. The term is misleading, since nuclear material before this stage is also relevant to safeguards—an aspect now rectified by the Additional Protocol.

[6] Perhaps the clearest statement of cost neutrality is to be found in the Secretariat's report of 17 November 2000 to the Board of Governors (a restricted document), which states that: 'Overall cost neutrality for the implementation of safeguards remains a goal in developing integrated safeguards. Once integrated safeguards are implemented, the savings from reductions in some of the Agency's traditional safeguards activities can be redistributed towards the cost of implementation of additional protocol measures. A substantial redistribution of resources should be possible once integrated safeguards are implemented on a large scale'.

[7] This is in line with the Principles and Objectives agreed by the 1995 NPT Review and Extension Conference, which said that: 'States parties that have concerns regarding non-compliance with the safeguards agreements of the Treaty . . . should direct such concerns, along with supporting evidence and information, to the IAEA to consider, investigate, draw conclusions and decide on necessary actions in accordance with its mandate'. See UN document NPT/conf.1995/32/DEC.2, 11 May 1995, para. 9.

[8] IAEA, *Safeguards Implementation Report* for 2000 (restricted distribution).

[9] The states concerned were Australia, Ghana, the Holy See, Jordan, Monaco, New Zealand and Uzbekistan.

[10] These include the 15 European Union (EU) members, of which eight have fulfilled all internal requirements for bringing a protocol into effect. It will not enter into force for any EU state until all have done so.

[11] Under the Agreed Framework concluded between North Korea and the US, North Korea agreed to an IAEA-monitored 'freeze' of its indigenous graphite-moderated reactor and reprocessing programme, to come into compliance with its IAEA safeguards agreement, and to the eventual dismantlement of the frozen facilities. In return, North Korea is to be provided with two 1,000 MWe LWRs and, in the interim, heavy fuel oil for power generation.

[12] Statement by President of the Security Council, UN document S/23500, 31 January 1992.

5

The Biological Weapons Convention: the protocol that almost was

Marie Chevrier

Reeling from the emphatic US rejection of the product of more than six years of negotiations, delegates to the Ad Hoc Group (AHG) charged with strengthening the Biological Weapons Convention (BWC) quarrelled until the early hours of 18 August 2001 over what to do. The group was unable to reach consensus even on a report on its work as the last negotiating session before the convention's November/December 2001 Review Conference drew to a close. It had been intended that the Review Conference, the fifth since the convention's entry into force in 1975, would be presented with a completed draft of a legally binding protocol containing verification and other measures to strengthen the effectiveness and improve the implementation of the convention.

Having met regularly since January 1995, the AHG held negotiating sessions in July and August 2000, November and December 2000, and February 2001 to resolve the substantive disagreements reflected in a Rolling Text of the protocol first compiled in July 1997. In July 2000 the format of the negotiations changed. Ambassador Tibor Tóth, chair of the Group, put forward 'building blocks' of a text which he was preparing to introduce and held informal discussions with delegations to gauge their reactions. Progress in the AHG to resolve outstanding disagreements sequentially was all but halted by the beginning of 2001. On 30 March 2001 Tóth released his Composite Text (CT) to governments in order to allow them to review it before the start of the 23rd session on 23 April. The CT represented the Chairman's best judgement of what an acceptable protocol would be if all states parties were willing to compromise and demonstrate political will to strengthen biological and toxin weapons (BW) arms control.

This chapter focuses on the verification and compliance measures of the draft protocol and analyses the ways in which the CT attempts to resolve some of the

most contentious issues in these areas in the Rolling Text. It goes on to discuss the preliminary reactions to the CT and what they might mean for the future of biological disarmament verification. It covers the period July 2000 to August 2001. Portions of the CT that concern other important issues, such as transfers of biological agents, equipment and material, export controls, technological exchanges and cooperation, are not dealt with in this chapter.

At its core, the 1972 BWC is a disarmament and nonproliferation treaty. All states parties agree to destroy existing weapons and not to acquire them in the future. The absence of verification provisions in the agreement has been a matter of concern since the treaty's inception. Each of the four BWC review conferences has taken steps to remedy the ensuing weaknesses. Indeed, the absence of a mechanism to investigate the 1979 outbreak of anthrax in the Soviet city of Sverdlovsk (now Yekaterinburg) provided much impetus for the exploration of verification measures by the group of experts known as VEREX from 1992 to 1994[1] and the AHG itself.

The table on the opposite page shows the milestones in efforts to strengthen the convention.[2]

The Composite Text

To enhance compliance with the BWC, the CT proposed a set of verification measures similar to that contained in the Chemical Weapons Convention (CWC)—declarations, non-challenge on-site measures at declared facilities and means to address suspicions of non-compliance through short-notice investigations conducted by a professional inspectorate. Innovative measures in the draft include provisions for follow-up after the submission of declarations, and steps to ensure that parties submit declarations completely and in a timely fashion. The text contains consultation and clarification procedures to resolve compliance questions and concerns, either as an adjunct or as an alternative to a potentially politically volatile investigation.[3] Other provisions of the text, which are not described here, cover transfers of listed agents and toxins, confidentiality, scientific and technological exchange for peaceful purposes, and entry into force.

The document, more than 200 pages long, is a carefully crafted package of measures supported by a large majority of AHG delegations. Despite being rejected

Efforts to achieve a BWC protocol

December 1991
Third BWC Review Conference establishes VEREX.

1992–94
VEREX examines possible verification measures for the BWC. The final report of the group concludes that 'some potential verification measures, including both off-site and on-site measures, could provide information which could be useful for the main objective of the Biological Weapons Convention'.

September 1994
A Special Conference of BWC state parties mandates the AHG to draft a legally binding protocol to strengthen the effectiveness and improve implementation of convention.

January 1995
The AHG begins to meet in Geneva under the chairmanship of Hungarian Ambassador Tibor Tóth. Meetings are organised in four substantive areas, assisted by Friends of the Chair: definitions of terms and objective criteria; compliance measures; confidence-building and transparency measures; and effective and full implementation of Article X.

July 1997
At 7th session of the AHG, Chairman introduces 'Rolling Text' of draft protocol.

September 1997–July 2000
In 13 negotiating sessions delegations develop language in Rolling Text.

July 2000
Negotiating format changes to informal consultations. Chairman introduces 'building blocks' of Composite Text.

30 March 2001
Chairman presents Composite Text to governments.

23 April 2001
Chairman tables Composite Text at opening of 23rd session of AHG.

25 July 2001
US formally rejects Composite Text.

18 August 2001
AHG is unable to reach consensus on report on its work.

outright by the Bush administration, the CT is a significant reference document and proponents of multilateral arms control are likely to use it as a basis for future discussions and proposals.[4]

Definitions, lists, criteria and thresholds

The AHG's mandate required it to consider definitions of terms and objectives 'where relevant for specific measures designed to strengthen the convention'.[5] Some delegations resisted any definition of key terms contained in the convention,

such as biological and toxin weapons, hostile purposes and purposes not prohibited by the treaty. They were concerned that any definition of these terms could undermine the 'general purpose criterion' of the BWC.[6] The CT addresses this concern by defining these terms using language lifted word for word from the convention and defining other terms relevant only to obligations under the protocol.

Similarly, the role that lists, objective criteria and thresholds play in the CT is strictly limited to the purposes of the protocol. The CT emphasises that threshold quantities are for transparency purposes and not to establish a cut-off quantity of biological agents below which possession would be presumed to be for peaceful purposes.[7] The thresholds define ranges of quantities that must be declared along with the possession of agents and toxins contained in a list in an annex to the protocol. The smallest range is typically up to 10 grams for agents and up to five grams for toxins. The list of agents and toxins is explicitly not exhaustive, and can be modified relatively easily.

Declarations

Initial declarations

Implementation of the CT would require parties to make initial and annual declarations of specific relevant activities and facilities. In initial declarations states parties would provide information on any offensive weapon programmes after 1945 and prior to entry into force of the convention for that state party. Such a provision would allow Russia to be silent about the past offensive programme of the Soviet Union.[8] Any defensive programmes or activities conducted during the 10 years prior to entry into force of the protocol would also have to be declared in the initial declaration.

Annual declarations

Facilities and activities whose characteristics would 'trigger' their inclusion in annual declarations fall into four broad categories:

- activities and facilities involved in national programmes to defend against biological or toxin weapons;
- facilities designed to prevent the release of biological agents into the surrounding environment—termed containment;

- facilities involved in certain types of work with particularly relevant agents or toxins; and
- facilities that produce various kinds of biologically-based products.

Each of these categories is discussed in greater detail below.

The trigger for national biological defence programmes

Under the BWC and the proposed protocol states may maintain biodefence programmes. Because such activities are an area of concern for many countries and many are inherently dual-use in nature, they have to be declared. One of the controversies during the AHG negotiations concerned whether all such national programmes and activities should be declared in annual declarations, or only some of them.

According to the Chairman's draft, every state with a biodefence programme would be required to declare its largest facilities—a proxy for the most relevant ones. The CT contains a formula whereby countries with extensive biological defence programmes would be required to declare only those facilities that employ the equivalent of 15 or more scientific and technical personnel. If a country's biodefence programme has fewer than 10 facilities that fall into the first category, it must declare 80 percent of all facilities related to research and development on pathogenicity, virulence, aerobiology or toxinology. Programmes that are even smaller would be subject to other criteria. The formulation contained in the CT was based on a US proposal.[9]

The effect of this declaration provision would be to exempt countries with many biodefence activities from declaring their small-scale activities. In contrast, countries that conducted only small-scale activities would have to make comprehensive declarations. Such an arrangement would limit the amount of declaration information that a future Organisation for the Prohibition of Biological Weapons (OPBW) would have to handle. Yet certain biodefence programmes would be subject to declaration only in some states. Moreover, states could manipulate the declaration trigger. The number of full-time personnel associated with a certain biodefence programme could be exaggerated or under-stated. There is also a worrisome loophole in such a provision: the most relevant defensive programmes could be secret, small-scale research programmes that employed few people. A government could

construct a larger-scale defensive programme in order to shield its most sensitive, and perhaps relevant, programmes from declaration—and possible on-site 'visits'.

Biological containment triggers

Many facilities that work with dangerous pathogens are designed and contain equipment to prevent the release of biological agents into the surrounding environment. This is termed containment. Under a regime based on the CT, all facilities working under maximum containment and certain facilities with high containment—those involved in the production of vaccines or other specified biological material, or performing specified genetic modifications of listed agents or toxins—would have to be declared.[10] In addition, plant pathogen containment facilities over a specified size would be subject to declaration.

Triggers for facilities that work with listed agents or toxins

Facilities that do specified work with agents or toxins listed in an annex to the protocol would have to be declared. The annex lists 26 agents that cause disease in humans, six that cause disease in animals, eight that attack plants and 11 toxins. The declaration of facilities involved in three different types of activities would be triggered:

- those that produce or recover any agents or toxins using equipment with a capacity over a minimum level or using more than a minimum quantity of growth media;
- those that conduct certain types of genetic modification of listed agents or toxins; and
- those that intentionally produce aerosols of a listed agent or toxin.

Production facility triggers

There are several categories of biological production facilities that would have to be declared in addition to those that would be triggered by containment or work with listed agents or toxins: facilities producing vaccines for humans or animals; and relatively large-scale facilities that produce or recover micro-organisms, biocontrol agents, plant inoculants or microbially-produced substances.

Food and beverage production facilities would not have to be declared. The declaration triggers for facilities and activities would be mutually reinforcing.

Measures to ensure submission of declarations

The negotiators learned from the experience of the CWC, for which the late submission of declarations by states parties caused considerable implementation difficulties. The CT proposes severe penalties for such behaviour. These range from depriving states of access to the declarations of other states parties to losing their vote in the Conference of State Parties and the possibility of suspension of membership of the Executive Council (EC) of the OPBW.

Follow-up after submission of declarations

The declaration follow-up procedures are designed to contribute to verifying compliance with the declaration obligations. These measures are not intended to monitor compliance with the prohibition of BW contained in Article I of the BWC. The overall purpose of these measures is to ensure that declared information is reliable and complete.[11]

The second 'pillar' of the protocol as proposed by the Chairman is non-challenge, on-site measures at facilities that meet declaration criteria (these activities are called 'visits').[12] There would be three different types: randomly-selected transparency visits; clarification visits; and assistance visits.

A formula would distribute randomly-selected visits among geographic regions and to different types of declared facilities. Clarification visits could occur at the culmination of a process to resolve questions about declarations. States parties could request an assistance visit to help them implement their obligations under the protocol.

Randomly-selected transparency visits

Randomly-selected transparency visits differ in many respects from routine inspections under the CWC, including in their number, purpose and duration, and in the extent of access afforded to international inspectors. The CT proposed a maximum of 90 transparency visits in any year, with no state party receiving more than seven per year and no facility more than three in any five-year period.

Many delegations favoured visits that would 'confirm that declarations are consistent with' obligations under the protocol.[13] In contrast, the US insisted that it would not agree to visits to confirm the accuracy of declaration information. Instead, Washington wanted to limit the purpose of randomly-selected transparency

visits to promoting accuracy in declarations and transparency.[14] The CT strikes a compromise. Under the draft protocol, random visits would not be used to check the accuracy of declarations; however, the CT does not separate the purpose of visits from the information declared. The proposed language links such visits to the facility declaration. Among the purposes of visits would be to 'increase confidence in the consistency of declarations with the activities of the facility' and to 'enhance transparency' at facilities subject to visits.[15]

The CT also states that 'the nature and extent of all access . . . [for transparency visits] shall be at the discretion of the visited State Party'.[16] This departs from the established concept of managed access. Under the CWC and the Comprehensive Nuclear Test Ban Treaty, the inspectors and those inspected negotiate access. While the CT obliges the visited state party to give the inspection team access, the ultimate decision about access is left to the host. The visited state party can also censor the inspection team's report in some aspects. The visiting team is barred from commenting on access or information that was not provided by the visited party. The visited party also has the right to make extensive comments on the draft report of the visiting team and to expect that those comments will be included in the final report. Finally, the visited party can restrict distribution of the final report.

Declaration clarification procedures

Declaration clarification procedures were included in the CT to create a formal but relatively low-key method of resolving any 'ambiguity, uncertainty, anomaly or omission' in an annual declaration of a state party, including the omission of a facility from a state party's declaration that meets declaration criteria.[17] The Technical Secretariat or a concerned state party could initiate declaration clarification procedures. Covering more than 10 pages in the CT, these foresee a procedure that would begin with a written request for clarification and response, possibly leading to a consultative meeting among concerned parties, and culminating in a clarification visit. Such a visit could be offered voluntarily by the requested state party or be initiated by the EC. Access during clarification visits would be negotiated between the inspectors and the visited state party, but in contrast to randomly-selected transparency visits the host state would not have the final say about access.

Declaration clarification procedures would fill an important gap between transparency visits and investigations. Although derided as 'challenge lite' in private

conversations, clarification procedures are in fact a clever way to deal with the fact that not all declared facilities would be visited on a routine basis. Clarification procedures could focus the organisation's attention on, and heighten transparency in, facilities whose declarations raise concerns or other activities where concerns, if not resolved, could give rise to serious suspicions of non-compliance with the convention. The procedures would significantly reinforce obligations to declare all relevant activities and facilities accurately.

Consultation, clarification and co-operation

The CT includes a mechanism for states parties to consult, clarify and co-operate in resolving any concerns regarding the implementation of the convention or the protocol. Importantly, the OPBW is envisaged as an alternative forum to the UN for dealing with such concerns. Some delegations sought to make consultation mandatory before an investigation can be launched. But the CT rejected that approach.

Investigations

International inspectors' ability to investigate allegations of non-compliance on-site is an essential verification tool in most arms control regimes. The investigations provisions of the CT, contained in Article 9, are broadly comparable to those governing challenge inspections under the CWC. The CT requires quick decision-making in the launching of an investigation. The Director-General of the OPBW must decide within six hours whether an investigation request should proceed to the EC, and that body must make its decision on an investigation within 24 hours.

The CT differentiates between field and facility investigations. The former are intended to investigate alleged use of BW and disease outbreaks relevant to the convention; the latter would be used to investigate allegations of violations of the convention relevant to facilities including, for example, development or production of weapons. The EC's decision-making procedures for investigations are a mixture of so-called 'red light' and 'green light'. They are designed to filter investigation requests according to type of investigation and whether or not it would be on the requesting state's territory or not. The following table shows the different types of investigations and the EC 'filters' for launching each type.

Under the red light procedure the investigation would proceed unless the EC voted to halt it. Under the green light procedure an affirmative vote of the members

Red light and green light procedures for investigations

Type	Sub-type	Place	Filter
Field	Alleged use	On one's own territory or territory under one's control	3/4 majority red light
Field	Alleged use	On another country's territory	2/3 majority red light
Field	Disease outbreak	On one's own territory or territory under one's control	simple majority red light
Field	Disease outbreak	On another country's territory	simple majority green light
Facility			simple majority green light

of the EC would be required in order for the investigation to proceed.[18] This decision-making process makes it somewhat less likely than under the CWC that certain investigations would take place. On the other hand, it would be harder for countries to retaliate against perceived abuses of the right to request an investigation by launching their own frivolous requests for one.

An investigation team would arrive on-site quickly, as soon as 12 hours after the EC decision. Once on-site, a wide array of activities would be open to the team, including interviewing relevant personnel, visual observation, examination of documents and records, including medical records, sampling and identification. Access to a particular facility, places and information and the activities of the investigation team would be negotiated between the investigation team and the receiving state party. The receiving state party would be able to take measures to protect national security and confidential information and data, but would be obliged to provide the greatest degree of access possible. If the requested party did not provide full access it would have to provide alternative means to demonstrate compliance. Refusal to provide access or to conduct activities could be noted in the investigation report. Other details concern, for example, monitoring of traffic leaving the site of an investigation, approved equipment, observers from the requesting state party, and post-investigation activities, including investigation reports.

Praise for the investigation provisions has come even from those most critical of the CT.[19] Procedurally, the need for approval by the EC before launching a facility investigation weakens the verification aspect of these measures. In addition, whether states parties would seek investigations and with what frequency is a

serious political question. If underused, this important aspect of verification would be weakened.

The Organisation

The CT envisages the establishment of an OPBW to assist in implementing the protocol. It would consist of a Conference of States Parties (CSP), the EC and a Technical Secretariat (TS). The CSP, the principal organ, would meet in annual and special sessions. Each state party would have one vote.[20] The CSP would elect the members of the EC, appoint the Director-General of the organisation and establish subsidiary organs as needed. The principal tasks of the 51-member EC would be to supervise the TS, decide on requests for visits and investigations, and oversee the effective implementation of the protocol, including its budget and programme of work. The TS would administer the protocol, including receiving, processing and analysing declarations, conducting visits and investigations, and facilitating consultation, clarification and co-operation among states parties. It would also promote scientific and technological exchanges for peaceful purposes and technical co-operation.

Reactions to the Composite Text[21]

The BWC protocol negotiations took place in the aftermath of exceptional geopolitical upheavals. The Warsaw Pact's dissolution, the break-up of the Soviet Union and the transition to majority rule in South Africa all affected the work of the AHG. Moreover, the revelations of defectors from the Soviet Union's offensive BW programme and the findings of the United Nations Special Commission on Iraq (UNSCOM) regarding Iraq's BW programme had a conspicuous effect on the negotiations. In contrast to most Cold War arms control negotiations, the BWC protocol negotiations were characterised by unusually strong disagreements within the Western Group and the Non-Aligned Movement (NAM). Meanwhile the Eastern Group practically disintegrated. This made it more difficult to find the path to the end game of the negotiations because the regional groups no longer 'bundled' disparate views to the same degree as they did during the East–West conflict.

The CT received a mixed reaction in Geneva during the 23rd AHG session in April 2001. A large majority of delegations embraced the CT as the negotiating

instrument through which further refinements could be sought. A group of seven countries—China, Cuba, Iran, Indonesia, Libya, Pakistan and Sri Lanka—urged the AHG to revert to the Rolling Text as the basis for resolving outstanding disagreements. Nevertheless, by the end of the session it became clear that the CT would be the basis for future negotiations, with the Rolling Text serving as a back-up or 'safety net' should the negotiators wish to protect their positions.

Apart from one single occasion late in the session, the US stayed conspicuously silent. Early in the 23rd session the media reported that after a review of BW policy the administration of George W. Bush had rejected the CT.[22] The US position became official on 25 July when Ambassador Don Mahley, in a 10-page statement, rejected not only the CT but the entire approach of the AHG towards fulfilling its mandate.

The Western Group

As befits a compromise document, no country or delegation saw everything that it wanted in the CT. A spectrum of views existed within the Western Group, but most members (other than the US)—especially Australia, Netherlands and Sweden—favoured stronger verification and compliance measures than the CT envisaged. The European Union (EU) member states would have preferred declaration triggers that covered more facilities, even though many of them have sophisticated pharmaceutical industries.[23] Most members of the Western Group (apart from the US) also preferred a 'super-majority' red light filter for all investigation requests, rather than the formula in the CT. The EU (with reluctance on the part of some members) accepted some weaker measures at US urging. It agreed, for example, to confine the purpose of randomly-selected visits to transparency rather than to confirming the accuracy of declarations.

The non-aligned countries

The NAM countries also held an array of opinions about the verification measures in the draft protocol and the CT. Generally speaking, South Africa and several South American countries, such as Brazil and Chile, tended to support positions similar to those of the EU, favouring strong verification. Others, including China, India, Iran and Pakistan, consistently advocated weaker measures. They opposed mandatory clarification visits, for instance, and wanted minimal provisions, if any, to investigate outbreaks of disease.

The CT also received support outside government. With a few exceptions, non-governmental organisations, independent researchers and academics praised the CT or thought its verification provisions should be stronger, in some cases considerably so.[24]

The US position and rejection of the protocol

The US argued consistently for weaker declaration triggers and provisions for visits. But the CT included much of what the US had advocated throughout the negotiations. At least for BW, the US government interprets the concept of 'verification' differently from many of its allies and has long maintained that the BWC is not verifiable and could not be made verifiable.[25] Nevertheless, the US supported the right to launch investigations of allegations of non-compliance quickly and was the initiator of many of the ideas behind the clarification process for declarations contained in the CT.[26] The US also promoted limiting declarations of national biological defence programmes and advocated 'triggers' that would identify fewer facilities, many of which (perhaps half or more) are likely to be in the US.

Negotiations within the US government to arrive at a position in the AHG were frequently arduous and contentious. Under the Clinton administration disagreements among the departments and agencies with a stake in the protocol were thrashed out in inter-agency meetings led by staff of the National Security Council. The positions thus arrived at often did not have the full support of the agencies involved. Against this backdrop, the incoming Bush administration carried out a classified review of US BW arms control policy.

On 25 July 2001, at the 24th session of the AHG, Ambassador Mahley announced that the US rejected not only the CT but essentially all the efforts of the AHG to fulfil its mandate. He argued that '[t]he mechanisms envisioned for the Protocol would not achieve their objectives, that no modifications of them would allow them to achieve their objectives and that trying to do more would simply raise the risk to legitimate United States activities'. He concluded that 'because the difficulties with this text are . . . inherent in the very approach used in the text, more drafting and modifications of this text would in our view, still not yield a result we could accept'.[27] Thus the Bush administration repudiated more than six years of negotiations, significant portions of the AHG mandate and the accomplishments of

VEREX, all of which the US, under the leadership of Presidents Clinton and George H. Bush, had endorsed.[28]

The US, Mahley stated, 'intends to develop other ideas and different approaches' to strengthen the BWC. One option for the US could be to advocate a new mandate. Rumours suggest a mandate limited to declarations and investigations, despite the fact that there is virtually no possibility that the states parties to the BWC will reach consensus on a new mandate in the foreseeable future. 'Picking out the cherries' from the protocol will be difficult. It is hard to imagine how implementing some verification measures, such as investigations provisions, will be acceptable without the other CT elements, such as visits, enhanced consultations and new confidence-building measures.[29] US-led efforts outside the BWC, including export controls and counterproliferation, are not likely to be readily implemented. It is also doubtful that these provisions will be successful in halting or turning back proliferation, especially in the long term. What counterproliferation measures is the US likely to propose to address alleged BW programmes in China, Iran and Russia, for example?[30]

The remainder of the 24th session of the AHG was dominated by reactions to the US statement, attempts to assign blame and the disintegration of consensus on a report of the group's work. Although Chairman Tóth achieved consensus on parts of the text, delegations were not able to agree on a complete report.[31]

Conclusion

The parties must now decide on the future of the efforts of the AHG. The rancour engendered by the US rejection of the AHG's efforts and the failure to reach consensus on a final procedural report bodes ill for future efforts to strengthen the convention. The mandate for the AHG established by consensus at the 1994 Special Conference will not expire at the 2001 Review Conference, even though that event was the target for completion of a protocol. Arguments about the way to proceed with strengthening the BWC may dominate discussions for years to come.

Many of the compromises contained in the CT were made to accommodate the US position on the Rolling Text before it categorically renounced the CT. It is therefore worthwhile to consider whether any changes to the CT would make it a better basis for strengthening the effectiveness of the convention.

Compared to the convention, even with the addition of the 1991 and 1996 confidence-building measures and associated agreements contained in the Final Statements of various BWC review conferences, the CT was a monumental step forward for verification. Taken together, measures contained in the draft would:

- trigger facilities and activities for declaration;
- permit visits to a number of facilities, albeit limited, to gain information regarding their activities;
- clarify omissions and irregularities in declared information; and
- permit the investigation of possible violations of the convention.

Nevertheless, the verification and compliance measures contained in the CT are weaker than many proposals contained in bracketed language in the Rolling Text. If states parties had moved forward with the CT as the basis for a legally-binding protocol and allowed tinkering with the language in order to achieve a consensus among participating delegations (with the possible exception of the US), a number of relatively small language changes could have enhanced the verification measures provided for and promoted greater confidence in the convention.

First, the CT's mixture of red light and green light voting procedures for launching an investigation could have been simplified and strengthened to allow any investigation, whether of alleged use or of another type of violation, to proceed unless blocked by a large (either two-thirds or three-quarters) majority. The launching of such an investigation, which could conceivably prevent the use of BW, should not be burdened by an overly restrictive approval mechanism.

Second, declaration requirements could have been strengthened. Declaration of all biodefence facilities is an important standard and would strengthen verification efforts. Such simplified provision would also place equal obligations on all parties. Similarly, details of the requirements for annual declaration of facilities that work with listed agents and of production facilities could be modified. A trigger mechanism in line with proposals made by the EU would capture more relevant facilities.

Third, a return to stronger proposals for randomly-selected transparency visits would have reinforced the protocol's potential to deter violations of the BWC. Requiring negotiated random access for transparency visits rather than allowing

the visited state party to make all access decisions could have restored faith in the ability of visits to play a role in deterring proliferation and enhanced their transparency function. Similarly, the connection between activities observed during visits to a declared facility and activities declared could have been reinstated in the language dealing with the purpose of transparency visits.

Alas, delegations showed no stomach for moving forward with negotiations without the participation of the US. The opportunity to strengthen the prohibition on the possession of BW is not likely to appear in any alternative forum or at any time in the foreseeable future. It is lamentable that the control of biological materials is so difficult to envision and problematic to implement. Nevertheless, to abandon a decade of serious work to address this threat with no prospect of alternatives that could garner sufficient support to be implemented would be the height of folly. The world would be left with a treaty whose weaknesses have been repeatedly articulated and with the knowledge that the available means to address those weaknesses had been shunned.

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Endnotes

[1] VEREX is the Ad Hoc Group of Governmental Experts to Identify and Examine Potential Verification Measures from a Scientific and Technical Standpoint established by the Third Review Conference in 1991.

[2] Nicholas Sims discusses each of these steps in greater detail in 'Verifying biological disarmament: towards a protocol and organisation' in Trevor Findlay (ed.), *Verification Yearbook 2000,* Verification Research, Training and Information Centre (VERTIC), London, December 2000, pp. 87–99.

[3] The author wishes to emphasize the importance of the other measures of the draft protocol, such as technological exchanges and co-operation that do not deal with compliance with the non-possession of BW. Their absence from this chapter reflects the emphasis of this publication on verification, not necessarily the protocol *in toto.*

[4] For a summary and analysis of the CT see also Daniel Feakes, 'Dissecting the Composite Text', *Briefing Paper 01/01*, VERTIC, London, July 2001.

[5] Special Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, *Final Report,* BWC/SPCONF/II, Geneva, 19–30 September 1994, p. 10.

[6] The general purpose criterion forbids the possession of all biological agents and toxins of types and in quantities that are not justified for prophylactic, protective or other peaceful purposes.

[7] For a more detailed discussion of these issues see Marie Isabelle Chevrier, 'From verification to strengthening compliance: prospects and challenges of the Biological Weapons Convention', *Politics and the Life Sciences,* vol. 14, no. 2, August 1995.

[8] According to the *Los Angeles Times,* Russian Deputy Foreign Minister Grigoriy V. Berdennikov admitted that offensive weapons development in violation of the BWC continued until March 1992. John Thor Dahlburg, 'Russia admits it violated pact on biological warfare', *Los Angeles Times,* 15 September 1992, pqasb.pqarchiver.com.

[9] See 'Proposed Text for Article III: Declarations, Current Biological Defence Declaration', Working Paper submitted by the United States of America, BWC/AD HOC GROUP/WP.319, 2 October 1998.

[10] Maximum containment and high containment are defined in Article 2 of the CT. See UN document BWC/AD HOC GROUP/CRP.8, 3 April 2001, available at www.opbw.org.

[11] In contrast, in the CWC much of the random activities are to verify basic obligations of the convention, such as chemical weapons destruction.

[12] Facilities may not be subject to visits if they fall only under the trigger for production facilities that produce microbially produced substances. See Article 4C, para. 15, p. 22 in the CT.

[13] Working Paper by Sweden: 'Visits and Investigations', BWC/AD HOC GROUP/WP.243, ninth session, Geneva, 5–23 January 1998. See also working paper submitted by South Africa, 'Visits', BWC/AD HOC GROUP/WP.336, January 1999; and working paper submitted by Brazil, Chile, New Zealand, and Norway, 'Proposed Language for the Section on Randomly-Selected Visits and Annex B', BWC/AD HOC GR, January 1999.

[14] The US delegation long opposed all but the most superficial non-challenge visits, partly because of the US pharmaceutical industry's long-standing opposition to any mandatory non-challenge on-site visits and partly because of sensitivities over its biodefence activities. A number of other Western Group countries agreed to support the US position regarding the purpose of what came to be called randomly-selected transparency visits. See Volker Beck, 'Preventing biological proliferation: strengthening the Biological Weapons Convention, A German perspective' in Oliver Thränert (ed.), *Preventing the Proliferation of Weapons of Mass Destruction: What Role for Arms Control? A German–American Dialogue,* Friedrich Ebert Stiftung, International Policy Analysis Unit, Berlin, 1999. For a discussion of the US position as of 1999 see Marie Isabelle Chevrier, 'Preventing biological proliferation: strengthening the Biological Weapons

Convention, an American perspective' in Thränert (ed.). In private conversations, members of delegations which have (perhaps reluctantly) agreed to support the position of the US on randomly-selected transparency visits stress the importance and value of all provisions that permit inspectors to go on-site, even under highly restricted circumstances.

[15] BWC/AD HOC GROUP/CRP.8, p. 28.

[16] BWC/AD HOC GROUP/CRP.8, p. 31.

[17] BWC/AD HOC GROUP/CRP.8, p. 37.

[18] That most investigations under the protocol would have required more support from the Executive Council in order to move forward may have little practical significance. No state party to the CWC has yet requested a challenge inspection.

[19] See Alan Zelicoff, 'An impractical protocol', *Arms Control Today,* vol. 31, no. 4, May 2001, p. 26; and Robert P. Kadlec, 'First, do no harm', *Arms Control Today,* vol. 31, no. 4, May 2001, p. 16.

[20] Under certain circumstances a state party could lose its vote in the CSP, for example, for repeated non-payment of dues.

[21] For a more detailed discussion of the reactions to the CT within the AHG at the 23rd session see Jenni Rissanen, 'Hurdles cleared, obstacles remaining: the Ad Hoc Group prepares for the final challenge', *Disarmament Diplomacy*, no. 51, April 2001.

[22] Lois Ember, 'US nixes efforts to strengthen treaty', *Chemical and Engineering News,* vol. 79, no. 17, 23 April 2001.

[23] See, for example, Working Paper submitted by France on Behalf of the European Union, 'Declaration Triggers for Work with Listed Agents and/or Toxins', BWC/AD HOC GROUP/WP.421, 18 July 2000. See also Rissanen.

[24] Nine NGOs signed a statement in support of the CT. 'NGO statement on BWC protocol negotiations', press release 24 July 2001, available at www.vertic.org. See also Oliver Meier, 'Comments on the Verification Provisions in the "Composite Text" for a Compliance Protocol to the BWC', presented at the meeting of EU delegations and NGOs, 25 April 2001, Palais des Nations, Geneva, available at www.vertic.org; Thérèse Delpech, 'United States' disarming rejection', *Libération,* 22 August 2001, p. 5 (in French); Graham S. Pearson, Malcolm R. Dando and Nicholas A. Sims, 'The composite protocol text: an evaluation of the costs and benefits to states parties,' *Evaluation Paper no. 21,* Bradford Project on Strengthening the Biological and Toxin Weapons Convention and Preventing Biological Warfare, University of Bradford, July 2001; Marie Isabelle Chevrier, 'A necessary compromise', *Arms Control Today,* vol. 31, no. 4, May 2001; and James F. Leonard, 'An essential first step', *Arms Control Today,* vol. 31, no. 4, May 2001. Steinbruner, Gallagher and Gunther call the exemption of facilities from declaration—particularly biodefence facilities—'the most serious defect' of the CT. John Steinbruner, Nancy Gallagher and Stacy Gunther, 'A tough call', *Arms Control Today,* vol. 31, no. 4, May 2001, p. 23. For exceptions see Michael Moodie, 'Building on faulty assumptions', *Arms Control Today,* vol. 31, no. 4, May 2001; Michael Moodie, *The BWC protocol: a critique*, The Chemical and Biological Arms Control Institute, Special Report 1, Washington, DC, June 2001; and Amy E. Smithson, Prepared Statement Before the House Committee on Government Reform, Subcommittee on National Security, Veterans Affairs, and International Relations, 5 June 2001, available at www.stimson.org. Smithson recommends rejection of the CT but not the protocol.

[25] In September 2000, at the annual conference of the Association for Politics and the Life Sciences, Assistant Secretary of State Edward Lacey stated that the BTWC could be verified, but not without a level of intrusion intolerable to the US government. For a discussion of the US understanding of verification see Marie Isabelle Chevrier, 'Verifying the Unverifiable: Lessons from the Biological Weapons Convention', *Politics and the Life Sciences,* vol. 9, August 1990, pp. 93–105.

[26] US support of the idea behind clarification visits was first announced by President Clinton on 27 January 1998. See White House, Office of the Press Secretary, 'The Biological Weapons Convention', Fact Sheet,

Washington, DC, 27 January 1998; and Working Paper submitted by the United States, 'Proposed Elements of Clarification Visits', BWC/AD HOC GROUP/WP.294, 9 July 1998.

[27] United States Delegation to the Ad Hoc Group of the Convention and on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, 'Statement by Ambassador Donald A. Mahley, United States Special Negotiator for Chemical and Biological Arms Control Issues', Geneva, 25 July 2001.

[28] George W. Bush's rejection of the CT did not come as a surprise given the personnel in his administration. Vice-President Richard Cheney, for example, was only the most prominent member of the administration arguing against US ratification of the CWC in 1997. In contrast, Secretary of State Colin Powell supported CWC ratification. Significantly, Ambassador Donald Mahley, who heads the US delegation in Geneva and the policy review conducted in early 2001, was involved in forging BW policy in the Reagan and Bush administrations long before the Clinton Administration came to power. He was known to be publicly questioning the mandate of the AHG as early as mid-2000.

[29] These measures were recommended by Moodie, *The BWC protocol: a critique*. The text is available at www.cbaci.org.

[30] In its annual reports to Congress the US Arms Control and Disarmament Agency repeatedly stated its suspicions that China, Iran and Russia (as well as others) were not in compliance with the BWC. The most recent report, issued in 1999, covered 1998.

[31] Jenni Rissanen 'A turning point to nowhere? The BWC in trouble as US turns its back on a verification protocol', *Disarmament Diplomacy*, no. 59, July/August 2001, pp. 11–19.

6

Verifying the Ottawa Convention

Angela Woodward

The 1997 Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction (the Ottawa Convention) is the result of a highly successful partnership between governments and civil society. Impetus for the treaty came initially from those seeking to alleviate the suffering and devastation wrought by these weapons on civilian populations around the world. As states increasingly came to question the military utility of landmines they too became convinced of the benefits of such a treaty. The convention is a novel blend of international humanitarian law and arms control and disarmament. It avoids many of the standard arms control monitoring and verification processes, structures and institutions, and has a clear humanitarian focus. Its verification provisions are modest, but a system has evolved over the treaty's relatively short life which incorporates, with state party approval, significant monitoring of compliance by civil society organisations. This chapter charts the development of this unique system, describes how it is being implemented and considers some challenges that may affect its future viability.

The Ottawa Convention was opened for signature on 3 December 1997 in Ottawa, Canada, and entered into force a mere 15 months later, on 1 March 1999. The text is relatively short. Article 1 contains the key prohibitions: states parties must not use anti-personnel mines (APMs) or assist, encourage or induce others to do so and must not develop, produce, acquire, stockpile, retain or transfer APMs. However an authorised 'inventory' of APMs may be retained for training and development in mine detection, clearance or destruction technologies.[1] States parties are required to destroy all APMs held in national stockpiles within four years[2] and those in mined areas within 10 years.[3] They are also obliged to identify and mark off mined areas as soon as possible.[4] By enforcing a total ban on APMs, the Article 1

provisions significantly strengthen existing customary international law[5] and treaty law[6] controlling this weapon.

As of 29 October 2001 there were 122 states parties and 20 signatories to the convention. As it has now entered into force, other states may now only join by accession.[7] Notable holders-out from the regime include China, which is both a large-scale producer and a stockpiler of APMs; landmine users, including India, Pakistan, Russia and Sri Lanka; Finland, the only European Union (EU) non-state party; and the US and Cuba, the only non-states parties in the Americas. Meetings of states parties are held annually until the first of the five-yearly Review Conferences is held in 2003.

The Ottawa Convention's verification provisions

The procedures and mechanisms in the treaty for clarifying compliance represent the balance arrived at by the treaty negotiators in amalgamating two disparate approaches—humanitarian norms and arms control—into one legal instrument. The result is a fusion of arms control verification procedures with the co-operative features of humanitarian treaty compliance determination. The treaty provisions focus on confidence-building, encouraging compliance through mutual transparency and co-operation. In fact, the term 'verification' does not even appear in the text.

At the heart of the treaty's verification system is self-reporting by states parties. Article 7 on 'Transparency measures' requires states parties to submit reports detailing their compliance under nine categories:

- national implementation measures (legal and administrative);
- the numbers and types of stockpiled mines;
- the location of mined areas;
- the numbers and types of mines retained for training purposes;
- the status of conversion and decommissioning programmes for production facilities;
- the methods, location and status of mine destruction programmes;
- the numbers and types of mines destroyed;
- the technical characteristics of mines formerly produced; and
- measures to warn the public about mined areas.

States have subsequently agreed to additional voluntary reporting on measures to provide assistance to mine victims.[8]

Article 7 reports are submitted to the United Nations Secretary-General (UNSG), the depositary for the convention. States parties must submit an initial, baseline report as soon as possible and not later than 180 days after the treaty enters into force for them. These reports must be updated annually, covering the previous calendar year, and be submitted by 30 April. The convention requires the UNSG to transmit these reports to all states parties.

While there are no procedures in the treaty for determining the veracity of 'Article 7 reports', there are mechanisms for verifying suspected cases of non-compliance with the prohibitions. These mechanisms are detailed in Article 8 on 'Facilitation and clarification of compliance', the longest and most detailed provision in the treaty. The negotiating states' preference for determination of non-compliance to be conducted co-operatively is enshrined in the text.[9]

If a state party is suspected of violating any treaty prohibition, the convention allows for any other state party ('requesting' state) to submit a 'Request for Clarification' to the suspected state ('requested' state), through the UNSG. The requested state party is required to respond within 28 days. If a response is not received, or is deemed unsatisfactory by the requesting state, it may submit the matter to the next Meeting of States Parties (MSP). Alternatively, the requesting state may request the UNSG to canvass states parties' support for the convening of an urgent Special Meeting of States Parties to consider the matter. If at least one-third of all parties convey their approval to the UNSG within 14 days, such a meeting will be held within a further 14 days. Pending a meeting to consider the matter, any of the states parties concerned may request the UNSG to exercise his or her 'good offices'.[10]

Meetings of states parties may then authorise[11] and mandate an on-site fact-finding mission in the requested state to collect additional information for use in determining compliance. A fact-finding team would consist of up to nine experts drawn from the lists that the treaty requires the United Nations (UN) to maintain.[12] Nationals of the requesting state are prohibited from serving on such a fact-finding mission. The team is expected to arrive in the requested state at the earliest opportunity after the mandatory 72 hours' notice. Requested states are obliged to grant access to all areas and installations where relevant facts could be expected to be

collated. However, a state may restrict the operation of a mission in its territory to protect sensitive information, equipment or areas; to protect the constitutional rights of its citizens; or to maintain the physical protection and safety of mission members.[13] The mission's findings are reported, through the UNSG, to a meeting of states parties where suggested action to redress the non-compliance, along with offers of co-operative assistance, may be made to the requested state. The requested state is required to report on all measures it takes in response.[14]

There is no further recourse under the treaty for determining non-compliance. Unlike many other multilateral arms control treaties, the treaty does not prescribe final recourse to the UN Security Council or UNSG for serious, flagrant cases of non-compliance. While a case could still be brought as a 'threat to international peace and security' under the UN Charter, it is highly unlikely that it would be successfully invoked in relation to the use of landmines (as compared with the use of weapons of mass destruction, for instance). Whether this potential lacuna will have an affect on the decision-making processes of the treaty's ultimate verification body, the MSP, is yet to be seen.

Implementation of the verification system

The official system

The official verification system detailed in the treaty is modest.[15] Unlike other arms control treaties, it does not create, or mandate an existing body to act as, a secretariat. Instead, institutional responsibility for receiving and disseminating states' declarations on their compliance and for instituting the mechanisms for clarifying and determining compliance is vested in the UNSG. In practice, responsibility for implementing these procedures is devolved to the UN Department for Disarmament Affairs (UNDDA) and the UN Mine Action Service (UNMAS).[16]

The UNDDA's mandate is to advise the UNSG and member states on disarmament matters, develop and strengthen disarmament norms and agreements, and promote transparency and confidence-building in all aspects of disarmament. The Monitoring, Database and Information branch of the UNDDA, which is also tasked with collating and disseminating voluntary reporting on conventional armaments,[17] assists the UNSG in carrying out his functions relating to transparency and clarification of compliance under the Ottawa Convention.

The UNDDA makes available template report forms,[18] receives completed reports and disseminates them, both in summary form at meetings of states and on a database on the UN website.[19] It also plays a facilitating role in any compliance determinations that might arise under the treaty by maintaining the list of experts[20] that may be used for setting up fact-finding missions and providing organisational and logistical support for any special meeting of states parties that may be required to determine a non-compliance allegation. The UNDDA is also responsible for organising the annual MSPs and the five-yearly Review Conferences.

The UN incurs expenses in undertaking these treaty functions, including paying for personnel and technical resources for the establishment and maintenance of the database and the maintenance of the lists of experts. The transparency report database was created in-house and is managed by one UN staff member on a part-time basis.[21] While states parties are obliged to cover the UN's costs in undertaking these treaty functions,[22] this provision has to date not been implemented. This means that, in effect, all UN member states are contributing towards the UN's involvement in implementing the compliance monitoring aspects of the Ottawa Convention. States parties have been meeting their obligation to pay for their annual meetings: such budgetary assessments are determined months in advance. However, if a special meeting is ever convened to consider an allegation of non-compliance, states parties will be required to provide their funding contributions at short notice.[23]

UNMAS is the focal point in the UN system for the formulation of UN mine action policy and co-ordination of mine action activities. While it provides mine action support for all UN member states, some of its work is indirectly related to the verification provisions of this treaty. For example, its Assessment Missions in mine-affected states,[24] which determine the extent of mine infestation and identify pertinent issues affecting the development of mine action initiatives, often ascertain new information for those states' Article 7 reports.

UNMAS' direct role in treaty implementation has expanded over time. It has recently appointed a Treaty Implementation Officer[25] to enhance its co-ordination of treaty implementation work. UNMAS is increasingly involved in researching items for states parties' consideration with regard to treaty implementation, such as drafting international standards for mine action operations,[26] and maintaining

a website with information on sources of mine action support and assistance in the UN system, in the non-governmental community and among international organisations.[27] UNMAS also identifies issues for mine action policy development in the UN system and provides briefings on treaty implementation issues to meetings of states, and regional meetings of mine-affected countries and their partner agencies. UNMAS receives limited funding from UN assessed contributions for its work during UN peacekeeping operations and relies on voluntary contributions from donor states for the majority of its projects, including those in support of the treaty.

The functions carried out by these UN offices derive from the UNSG's role as the depositary for the treaty. The extent of these functions is, however, clearly delimited: the UN is not a *de facto* treaty secretariat. Many treaty implementation and compliance adjudication functions are vested in the states parties themselves. This degree of initiative required of states parties in formulating and implementing procedures for the maintenance of the treaty is thus considerable.

While states parties have developed treaty implementation procedures, specific institutions and fora have evolved, and been granted mandates, to assist state parties with their implementation. The Geneva International Centre for Humanitarian Demining (GICHD), which may in some respects now be seen as the treaty's *de facto* secretariat, is an independent foundation established by the Swiss government in 1998, with continuing support from 18 other governments,[28] to provide research and operational support to states in implementing the convention. It has key roles such as are usually undertaken by a secretariat—providing logistical and administrative support for preparatory meetings; and facilitating liaison between, and disseminating information on, treaty implementing committees.

The First MSP accepted an offer from the GICHD to provide administrative and logistical resources in support of an Intersessional Work Programme (IWP) to be held between MSPs. The GICHD co-ordinates and hosts the meetings and acts as an information resource, disseminating reports of the Intersessional Standing Committee (ISC) meetings and associated information on its website.[29]

The Intersessional Work Programme is carried out at two annual ISC sessions.[30] These meetings are attended by states parties, signatory states, observer states, and international and non-governmental organisations (NGOs).[31] The ISC has the following subcommittees:

- Victim Assistance and Socio-Economic Reintegration;
- Mine Clearance, Related Technologies and Mine Awareness;
- Stockpile Destruction; and
- General Status and Operation of the Convention.[32]

Each subcommittee assesses implementation and makes recommendations for the review of mine action practice in its focus area. Without a treaty mandate to make determinations of compliance, these meetings can only encourage states to demonstrate compliance when allegations are made. Reports of the ISC meetings, compiled by the co-chairs,[33] reflect consensus.

These reports are presented for the consideration of states parties at their annual meetings via a Coordinating Committee (CC). This body was established by the Second MSP to improve the carrying out of the Intersessional Work Programme. The CC, which initially comprised only the co-chairs of the ISC meetings but now includes the co-rapporteurs and selected international and non-governmental organisations,[34] meets in the margins of the ISC and Meetings of States Parties. Members of the Coordinating Committee have had a heavier workload than their counterparts in treaty regimes which are administered by full-time secretariats, as they are obliged to undertake administrative and report writing tasks usually undertaken by permanent staff. As new representatives have been appointed to the CC at each MSP, institutional memory within the CC has been lost, with adverse affects on its effectiveness.

The Third MSP in Managua, Nicaragua, in 2001 authorised the GICHD to establish a small Implementation Support Unit (ISU) which will support the work of the ISC, the CC and the MSP presidents. The unit is mandated to provide secretarial and administrative support to the ISC and the CC, including appropriate liaison, communication and follow-up. While the UK initially voiced its concern[35] that this might institutionalise the treaty's implementation in a way that the treaty negotiators had sought to avoid, the UK and other states that held the same opinion privately supported its adoption at the Third MSP. The ISU is to be funded by voluntary contributions from donor states, many of which pledged at least initial financial support at the Third MSP.[36]

Another organisation which receives support from states in undertaking traditional secretariat functions for the convention, but without a formal treaty mandate,

is the International Committee of the Red Cross (ICRC), based in Geneva, Switzerland. Its Advisory Service on International Humanitarian Law, in its Legal Division, provides states with technical advice and assistance in establishing the required national measures to implement the treaty effectively.[37] It has issued a guide which details legislative and other measures necessary to comply with the treaty and includes sample legislation passed by states parties.[38] It also collates and publicly disseminates national legislation submitted voluntarily by states parties, and has hosted meetings to consider treaty interpretation issues that may affect future determinations of compliance with the treaty.[39] While the ICRC promotes adherence to, and respect for, international humanitarian law, it does not make statements on states parties' compliance with the treaty.

The unofficial verification system

Unlike other disarmament regimes, civil society monitoring and verification is not just tolerated by states parties, but actively encouraged. It is now a major, integral part of the verification system.

The Landmine Monitor initiative of the International Campaign to Ban Landmines (ICBL) and others has produced an annual *Landmine Monitor Report* on state party compliance, signatory adherence and non-state party observance of the ban since 1999. Landmine Monitor also collects and publicises information on states that are not fulfilling their reporting obligations, including those that are late. It collates and disseminates a vast amount of verification-relevant information that would otherwise not be available.

Landmine Monitor Report is widely distributed among states parties and the mine action community worldwide. In addition to the published version of *Landmine Monitor* and its Executive Summary, the network publishes electronic versions on CD-ROM and has a searchable database on its website.[40] States readily acknowledge its authority and usefulness in their own assessments of other parties' compliance.

Landmine Monitor's global network comprises in-country and external researchers for every country, whether they are parties to the convention or not.[41] Papers on thematic issues related to treaty implementation are also included. Landmine Monitor commissions researchers on an annual cycle between the MSPs, at which each new report is released. The network seeks to retain the same researchers in

successive years in order to maximise the impact of the research training they provide and to maintain institutional memory.

The researchers monitor developments continuously, providing a rolling commentary for each edition of *Landmine Monitor Report*. They are organised into regional groupings, each led by a regional co-ordinator who provides day-to-day guidance on the focus and status of their research and sub-edits the reports submitted. While much of the interaction among the network is conducted electronically,[42] researchers attend a regional meeting early in the annual cycle where they discuss their preliminary findings, assess what further research needs to be undertaken, receive training on research methods and discuss problems encountered during their research. A further meeting of all researchers is held later in the cycle at which final research findings are presented. For researchers working alone in their home country the meetings reinforce the solidarity of the Landmine Monitor research network.

Landmine Monitor prides itself on the veracity of the information it provides. According to the organisation, facts in each state's report are documented and verified to an exacting standard by the country researcher, the regional and thematic co-ordinators[43] and the report editors. Reports are then cross-checked against each other so that they are consistent in terms of previous reports for each state and between states where evidence relates to more than one country—for instance, regarding the provision of assistance or the transfer of APMs. Because Landmine Monitor covers all countries of the world, reports will detect inconsistencies between the reported activities of states parties and non-states parties—an advantage it has over the Article 7 process. Allegations of violations of the treaty's prohibitions are backed up by documented evidence: where there are many, verifiable sources showing a case of non-compliance, a more forceful allegation of non-compliance is made by the network.

The initiative receives funding from governments and philanthropic organisations. The US$1.6 million total budget for the 2001 edition of *Landmine Monitor Report* supports communication within the research network, including the regional and international research meetings, and production and distribution costs. Researchers work under contract to Landmine Monitor in return for either limited, out-of-pocket expenses or a small research grant.

Yet Landmine Monitor struggles constantly to maintain consistent levels of financial and personnel resources. It has to raise funds for each successive edition of *Landmine Monitor Report*, often after costs have been incurred. Initial expectations that the size of the *Report* would decrease once it only needed updating from year to year have not materialised, as extensive reports on new developments are included each year. The annual cost continues to rise as more in-country researchers are added to the network each year. So far funders willing to make this informal verification a priority have been secured for each edition, but this cannot be assumed in the future: the very effectiveness of its work could result in a shift in funding priorities to, for instance, increased humanitarian mine action.

Many researchers encounter threats to their personal security in researching in politically sensitive or closed societies. Landmine Monitor provides solidarity and support for the network, often with the indirect support of governments.[44] Increasing awareness of the initiative is leading in some cases to greater government co-operation or to less obstruction.

Verification challenges

Demonstrating compliance

The potential for non-compliance with the substantive and the procedural aspects of this treaty is high. It has set an ambitious programme which some states are having difficulty carrying out, despite their enthusiasm and support for the accord and the international assistance available. Violation of its prohibitions would be a serious breach of the treaty norm, while failure to implement national measures, including legislation, or to submit transparency reports on compliance, directly undermines the verification of, and confidence in, the convention.

Landmine Monitor has alleged use of APMs by the militaries of seven signatory governments[45] and two states parties[46] since it began monitoring in December 1997. It has also reported alleged use of APMs by non-state actors.[47] While Uganda has denied that it has laid APMs, blaming instead its warring opponent, the Democratic Republic of the Congo, a non-state party, it has invited an investigation of the matter.[48] Angola, a signatory state, and Eritrea, a non-state party, have openly acknowledged their use of APMs to Landmine Monitor.[49] Angola is allegedly continuing to use mines, while Eritrea has stopped and acceded to the treaty.[50]

Evidence suggests that the norms against production and transfer of APMs by signatories and states parties took hold even before the treaty entered into force. Many of the world's former large-scale producers of mines have joined the treaty[51] and are in compliance with its prohibitions. Decommissioning of these production facilities has significantly affected the trade in APMs to states outside the regime.

Information on the numbers of mines stockpiled by signatories and states parties is not always reported either in the Article 7 transparency reports or to Landmine Monitor researchers. This may be due to inadequate record keeping by states, poor communication between government departments or bureaucratic secrecy on defence matters. Given the treaty requirement to destroy stockpiled mines within four years, decreasing numbers of stockpiled mines can be expected each year. But while citizen verification of stockpile destruction is encouraged in many states,[52] high level verification of stockpile numbers will remain a near impossible task for both the official and the unofficial verification systems of the treaty.

Providing information on the marking, let alone clearance, of mined territory is also difficult for states which are unable to determine the extent of mine infestation in their territory. While co-operative assistance is available under the convention in fulfilling these, and all other, treaty obligations, a low level of reporting on assistance provided and received is making it difficult to evaluate this treaty benefit.

Compliance with less readily quantifiable treaty requirements, such as the establishment of mine awareness programmes and physical rehabilitation for landmine survivors, is proving problematic in many mine-affected countries. Landmine survivors receive medical treatment, if at all, as part of general disability assistance programmes. Many states parties are experiencing difficulty in determining and collating the necessary data for reporting.

While it is a less serious treaty violation, non-compliance with the obligation to adopt national implementation measures is common. The rate at which states are doing this is slow, while the appropriateness of some legislation which is claimed to implement the treaty is questionable in certain cases. This is not peculiar to the Ottawa Convention.

Failure to submit transparency reports on compliance is the most widespread violation of the treaty to date. The rate of reporting is currently 60 percent for the initial, baseline reports and 40 percent for the annual reports. Resource and

personnel shortages and a perceived lack of clarity as to the submission procedure, combined with the competing reporting requirements of many other treaties have delayed the compilation and submission of reports. However, the rate of reporting for this treaty is admirable compared with the rates achieved under other arms control regimes.

Resourcing the verification system

The official compliance reporting process was required to be implemented at short notice by the UNDDA following the treaty's entry into force.[53] The UNDDA created the online database with the resources it had available, and has since proved responsive in improving the layout and accessibility of the site following constructive comments from its users. Criticism regarding the delay in posting reports could be avoided if states adhered to the agreed procedure of submitting reports electronically wherever possible[54] and if adequate resources were provided in support of the system. While the treaty provides for the states parties to make resources available for this purpose, this article has not been implemented to date. In line with the spirit of co-operation and voluntary assistance espoused by the treaty, states are free to provide resources to the UN voluntarily for this purpose.

Increasing pressure on resources is also likely to plague the unofficial monitoring system. Landmine Monitor has had to hunt out potential donors every year. With the scale of the initiative showing no sign of abating, certainly not before the first Review Conference in 2004, its costs are unlikely to fall over the coming years. Should donor support for the initiative founder, either because of a refocusing of mine action funding priorities or perhaps even a withdrawal of political support for Landmine Monitor, states would lose the most impartial, and arguably comprehensive, source of information for monitoring compliance with the treaty.

Verifying compliance

That states parties have not yet invoked the treaty's verification procedures when clear allegations of non-compliance with substantive norms have been raised in treaty organs has, on a charitable reading, as much to do with the ill-preparedness of the system as with states parties' unwillingness to openly confront non-compliance and thereby put at risk the co-operative spirit of the treaty.

States parties are reluctant to make allegations of non-compliance themselves at an ISC meeting or MSP. Yet many corroborate the allegations made by Landmine Monitor at these meetings, either on the basis of their analysis of Landmine Monitor's evidence or information from their own sources. Where allegations relate to a violation of a treaty prohibition by a state party, the other parties invariably unanimously urge immediate demonstration of compliance by the state concerned. Allegations of non-compliance by signatories lead to calls for ratification and demonstration of compliance. Non-adherence to the treaty norms by non-states parties is also noted and accession encouraged.

Violations of procedural requirements, such as failure to enact legislation and non-reporting, are being dealt with pragmatically by both states parties and the NGO community. States parties' efforts in this regard include the Article 7 Contact Group,[55] which co-ordinates démarches to states which are late in reporting, offering them assistance, and Canada's promotion of timely reporting by states parties which are members of the Organisation of American States.[56] NGO initiatives to increase the rate and quality of reporting include the lobbying efforts by Landmine Monitor researchers and VERTIC's *Guide to Reporting under Article 7 of the Ottawa Convention.*[57]

Yet the treaty mechanisms for clarifying compliance remain unused. States parties claim that the mechanisms require fine-tuning before they will be capable of being used as envisaged in the treaty.[58] Issues that require further consideration include the range of skills that might be required for fact-finding mission members;[59] how to recruit experts with appropriate skill from states parties; and the logistical and financial preparedness of missions for rapid deployment.[60] Canada has been leading efforts to achieve consensus on how to prepare these procedures.[61]

Aside from using the treaty mechanisms, states are, of course, free to use diplomatic démarches to clarify compliance in line with the treaty's spirit of co-operation. There are benefits and risks in seeking to resolve non-compliance allegations in private. While accused states may respond better when they have not been publicly chastened and have an opportunity to resolve issues out of the public spotlight, the wider community needs to be assured that compliance has been achieved. Given the recent challenge to the clarification system posed by the Ugandan case, states parties must act urgently to restore full confidence in the treaty's verifiability.

Conclusion

The Ottawa Convention has, in only three years, successfully established and enshrined strong norms prohibiting the use, production, stockpiling and transfer of anti-personnel landmines and for the provision of assistance to landmine survivors. The partnership between states parties and civil society that led to the creation of the treaty has been sustained through to the beginnings of its implementation. The treaty provisions for a system of compliance monitoring based on transparency reporting have been implemented. This system's capabilities for detecting non-compliance have been substantially enhanced by incorporating the comprehensive data supplied by civil society monitoring initiatives. Yet, now that this system has raised credible allegations of non-compliance, states parties must turn their attention to readying the range of treaty procedures available for determining compliance and have the courage to use them in the knowledge that this will ultimately strengthen and create even more confidence in the treaty. States parties must also ensure continued financial and political support for the civil society and international organisations which are undertaking the necessary monitoring and implementation functions for this treaty that permanent, full-time treaty secretariats traditionally perform.

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Endnotes

[1] Ottawa Convention, 1997, Article 3. Treaty negotiators intended that anti-personnel mines (APM) retained under this exception should be the 'minimum number absolutely necessary and should be calculated in hundreds or thousands, and not in tens of thousands' (see APLC/MSP.3/2001/L7, 21 September 2001).

[2] Ottawa Convention, 1997, Article 4.

[3] Ottawa Convention, 1997, Article 5(1).

[4] Ottawa Convention, 1997, Article 5(2).

[5] Customary international law develops when a general practice of states becomes accepted as law and is considered to apply to all states. Customary international law prohibits the use of weapons that cause superfluous injury or unnecessary suffering or that are inherently indiscriminate, such as APMs.

[6] The failure to conclude a total ban on APMs in Amended Protocol II of the 1980 Convention on Certain Conventional Weapons at its Review Conference in 1996 was a substantial catalyst for the Ottawa Process.

[7] Ottawa Convention, Articles 15 and 16.

[8] The use of Form J, 'Other relevant matters', was agreed at the Second Meeting of States Parties, Geneva, Switzerland, 11–15 September 2000. See APLC/MSP.2/2000/1, 18 September 2001. States parties are encouraged to use this form 'to report voluntarily on other relevant matters, including matters pertaining to compliance and implementation not covered by the formal reporting requirements contained in Article 7 . . . to report on activities undertaken with respect to Article 6, and in particular to report on assistance provided for the care and rehabilitation, and social and economic reintegration, of mine victims'.

[9] Ottawa Convention, 1997, Article 8(1).

[10] This involves assisting parties to establish direct communication links and to commence negotiations to resolve their dispute.

[11] By majority decision of states parties present and voting at such a meeting (Article 8(8)).

[12] The UN Secretary-General is required to prepare and update a list of the names and nationalities of and other relevant data on qualified experts who may be called on to serve in a fact-finding mission (Article 8 (9)). All states parties are regularly requested to submit this information to the UN Department of Disarmament Affairs (UNDDA), although this is not a legal obligation.

[13] Ottawa Convention, 1997, Article 8(14).

[14] The treaty text does not specify to whom the requested state should submit this report. It can be implied from the other reporting provisions in the treaty that it should be transmitted to states parties through the UNSG.

[15] See Trevor Findlay, 'Verification of the Ottawa Convention: workable hybrid or fatal compromise', *Disarmament Forum,* vol. 4, 1999.

[16] There are around two UNDDA staff and 16 UNMAS staff involved in treaty implementation.

[17] UN General Assembly Resolution 46/36 L, 6 December 1991, established the UN Register of Conventional Arms containing information on imports and exports of specified conventional weapon types, as well as any background information on military holdings, procurement through national production and other relevant policies that states wish to submit. While the information is submitted voluntarily (unlike under the Ottawa Convention), there are recommended reporting forms for states' use.

[18] Austria developed Article 7 template report forms A to I, corresponding to the nine specified reporting categories under that article. The First Meeting of States Parties, in Maputo, Mozambique, 3–7 May 1999, adopted these standard forms for the reporting process. See APLC/MSP.1/1999/1, May 1999.

[19] See domino.un.org.

[20] States are encouraged, but not legally obliged, to submit names of experts for this list.

[21] As annual reports are due by 30 April, the workload is heaviest at that time of year.

[22] Ottawa Convention, 1997, Article 14.

[23] A voluntary trust fund has been established by UNDDA to collect funds for any Special Meeting of States Parties that may be convened.

[24] Assessment Missions have so far been conducted in: Azerbaijan, Burundi, Ethiopia, Somalia and Yemen (1998); Ecuador, Jordan, Lebanon, Namibia, Peru and Zimbabwe (1999); and Belarus, Egypt, Nicaragua, Sierra Leone and Zambia (2000). See UNMAS website at www.un.org.

[25] This position was created on a temporary basis in January 2000; a permanent appointment was made in September 2001.

[26] UNMAS contracted this work to the Geneva International Centre for Humanitarian Demining (GICHD). The current draft set of International Mine Action Standards is available at www.gichd.org.

[27] See www.mineaction.org. Financial and in-kind contributions for this website were provided by Canada, Germany and the UK.

[28] See www.gichd.ch. Support includes funding and personnel on secondment, typically from ministries of defence.

[29] This information includes meeting agendas, participant lists and reference documents. See www.gichd.ch.

[30] These are effectively preparatory committees for the annual MSPs.

[31] Representatives of the UNDDA, UNMAS, the ICBL, the ICRC and VERTIC regularly participate in ISC meetings. The GICHD administers a trust fund established by donor states to enable representatives of developing and mine-affected states that do not have diplomatic representation in Geneva to attend.

[32] The First MSP agreed on five working groups, originally named Standing Committees of Experts, for the first intersessional period. Each group met separately, on two occasions during the period. The Second MSP reduced the number of these groups to four, removed the word 'experts' from their title, and requested them to meet consecutively over a week on two occasions during the IWP period. The Third MSP changed the issue areas of the groups to the four mentioned.

[33] Each committee has two co-chairs and two co-rapporteurs, each pair consisting of a representative of mine-affected and non-mine-affected states parties. At the end of each intersessional period (that is, at each MSP) the co-chairs stand down, the co-rapporteurs become co-chairs, and new co-rapporteurs are appointed.

[34] The ICBL and the ICRC have recently been permitted to attend these meetings.

[35] Oral statement by the UK, ISC meeting on the General Status and Operation of the Convention, 11 May 2001.

[36] Including Austria, Australia, Canada, Netherlands, Norway and South Africa.

[37] The ICRC provides similar assistance to states with regard to the 1949 Geneva Conventions; the 1977 Geneva Protocols; the 1954 Hague Convention on the Protection of Cultural Property during Armed Conflict; the 1980 Convention on Certain Conventional Weapons and its Protocols; and the 1998 Rome Statute of the International Criminal Court.

[38] 'Information kit on the development of national legislation to implement the convention on the prohibition of anti-personnel mines', ICRC, Geneva, Switzerland, May 2001.

[39] The Technical Expert Meeting on Anti-Vehicle Mines with Sensitive Fuses or with Sensitive Anti-Handling Devices, hosted by the ICRC in Geneva, Switzerland, on 13–14 March 2001 allowed states and interested international, non-governmental and regional organisations to exchange views on the interpretation of the definition of APMs in Article 2 of the 1997 Ottawa Convention.

[40] www.lm-online.org. The full text is also available at www.icbl.org.

[41] Reports are also included for territories that are not recognised as states by the UN, including Abkhazia, Chechnya, East Timor, Falkland Islands/Malvinas, Golan Heights, Iraqi Kurdistan, Kosovo, Nagorno-Karabakh, Palestine, Somaliland, Taiwan and Western Sahara.

[42] Each regional research group has a closed email listserve where participants discuss their research.

[43] Regional and thematic co-ordinators, who are usually employees of, or contracted to, a member organisa-

tion of the ICBL core group, ensure that reports are internally and comparatively consistent. Thematic co-ordinators ensure that reports include information on specific treaty issues—ban policy, victim assistance, mine action and mine awareness.

[44] For example, Canada has offered to monitor researchers' safety from its nearest diplomatic mission.

[45] Angola, Burundi, Ethiopia, Guinea-Bissau, Rwanda, Senegal and Sudan. Qualifications include 'likely', 'suspected' or 'unconfirmed'.

[46] Uganda and Zimbabwe.

[47] In Afghanistan, Colombia, Philippines, Senegal and Sudan.

[48] Oral statement of representative of Uganda, Third Meeting of States Parties, Managua, Nicaragua, 18 September 2001.

[49] *Landmine Monitor Report 2001,* Human Rights Watch for Landmine Monitor, Washington, DC, 2001, p. 185 (Angola) and p. 248 (Eritrea).

[50] Eritrea admitted to Landmine Monitor researchers in 2001 that government troops laid mines during the border conflict with Ethiopia from May 1998 to June 2000. It ceased laying mines when the war ended and has supplied maps of areas it mined to relevant demining organisations. Eritrea acceded to the treaty on 25 August 2001.

[51] Belgium, Bosnia and Herzegovina, Bulgaria, Czech Republic, France, Hungary, Italy and the UK.

[52] Many states hold stockpile destruction ceremonies, to which ICBL representatives and landmine survivors are invited.

[53] Initial reports were due for parties no later than 180 days after the treaty entered into force for them.

[54] It is recognised that this may prove difficult for some states parties, although many are submitting hard copy versions of reports that were completed electronically.

[55] This is an informal, open-ended group of states parties that meets on the margins of ISC meetings and MSPs. Members often take responsibility for contacting states parties which are late in reporting and with which they share a common language or historical association, or which are in the same region.

[56] Canada has held meetings with fellow members of the Organisation of American States to promote the treaty and provide information on treaty requirements, obligations and benefits, including assistance.

[57] VERTIC presented this document at the Third MSP in Managua, Nicaragua, 18–21 September 2001. Parties endorsed the guide as a 'useful tool' for states in meeting their reporting obligations. See APLC/MSP.3/2001/L7, 21 September 2001. See also www.vertic.org.

[58] ISC meetings on the General Status and Operation of the Convention consistently report on action taken in implementing Article 8 and on the need for further discussions on the issue.

[59] Negotiation, language and team-building skills are as important as familiarity with ordnance or military experience.

[60] There are logistical and financial issues that can be determined in advance to ensure rapid deployment when required. It may also be appropriate to have a draft set of mission mandates drawn up to cover the types of non-compliance activities that may be investigated.

[61] These efforts include Canada's working paper, 'Article 8 and the Facilitation and Clarification of Compliance', presented at the ISC meeting on the General Status and Operation of the Convention, Geneva, Switzerland, 11 May 2001. See www.gichd.ch.

the environment

7

The Kyoto Protocol: verification falls into place

Molly Anderson, Trevor Findlay and Clare Tenner

The period between 2000 and 2001 proved to be a dramatic one for the climate change regime. Parties to the 1992 United Nations Framework Convention on Climate Change (UNFCCC) negotiated energetically in an attempt to agree the details of the Kyoto Protocol that they had adopted in Kyoto, Japan, in December 1997.[1] Despite the US decision in early 2001 to withdraw support for the protocol as a means of tackling human-induced climate change, the remaining parties were able to reach an historic political agreement in July on a package of measures to permit the agreement to be implemented—including its verification.

The protocol obliges developed countries, listed in Annex I of the convention, to reduce their collective emissions of six greenhouse gases (GHG) during a first commitment period (2008–12) by 5.2 percent below 1990 levels.[2] Different emissions targets (assigned amounts) were agreed at Kyoto for each party. Targets for subsequent commitment periods will be agreed later. The protocol establishes complex rules and procedures that states must follow in achieving their obligations, including rules for using the three 'Kyoto Mechanisms'—International Emissions Trading (IET), Joint Implementation (JI) and the Clean Development Mechanism (CDM)—which permit the transfer of emissions reductions between parties. IET will allow Annex I parties to sell their GHG emissions reductions to other Annex I parties.[3] Under JI, Annex I parties will be able to set up emissions reduction projects in other Annex I countries, and under the CDM they will be able to do so in non-Annex I countries, in both cases claiming the resulting emissions reductions for themselves.

Although the basic rules for implementing the protocol were agreed in Kyoto, the negotiators failed to complete the necessary detail. For most parties, however, agreement on such detail was necessary before they would consider ratifying. The

Fourth Conference of the Parties (COP4), held in Buenos Aires, Argentina, in November 1998, agreed to aim to resolve the outstanding issues by COP6 in November 2000. This chapter analyses the progress made in 2000 and 2001 in meeting this goal, particularly in relation to the verification system for the protocol, and considers the work that remains to be done.

Progress made in 2000–01

Negotiations intensified throughout 2000 as the parties attempted to meet the November deadline. Subsidiary bodies of the UNFCCC met twice—in Bonn, Germany, from 5–16 June, and in Lyon, France, from 4–15 September—and a number of informal workshops were convened. However, many issues remained unresolved by the time COP6 was convened in The Hague, Netherlands, from 13–25 November. In the event the meeting was unable to reach agreement on a final package deal and was adjourned until 2001.

COP6 was resumed, as COP6 bis, from 16–27 July 2001 in Bonn. Consensus was finally reached at this meeting—albeit without the US. Between the two COP6 meetings, George W. Bush was elected US president and, after reviewing US climate change policy, decided to withhold his administration's support both for the Kyoto Protocol itself and the agreement reached in Bonn. Nonetheless, the remaining participating states agreed to proceed with the agreement. The outcome in Bonn paves the way for ratification of the protocol by the states that are necessary to bring it into force.[4] It is not yet clear when this will occur. In the meantime, the next meeting of the parties, COP7, will be held in Marrakech, Morocco, between 29 October and 10 November 2001, when further details of the protocol's implementation, based on the political agreement reached at Bonn, will be considered.

Four of the key issues resolved in Bonn, which all have profound implications for verification of the protocol, were those relating to sinks, the use of the Kyoto Mechanisms, the financial package and the consequences of non-compliance.

The 'sinks' issue

One of the most divisive issues of the post-Kyoto negotiations concerned the use of 'sinks'—Land-Use, Land-Use Change and Forestry (LULUCF) activities—to meet states' emissions reduction commitments. The protocol, as agreed at Kyoto,

already permitted countries to use net changes in GHG emissions resulting from domestic afforestation, reforestation and deforestation for such purposes.[5] But agreement needed to be reached at COP6 on whether this list of activities should be extended and whether sinks projects could occur within the CDM.

The 'Umbrella Group'[6] of developed countries favoured the full inclusion of LULUCF activities in the first commitment period and many stated that their ratification of the protocol would be contingent on such a provision. European Union (EU) states and some developing countries, such as the Alliance of Small Island States (AOSIS), strongly opposed the use of such activities in the first commitment period, arguing that the scale of the potential credits generated could render emission reduction commitments meaningless. They also argued that monitoring, reporting and verifying LULUCF activities would be extremely difficult.

Consensus on the sinks issue was finally reached, albeit reluctantly, in Bonn. It was agreed that afforestation and reforestation projects would be eligible under the CDM in the first commitment period. The list of sink activities that an Annex I party can undertake within its borders was expanded, subject to an individually negotiated cap on the amount of GHG absorption that can be claimed. Canada and Japan negotiated generous caps as the price of their support.[7] The extra sinks allowances increase the importance of having an accurate, reliable and transparent monitoring and verification system. However, this could prove difficult, given the many problems associated with monitoring a carbon sink.[8]

Use of the Kyoto Mechanisms

There were deep divisions among parties about 'supplementarity'—the extent to which the Kyoto Mechanisms generally could be used to achieve national GHG emissions targets. The protocol requires that the use of IET and JI only be 'supplemental' to domestic action. Fearful that they might not otherwise be able to achieve their first commitment period targets, Umbrella Group members pressed for unrestricted use. The EU and the G77 and China group,[9] by contrast, advocated a cap on the use of the mechanisms to ensure that Annex I parties take significant domestic action to cut their GHG emissions. Parties also disagreed on the types of projects other than sinks to be allowed under the CDM. It is now the remit of the executive board to decide whether a CDM project is valid or not.

The EU again compromised at Bonn on the issue of supplementarity. No limit was imposed on the use of the flexible mechanisms. Instead the rules now state that the 'the use of the mechanisms shall be supplemental to domestic action and domestic action shall thus constitute a significant element of the effort made by each party'.[10] The means for establishing the significance of domestic action has not yet been determined. But if parties are required to report on how their trading and overseas projects are supplemental to domestic action, the lack of criteria will make it difficult to judge non-compliance and to impose penalties.

Technology and financial transfer

Another unresolved debate in The Hague concerned the extent of, and arrangements for, technology and financial transfers between Annex I and non-Annex I parties. The protocol requires that developed countries provide new and additional resources to developing nations to help them mitigate and adapt to climate change. Given developed countries' poor performance in relation to similar activities under the Framework Convention, the G77 and China group championed the issue to ensure that these commitments were taken seriously.

The Bonn agreement made provisions for three new funds. The first will fund adaptation projects and programmes in developing countries and will be financed from a share of the proceeds from the clean development mechanism. The second, termed the 'special climate change fund', will be additional to the first and complimentary to the Global Environment Facility funding. Political commitments by the EU, Canada, Iceland, New Zealand, Norway and Switzerland mean that this fund will provide an annual amount of US$410 million. The third fund will benefit the least developed countries by helping them with their national adaptation programmes. In reporting and review discussions, the G77 and China group pressed for mandatory annual reporting on these activities, which the Annex I countries were unwilling to accept because this would have an impact on their eligibility to use the flexible mechanisms.

Consequences of non-compliance

The last and perhaps greatest hurdle for negotiators in Bonn was the issue of compliance. Parties agreed that the penalty for failing to achieve their assigned emissions targets by the end of the commitment period would be an obligation

to reduce by the amount that they have exceeded the target, plus 30 percent. However, the most contentious issue relating to the compliance regime was whether the penalties should be 'legally binding'. Despite a deal being reached in Bonn, parties continue to argue over its meaning. The EU and the G77 and China group believe that the Bonn text strongly suggests an acknowledgement by parties of the need for binding consequences, but that a decision on whether they would be adopted via an amendment to Article 18 would be postponed. In contrast, the Umbrella Group seeks to ensure that the Bonn agreement does not imply that the consequences of non-compliance should be binding. Given continued disagreement over the legal nature of the compliance regime, this will be one of the key issues discussed at COP7 in Marrakech.

The verification system: further work required

Among the implementation details for the protocol left undecided at Kyoto were those dealing with verification—the system for monitoring, reporting and reviewing implementation of parties' commitments—and the arrangements for ensuring that they comply with them.

Draft guidelines for reporting and reviewing information on implementation were successfully negotiated during 2000 and agreed in The Hague in November.[11] Yet they contained large gaps that could only be filled when other aspects of the protocol were resolved. As a result of the political agreement achieved in Bonn in July 2001, the details of the verification and compliance arrangements can now be finalised. The rest of this chapter describes the progress made in 2000–01 and analyses the issues that remain to be resolved.

Reporting requirements

Under the protocol, each Annex I party is required to provide two types of reports on implementation of its commitments. First, an annual report on compliance with its emissions reduction targets.[12] Second, a less frequent 'national communication', reporting information on implementation of all other aspects of the protocol.[13]

Annual reports

A key component of annual reports will be the annual GHG inventory which Annex I parties are already obliged to provide under the UNFCCC. It was agreed

at COP6 that Annex I parties should report the following additional information: GHG emissions and removals resulting from LULUCF activities; data on the assigned amount held in the party's registry, including acquisitions and transfers under the Kyoto Mechanisms; and changes in national systems and to the national registry.

These items will be reported via the UNFCCC Secretariat to the annual meeting of the parties, as well as being published on the UNFCCC website.

At COP6 the G77 and China group unsuccessfully advocated the inclusion of additional information on: implementation of Article 3.14 (requiring Annex I parties to minimise the adverse effects of climate change and to mitigate its effects on developing countries);[14] and 'supplementarity' (the extent to which the use of the Kyoto Mechanisms is 'supplemental' to domestic action to reduce emissions).

Annex I parties were anxious to avoid including such details in annual reports, rather than in national communications, because the former will be subject to scrutiny by the protocol's Compliance Committee's Enforcement Branch (see below), whereas it is expected that national communications will face no such examination. The Bonn agreement explicitly excluded Article 3.14 information from being considered by the enforcement branch.

The principal purpose of annual reporting will be to permit an assessment to be made of each party's compliance with its emission reduction commitments. However, the reports will also have a unique second function: to assess whether parties are eligible to participate in the Kyoto Mechanisms. Early in 2000 it was agreed that parties not reporting their GHG emissions satisfactorily should be barred from transferring and/or acquiring emissions reductions under the Kyoto Mechanisms, and that this should happen as quickly as possible to minimise the acquisition of unreliable emissions reductions by other parties.

National communications

While negotiators paid a great deal of attention to the annual reporting process, relatively little was devoted to the guidelines for national communications—mostly because they will not be used to assess compliance with emissions reduction commitments. Although states are already obliged to submit national communications under the UNFCCC, supplementary data will be required as a result of their additional commitments under the protocol. It has been agreed that national communications under the protocol should include sections on: policies and measures implemented

to reduce GHG emissions; the legislative arrangements and enforcement and administrative procedures in place to implement the protocol; implementation of Article 3.14 (requiring Annex I parties to minimise the adverse effects of climate change and to mitigate its effects on developing countries); further action to monitor, alleviate and adapt to climate change, particularly technology transfers to developing countries; the provision of financial resources to developing countries; and the national system and registry.

Estimating GHG emissions and compiling inventories

Under the UNFCCC, parties are obliged to adhere to guidelines for estimating GHG emissions and for compiling and reporting their inventories.[15] The protocol strengthens the UNFCCC reporting requirements by obliging Annex I parties to establish 'national systems' for accurately estimating their GHG emissions.[16] Draft guidelines for setting up such systems were negotiated early in 2000 and adopted by the Subsidiary Body for Scientific and Technical Advice (SBSTA) in June.[17] They specify the institutional, legal and procedural arrangements for estimating greenhouse gas emissions and removals and for reporting and archiving the inventory information. Some activities involved in the planning, preparation and management of inventory activities, such as devising a Quality Assurance and Quality Control (QA/QC) plan, are mandatory. However, parties are by and large left to decide how to implement the requirements.

Each party must provide a full account of its national system in its national communication and notify details of any changes in its annual reports. The incremental strengthening of the guidelines for producing GHG inventories is in recognition of the need for high quality data to make the protocol function as intended.

Estimating and reporting GHG emissions and removals from LULUCF

The verification issue was an important element in the debate on the role of LULUCF, since the protocol explicitly states that only verifiable changes in carbon stocks, which can be transparently reported, will be allowed.[18]

A welcome advance in promoting better calculation and reporting of GHG removals from LULUCF was the May 2000 publication of *Land Use, Land-Use Change and Forestry,* an Intergovernmental Panel on Climate Change (IPCC) special report that assessed the implications of the different options for including LULUCF

activities in the protocol.[19] The document stated that measuring changes in carbon stocks will require complete soil and forest inventories, land-use surveys and data based on remote sensing and other methods. The IPCC warned, though, that 'few, if any, countries, perform all of these measurements routinely'.[20]

Given that biological systems can be sinks or sources of GHG, once an area of land has been counted as a sink the sequestered carbon must be monitored for the indefinite future. Furthermore, it is difficult to separate observed stock changes directly induced by humans (which can be counted under the protocol) from those caused by indirect and natural factors (which cannot be counted).

Gathering and reporting information on the 'assigned amount'

At the start of the first commitment period, an 'assigned amount' of permissible GHG emissions will be fixed for each Annex I state, based on its 1990 emissions and the emissions reduction commitment agreed at Kyoto. Compliance with the latter will be assessed at the end of the commitment period by comparing the assigned amount with the party's total emissions. However, as noted, the party will be able to use emission reduction credits—acquired through participation in the Kyoto Mechanisms or through LULUCF activities—to offset its assigned amount. In effect, these credits will increase a party's assigned amounts. But the means of accounting are highly contentious and were not agreed in The Hague or in Bonn.

Whatever the final accounting system, parties will need to record their assigned amounts and transfers of emission credits in a national 'registry'. Although operating guidelines for such registries are still being prepared, the draft reporting guidelines require that parties provide a description of their national registry in their national communication, and that they report on changes to the registry annually. It is likely that parties will be required to allocate a serial number to each discrete emission reduction amount and each year report both these numbers and the total quantity of emission reduction credits held, acquired, transferred, retired and cancelled.

Reviewing information: the Expert Review Teams

All reports filed by the parties will be reviewed by Expert Review Teams (ERTs), co-ordinated by the Climate Change Secretariat, located in Bonn.[21] The ERTs will convey their findings to the annual meeting of the parties.[22] As the extent of the

ERTs' tasks has become increasingly apparent, the parties have been obliged to agree on the need for a standing group of experts from which at least some members of each review team would be drawn. This is a significant step forward compared to the review system under the Framework Convention, which is carried out solely by *ad hoc* teams of experts on loan from their regular employer.

Other details relating to the ERTs, such as their size, composition, membership selection criteria, responsibilities and operational arrangements, have, however, yet to be agreed. As with the membership of other climate change bodies, the composition of both the standing group and the ERTs has proved controversial. The G77 and China group argued that the composition of the review teams should ensure equitable geographic representation of the five United Nations (UN) regional groups. Annex I parties, though, want technical competence to be the prime selection criterion. Some developed countries are also uncomfortable with the prospect of being reviewed by experts from developing countries.[23]

Inventory review

Reflecting the importance of credible assessments of state party compliance with GHG emission targets and their eligibility to participate in the Kyoto Mechanisms, negotiators invested great efforts in 2000 in developing guidelines for reviewing GHG inventories. It was agreed that the GHG inventory review would involve two stages. The first will consist of automated checking of the timeliness, consistency and completeness of the inventories. A status report will be produced for every party and posted on the UNFCCC website. The Secretariat and UNFCCC parties already have experience of such a system as a result of the UNFCCC review guidelines adopted at COP5.[24] The Secretariat has developed software to permit storage of inventory data submitted electronically in the common reporting format and to enable initial checks to be carried out.

During the second stage the ERTs will review individual inventories. This will involve, *inter alia:*

- checking that GHG emissions and removals have been estimated according to relevant guidelines;
- comparing the inventory data with the inventory report and a party's previous submissions, to identify inconsistencies;

- contrasting activity data with authoritative external sources, if feasible;
- assessing the extent to which issues raised by previous reviews have been addressed; and
- recommending ways to improve the emissions/removals estimates and the reporting of inventory information.

The annual review will usually be a desk study, with each party being visited once during each commitment period. The ERT can also request an in-country visit if it considers a fuller investigation necessary. It is clear, however, that the ERTs will not have time to verify fully each GHG emission estimate. Instead, the onus is on the parties to implement high quality national systems.

A significant challenge for negotiators was to agree on how to recognise and deal with inventory problems. The protocol states that where a party has not followed the reporting guidelines in estimating its emissions and removals, 'adjustments' should be applied to the estimates.[25] Negotiators had to decide whether adjustments could be applied to all inventory problems, how they should be calculated, and who should apply them.

By the time the SBSTA met in June 2000, the parties had agreed that, where there was doubt about the veracity of estimated emissions and removals, adjustments should favour the environment rather than the party concerned. Hence disputed emission estimates for the commitment period would be revised upwards (to increase the estimated amount of GHG emitted), while for the base-year inventory (which states may tend to exaggerate) they should be revised downwards. It was agreed that adjustments should be applied when parties fail to follow the IPCC good practice guidelines or the UNFCCC inventory reporting guidelines. The flexibility provided by the reporting guidelines may, however, make it hard, in some respects, to assess non-compliance.

At the SBSTA meeting, some states, in particular Australia, argued that the party whose inventory was in question should calculate the adjustment, since they would understand their national circumstances best. But given that the party would have already had a chance to provide its own figures, it was decided that the ERTs should calculate the adjustment. The SBSTA will draft guidelines for calculating them.

Negotiators have paid less attention to drafting guidelines for the review of national systems, even though inventory problems can, in many cases, be linked to inadequate national arrangements.[26] GHG inventories will be used to review adherence to some parts of the national system guidelines. But compliance with most of the guidelines will be assessed using information provided by the parties, other documentation and interviews with relevant personnel. As with the inventories, review teams may find it hard to assess compliance in cases where the national system guidelines leave the exact details of implementation up to the party.

Parties have not yet discussed the review of national registries. With regard to reviewing information on assigned amounts, it was agreed that at the start of the commitment period the ERTs will check the base-year inventory and assigned amount calculation. During the commitment period, information on transfers between parties will be cross-checked to verify whether data are complete and submitted in accordance with the reporting guidelines.

The national communication reviews will always occur in-country but will be preceded by a desk study. Given the volume of information that reviewers will confront, the draft review guidelines are brief and rather vague. They state that the ERT should identify any potential problems that the party is encountering in fulfilling its commitments and in reporting its compliance. But they provide definitions of such problems only in relation to reporting—for example in regard to transparency, completeness or timeliness. It is unclear, therefore, how the ERT and the Compliance Committee will assess compliance with parties' wider commitments under the protocol.

Pre-commitment period reporting and review

An effective and efficient monitoring and verification system must be functioning properly by the start of the first commitment period (and the commencement of International Emissions Trading) on 1 January 2008. An obvious means of achieving this objective is for the relevant information to be reported by parties and reviewed by ERTs prior to this date. Yet the issue of pre-commitment period reporting and review has been one of the more controversial aspects of verification discussions.

It was agreed in The Hague that each Annex 1 party should report on the following items by 1 January 2007, or earlier if it wishes: their base-year inventory;

their calculation of assigned amount; the details of their national system; the inventory for the most recent year, and details of their national registry.

These items will be subject to an initial in-depth, in-country review by an ERT. It was agreed that such a review must be completed within one year of the date that the information is submitted.

However, it was not agreed whether parties will have to wait for the Compliance Committee to rule that they are in compliance with the eligibility criteria before participating in the mechanisms, or whether they have an automatic right to participate unless they are found to be in non-compliance after review. The EU and the G77 and China group had argued that states should not be allowed to participate automatically. Australia, Canada and Japan argued that parties should have a right to participate unless it is revoked as a result of a finding of non-compliance. They are concerned that the committee will simply be incapable of making a definitive ruling that a party is in compliance at this early stage of the protocol's implementation and that this will delay the operation of the mechanisms indefinitely.

Reporting on 'demonstrable progress'

Perhaps the most interesting verification development in 2000 related to the protocol's clause on Demonstrable Progress—the requirement that each Annex I party make 'demonstrable progress in achieving its commitments' under the protocol by 2005.[27] Umbrella Group members initially refused to discuss reporting guidelines, let alone review guidelines, for demonstrable progress, arguing that the fourth national communication due under the Framework Convention, the date for which has not yet been set, would provide enough information to demonstrate progress. The EU strongly advocated full reporting on demonstrable progress made in implementing domestic policies and measures to reduce GHG emissions. Umbrella Group nations contended that it would be sufficient to report on preparations made for complying with the protocol, such as setting up national systems, passing domestic legislation and establishing domestic enforcement procedures.

The agreed text simply 'urges' Annex I parties to report by 1 January 2006 to provide the basis for reviewing 'demonstrable progress'. The report must contain: a description of domestic measures, including legal and institutional steps taken

toward implementing the protocol, and any domestic compliance and enforcement programmes; trends and projections of GHGs; and an evaluation of how these domestic measures, in view of these trends and projections, will contribute to the state party meeting its emission reduction commitments.

Although the reporting obligation is not mandatory, the elements included are surprisingly comprehensive. However, no agreement was reached on whether parties will have to report on initiatives to minimise the adverse effects on developing countries, or on financial and technology transfers to these nations. Furthermore, the question of whether and how information on demonstrable progress will be reviewed has not been discussed.

Assessing compliance: the role of the Compliance Committee

The protocol provides for a Compliance Committee 'to determine and to address cases of non-compliance'.[28] The committee will consist of an Enforcement Branch and a Facilitative Branch, the former having the authority to impose penalties. Much of the operational detail remains undecided, including what issues fall under the mandate of each branch. The Bonn agreement determined that the composition of the compliance committee would be based on equitable geographic representation.[29] Yet, despite the effort that has gone into drafting the reporting guidelines, it is still unclear exactly how the Compliance Committee will assess compliance. While the ERTs' findings will inform the work of the committee, the exact division of responsibilities between them is also not yet completely clear. The guidelines for both the ERTs and the Compliance Committee must be ready for adoption at the first Meeting of the Parties to the protocol (MOP), which can only occur when the protocol has entered into force.

However, agreement was reached in The Hague that the following would constitute compliance 'problems': the failure to submit an inventory; the failure to include an estimate for a source category that accounts for (x) percent or more of total emissions; presenting an inventory for any given year that consists of (y) percent or more adjusted data; if at any time in the commitment period the sum of adjusted data exceeded (z) percent of total emissions estimates submitted; and the application of an adjustment (by an ERT) to the same key source category in three subsequent years.

No agreement could be reached on whether a failure to submit information on demonstrable progress, minimisation of adverse impacts on developing countries and technology and finance transfers would be considered a 'compliance problem'.

Moreover, the agreed 'problems' only cover inventory reporting, with no mention of compliance problems relating to national systems, national communications or information on assigned amounts or GHG emissions and removals from LULUCF activities.[30] The text is also not clear as to whether it is referring to annual reporting, all reporting, or simply 'questions that relate to eligibility requirements'.[31]

Conclusion

The Kyoto Protocol's verification system, while not yet complete, is starting to take its final shape. As agreed so far, its reporting and review arrangements strike a delicate balance between mandatory and discretionary elements.

The draft reporting guidelines seek to maintain a minimum standard of reporting, while encouraging parties to improve their inventories and other reports as much as possible. The flexibility allowed to states should increase the accuracy of national submissions, but could hinder the comparison of a party's submissions from year to year. It may also make assessments of compliance with the reporting guidelines more difficult and allow parties to interpret them to their own advantage.

The review process should help ensure that parties produce and report their GHG inventories according to the guidelines. It is recognised that the ERTs will not have the resources to assess the accuracy of the estimates, but will rely on the parties to verify their own emission calculations using QA/QC procedures and expert and public reviews. However, the ERTs will have significant power as a result of their right to apply adjustments to GHG inventories.

While the procedures for assessing compliance with Annex I parties' emissions reduction commitments are now relatively apparent, it is unclear how compliance with the parties' other obligations will be assessed. The transparency measures envisaged will certainly encourage compliance. All submissions and ERT reports will be published on the UNFCCC website. It is likely that parties will also be required to establish their own publicly accessible websites on which further information, such as on implementation of the mechanisms, will be available. In addition to the formal review process, therefore, data submitted by parties will be subject to extensive informal review, including by non-governmental organisations.

Decisions yet to be made concerning the arrangements for the ERTs will also determine the effectiveness of the review process. Agreement on the relationship of the pre-commitment period review to the eligibility of parties to participate in the mechanisms will also be important. An early, thorough review, starting by 2006 at the latest, could help parties, the Secretariat and the ERTs to iron out problems in the system before the first crucial commitment period begins.

Finally, although somewhat neglected to date, the national communication requirement could become a much more significant part of the verification system as it begins to be implemented. Given the difficulties associated with monitoring and reporting emission reductions, the value of information in national communications with regard to the steps that parties are taking to reduce their emissions should not be underestimated. Since national communications also include emission projections, they will also be invaluable for assessing whether the protocol will reach its objectives by the end of each commitment period.

Clearly there are many aspects of the Kyoto Protocol's verification system that need to be agreed, tested and adjusted in the light of experience. Nonetheless, the political agreement reached in Bonn in July 2001, paving the way for final agreement and entry into force, means that the year will be forever viewed as a watershed in the long march towards an effective climate change regime.

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Endnotes

[1] Further detail on the foundations of the verification system is provided in Clare Tenner, 'Verification and compliance systems in the climate change regime', in *Verification Yearbook 2000,* Verification Research, Training and Information Centre (VERTIC), London, 2000, pp. 151–166.

[2] Annex I parties are Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, European Economic Community, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Ukraine, UK and US.

[3] It is likely that these activities will be devolved to the sub-state level, with individual businesses buying and selling assigned amounts.

[4] The Kyoto Protocol will enter into force on the ninetieth day after the date on which no fewer than 55 parties to the Framework Convention have ratified, including Annex I parties which accounted for at least 55 percent of the total carbon dioxide emitted by Annex I parties in 1990.

[5] Article 3.3, Kyoto Protocol.

[6] The Umbrella Group is a loose alliance of non-EU members of the Organisation for Economic Co-operation and Development (OECD) which have similar views on some issues. Although they negotiate individually, collectively they act as a counterweight to the EU in the negotiations. Umbrella Group states are Australia, Canada, Japan, New Zealand, Norway, Russia, Ukraine and the US.

[7] It has been calculated that the inclusion of such sinks activities will slash Kyoto's 5.2 percent global reduction target to 1.8 percent at best and, at worst, produce a 0.3 percent rise.

[8] See David Reed *et al.*, 'The role of land carbon sinks in mitigating global climate change', Royal Society Policy Document, no. 10/01, July 2001, available at www.royalsoc.ac.uk and Pete Smith, 'Verifying sinks under the Kyoto Protocol', *Briefing Paper,* VERTIC, no. 01/03, July 2001.

[9] The G77 and China group comprises developing countries and China.

[10] See 'Preparations for the first session of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (Decision 8/CP.4): Decision 5/CP.6 implementation of the Buenos Aires Plan of Action', FCCC/CP/2001/L.7, 24 July 2001, available at www.unfcc.int.

[11] See 'Preparations for the first session of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (Decision 8/CP.4): national systems, adjustments and guidelines under Articles 5, 7 and 8 of the Kyoto Protocol', FCCC/CP/2000/CRP.10, 25 November 2000, available at www.unfcc.int.

[12] Article 7.1, Kyoto Protocol.

[13] Article 7.2, Kyoto Protocol.

[14] The implementation of this commitment is especially hard to negotiate because it was crafted to satisfy two divergent groups of developing countries: the least developed countries, which will be most affected by climate change, and the members of the Organization of the Petroleum Exporting Countries (OPEC), which may suffer reduced oil revenue as a result of energy conservation efforts under the protocol. Annex I parties have always strongly objected to OPEC's demands for compensation for reduced oil revenue.

[15] The 1999 UNFCCC reporting guidelines require parties to report their inventories in a common reporting format. See Decision 3/CP.5 in 'Report of the Conference of the Parties at its fifth session, held at Bonn from 25 October to 5 November 1999, part two, action taken by the Conference of the Parties at its fifth session', FCCC/CP/1999/6/Add.1, available at www.unfccc.int. The *Guidelines for National Greenhouse Gas Inventories*, released in 1996 by the Intergovernmental Panel on Climate Change (IPCC), provide advice on preparing and calculating inventories. To account for different national circumstances the guidelines offer alternative methods, ranging in complexity, for calculating emissions from each GHG source. Parties are

encouraged to use the most sophisticated procedures possible and the most accurate local data available. In recognition of the fact that some parties will have difficulties in following this advice, simple methods and default emissions factors are permitted. In 2000 the IPCC released a *Good Practice Report* to encourage states to improve the quality of their inventories, whatever method is used to calculate their emissions. In June 2000 this report was endorsed by the Subsidiary Body for Scientific and Technical Advice (SBSTA).

[16] Article 5.1, Kyoto Protocol.

[17] 'Methodological issues: guidelines under Articles 5, 7 and 8 of the Kyoto Protocol', UNFCCC/SBSTA/2000/L.2, available at www.unfccc.int.

[18] Article 3.3 states that only 'verifiable changes in carbon stocks . . . shall be used to meet the commitments' and that these activities 'shall be reported in a transparent and verifiable manner'. Article 3.4 states that, in deciding on how and which additional LULUCF activities should be allowed, parties should take into account 'uncertainties, transparency in reporting, verifiability' (Articles 3.3 and 3.4, Kyoto Protocol).

[19] Robert Watson *et al.* (eds.) 'Land-Use, Land-Use Change and Forestry', *Intergovernmental Panel on Climate Change*, May 2000.

[20] Watson, p. II.

[21] Article 8, Kyoto Protocol.

[22] Parties to the Kyoto Protocol will convene in an annual Conference of the Parties/Meeting of the Parties, known as the COP/MOP.

[23] Since the meeting in The Hague, this issue has been removed from the political issues covered by the president's paper. 'New proposals by the president of COP6' (9 April 2001) contains a section on composition of protocol bodies, although this explicitly excludes the ERTs. It states that their composition will be primarily based on the technical capacity of the experts.

[24] Decision 4/CP.5 in 'Report of the Conference of the Parties at its fifth session, held at Bonn from 25 October to 5 November 1999, part two, action taken by the Conference of the Parties at its fifth session', FCCC/CP/1999/6/Add.1, p. 6, available at www.unfccc.int.

[25] Article 5.2, Kyoto Protocol.

[26] Anke Herold, 'National systems (Article 5.1) and reporting (Article 7.1)', paper presented at VERTIC workshop, *Developing verification systems for the Kyoto Protocol,* London, 28 July 2000. See www.vertic.org.

[27] Article 3.2, Kyoto Protocol.

[28] Article 18, Kyoto Protocol.

[29] The most recent draft procedures are found in 'Report of the Joint Working Group on Compliance on its work during the second part of the thirteenth sessions of the subsidiary bodies', FCCC/SB/2000/CRP.15/Rev.2, 20 November 2000, available at www.unfcc.int.

[30] The emissions and removals from LULUCF may be included in the inventory, but this is not yet agreed. There is agreement that activities included in Annex A to the protocol are reported on, but this does not include most activities under Article 3.3 and 3.4.

[31] 'Preparations for the first session of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (Decision 8/CP.4): national systems, adjustments and guidelines under Articles 5, 7 and 8 of the Kyoto Protocol', FCCC/CP/2000/CRP.10, 25 November 2000, available at www.unfcc.int, p. II.

8

Verification mechanisms in CITES

Rosalind Reeve

The 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is one of the oldest multilateral environmental agreements (MEAs).[1] Seen as the flagship wildlife accord, CITES now has 155 states parties and has been in force since 1 July 1975. It addresses one of many threats to the earth's biological diversity: over-exploitation of wildlife through international trade. Its primary objective is to ensure 'the international co-operation of Parties to prevent international trade in specimens of wild animals and plants from threatening their survival'.[2]

A formal verification system was not established by or for CITES at the outset. Instead, resolutions and decisions of the Conference of the Parties (COP)—so-called 'soft' law—have gradually put in place mechanisms to induce state party compliance with CITES rules. Collectively these mechanisms amount to a compliance system. While among them are techniques that in other treaty contexts might collectively be called verification, CITES parties use the term only to refer to *ad hoc* inspection activities.

A 'compliance system' has been defined as the 'subset of the treaty's rules and procedures that influence the compliance level of a given rule'.[3] It can be broken down into three sub-systems: the primary rule system; the compliance information system; and the non-compliance response system.[4] The sub-systems all contain elements of verification. The latter is seen as a means to appraise the verity of a treaty's information base, to review progress in regard to implementation of state party commitments, and to permit states parties to respond to non-compliance with some type of action.

The chief actors in the CITES compliance system are the COP, the Standing Committee and the CITES Secretariat. The COP is composed of state party represen-

tatives and is the supreme decision-making body, meeting every two and a half years. The Standing Committee is an executive body made up primarily of 14 representatives of the parties—elected on a regional basis[5]—which oversees the operation of the convention between COP meetings. Its functions include: overseeing financial activities; co-ordinating and advising other committees, as well as working groups set up by the COP; drafting potential COP resolutions; and performing 'any other functions as may be entrusted to it' by the COP.[6] The Geneva-based Secretariat, meanwhile, comprises over 30 professionals and support staff. In addition to information gathering and review, it is mandated: to undertake scientific and technical studies that will contribute to implementation; to prepare reports and make recommendations on implementation; and 'to perform any other function as may be entrusted to it by the Parties'.[7] The Animals and Plants Committees, composed of individual experts (usually biologists) elected on a regional basis, also play a minor role in the compliance system. Reporting to the COP and the Standing Committee (if requested), these technical bodies review the status of selected CITES species and advise on action to be taken.

Non-governmental organisations (NGOs) are also key players in the compliance system. The World Conservation Union (IUCN) and Trade Records Analysis of Fauna and Flora in Commerce (TRAFFIC)—a joint programme of the World Wide Fund for Nature (WWF) and IUCN—play central roles in aspects of compliance, including verification. Although the World Conservation Monitoring Centre (WCMC) is now part of the United Nations Environment Programme (UNEP), for 25 years it maintained the CITES database as an NGO. Other NGOs also have considerable influence in CITES, mostly through lobbying at COP meetings. Action taken under CITES to protect rhinos and tigers, for instance, resulted largely from pressure applied by NGOs.

Primary rule system

The convention regulates international trade in wildlife through a permit system that is applied to species listed in three Appendices. Appendix I is a 'black' list, prohibiting commercial trade. It includes 'all species threatened with extinction which are or may be affected by trade'.[8] Only non-commercial trade, largely for scientific and educational purposes and hunting trophies, is allowed. Appendix 2

is a 'grey' list under which commercial trade is controlled. It encompasses 'all species which although not necessarily now threatened with extinction may become so unless trade . . . is subject to strict regulation'.[9] Appendix 3 includes species listed unilaterally by parties needing international assistance to control trade.[10] Over 30,000 species are listed, mostly in Appendix 2.

Although 'mega fauna', such as elephants, whales, rhinos and tigers, tend to receive most attention, over 25,000 of the listed species are, in fact, plants.[11] The Appendices are revised at each COP meeting—a two-thirds majority is required for amendments to be adopted. Proposed changes to Appendices I and 2 are subject to review by other parties and by the Secretariat. The IUCN Species Survival Commission and TRAFFIC conduct a separate assessment, which is distributed as a formal COP document, affording them significant influence in the listing process.

All trade in listed species must have a permit or certificate, the requirements for which depend on which Appendix they are listed in. One of the most important, but rarely implemented prerequisites for Appendix I and 2 trade is a 'no-detriment' finding—that is, that trade will not be detrimental to the species' survival. CITES incorporates several exemptions, including reservations regarding the listing of a species, as well as a number of exceptions pertaining to captive bred or artificially propagated specimens and household or personal effects, for example.[12] These exemptions were designed to give CITES flexibility. However, abuse[13] has led to successive redefinitions of the exemptions by the COP. Sometimes it has narrowed the exemption; more often it has accommodated special interests to enable legitimate trade in Appendix I species through its definitions of 'captive breeding' and 'artificial propagation'.[14] Although there is no reference to a quota system in the convention, the setting of quotas—introduced initially as exceptional measures to control trade in leopard skins and African elephant ivory—is now standard practice.[15] To prevent non-parties from 'free-riding' on CITES by trading with parties outside the terms of the convention, they are required to provide 'comparable documentation'—issued by 'competent authorities'—to that of a state party.[16]

CITES is a non-self-executing treaty, meaning that national legislation is required to implement several provisions.[17] Parties are obliged to prohibit trade that contravenes the convention, and to penalise violations and confiscate specimens.[18] The convention also permits them to adopt 'stricter domestic measures' than those

mandated by the treaty itself.[19] Parties are required to designate 'one or more Management Authorities competent to grant permits or certificates' and 'one or more Scientific Authorities'.[20] The latter play an important role in verification through monitoring export permits, producing no-detriment findings and ensuring that exports are limited in order to maintain healthy populations—a form of self-certification.[21] Yet they are often under-resourced, under-staffed and, in some cases, non-existent.[22]

Compliance information system

CITES was one of the first MEAs to provide for an information system.[23] The collection, review and dissemination of data are responsibilities of the Secretariat. The regime relies largely on self-reporting by parties, but also on information supplied by NGOs and intergovernmental organisations, such as Interpol[24] and the World Customs Organisation (WCO). In addition, information may be gathered by the Secretariat during *ad hoc* visits to states parties, usually at the request of the COP or the Standing Committee.

Reporting by states parties

Parties are required to provide annual and biennial reports.[25] Annual reports are to include information on trade in CITES specimens, while biennial reports are to contain data on legislative, regulatory and administrative steps taken to enforce the agreement.[26] Emphasis has been placed on annual reporting. The two primary objectives are to monitor trade in listed species, and to provide information on compliance, particularly detection of possible illegal trade. This is done through highlighting discrepancies between reported imports and exports and by assessing compliance with quotas.[27] The biennial reporting requirement has remained largely unimplemented and little time has been devoted to pursuing the issue.[28] But difficulties in obtaining current information for the national legislation project (detailed below) have drawn attention to the lack of biennial reporting, leading to a call in 2000 for parties to submit reports.

The Secretariat is mandated to study parties' reports, to request further information, and to prepare annual reports on implementation.[29] Some of these functions are contracted out. Trade information from parties' reports is maintained in a

database by the WCMC. The database has been in existence since 1975 and some 500,000 records are added to it every year, allowing import and export records to be compared and export records to be compared with export quotas. Consequently, it provides a limited form of verification. In situations where the records do not match, or parties report possible illegal trade, the WCMC informs the Secretariat.

Annual reports are essential for analysing trade in CITES-listed species—trade studies are heavily dependent on precise and complete reporting by parties. Yet reporting has proved to be a persistent problem.[30] Either parties have failed to submit reports or they have filed them late. Alternatively, they have failed to comply with the guidelines on reporting, or they have provided incomplete or inaccurate data.[31] The 2000 assessment by the WCMC showed a decline in the number of parties reporting since 1995, making accurate and confident analysis of trade in CITES-listed species increasingly difficult.[32]

The role of NGOs

Certain NGOs have always played an important role in the functioning of the Secretariat and in the provision and review of information—the IUCN was involved in founding CITES and initially in administering the Secretariat. The legal basis for their involvement is the provision in the convention that enables the Secretariat to be 'assisted by suitable inter-governmental or non-governmental, international or national agencies or bodies technically qualified in protection, conservation and management of wild fauna and flora'.[33] This has led to the development of a close relationship between the Secretariat and those NGOs contracted for particular tasks. These include IUCN specialist groups, its Environmental Law Centre, and TRAFFIC. As well as reviewing and commenting on parties' proposals to amend the Appendices, the IUCN and TRAFFIC play a key role in reviewing the trade in, and status of, significantly traded species, as well as in examining and categorising parties' national legislation under the national legislation project (see below). The Africa Resources Trust was also contracted to develop a guide for the COP meeting in 2000 to help parties review and control significant trade in species listed in Appendix 2.

The Secretariat receives information on compliance from NGOs, either directly or indirectly via reports from states to the Secretariat.[34] Since its establishment

in 1976, TRAFFIC has collected information on illegal wildlife trade and has transmitted it to the Secretariat and national authorities. Some of those authorities report infractions to the Secretariat that were originally reported to them by TRAFFIC. Co-operation with the TRAFFIC network, consisting of 22 offices worldwide, has resulted in CITES having one of the best operational information sources of any MEA.[35] Data about illegal trade in Thailand, for instance, contributed, in part, to the Standing Committee recommending trade sanctions. Similarly, TRAFFIC was instrumental in providing information on illegal trade in Italy, and it assisted the Secretariat and the Italian CITES Management Authorities to enable Italy eventually to come into compliance.[36] TRAFFIC also maintains the Elephant Trade Information System (ETIS), which was set up to monitor the ivory trade. While other NGOs also provide information on an *ad hoc* basis, they do not have such a close relationship with the Secretariat.

Infractions reports

Under the convention, the Secretariat is required to inform parties of cases of non-compliance. In response, parties are obliged to provide 'relevant facts' and to take remedial action.[37] They are also asked to supply the Secretariat with detailed information on significant cases of illegal trade and to notify it about convicted illegal traders and persistent offenders.[38] Since 1987, the Secretariat has been compiling data from the few parties that comply with this provision, as well as from NGOs and other sources, such as Interpol and the WCO, into a Report on Alleged Infractions, which is prepared for each COP meeting. Until COP 11 in April 2000, the objectives of these detailed, publicly available reports were listed as: providing parties with a record of significant violations; identifying other enforcement problems affecting compliance; and stimulating discussion and seeking mechanisms to reduce or to eliminate problems.[39]

Two types of infraction were detailed prior to COP 11: illegal trade, commonly committed by individuals; and non-compliance by parties with the provisions of the convention.[40]

Despite some parties complaining about having their violations placed on record, infractions reports came 'to be accepted as a reliable and impartial instrument reinforcing national implementation and accountability'.[41] At COP 11, though, the

Secretariat unilaterally decided to redefine the goal of the reports as being to provide an 'overview of illicit trade and to identify significant problems relating to the issuance and acceptance of CITES documents' and henceforth to report 'only work by Parties that illustrates innovative or particularly significant enforcement action'.[42]

This decision resulted in the COP 11 report having just six pages of mostly general information, compared with almost 100 pages of detailed infractions in previous years. Only three infraction cases were mentioned in anything more than general terms. The justification for this unilateral shift was that many incidents cited previously were purportedly irrelevant to analysis of wildlife crime (betraying a misunderstanding of the term 'infractions'). Other factors cited were the discomfort felt by certain parties at having their violations put on record and by the Secretariat at the disclosure of the *modus operandi* of criminals in a publicly available document.

On-site verification through missions

As a means of verification, the CITES Secretariat conducts *ad hoc* visits or missions to parties experiencing implementation problems. The purpose is to gather information, assess problems and provide advice to national authorities. Secretariat missions to Bolivia, Greece and Italy, for example, yielded information on non-compliance that, in part, contributed to eventual recommendations for trade sanctions. Secretariat missions are also used to verify progress with implementing conditions specified for the lifting of trade sanctions. Italy and Thailand provide examples of where verification missions have been used to this effect.

Missions are only conducted with the consent of the country concerned. There is no provision for 'challenge missions' without consent. An exception was the refusal of the United Arab Emirates (UAE) to meet a Secretariat staff member sent in November 1986 to begin a dialogue over trade sanctions.[43]

The most extensive and controversial use of on-site verification by the Secretariat has been in connection with the sale to Japan of ivory stocks by Botswana, Namibia and Zimbabwe in April 1999.[44] In 1997, the African elephant populations from these three range states were downgraded to Appendix 2 status. Commercial exports of raw ivory were, however, limited to 'experimental trade' in declared stocks and subject to conditions that the Secretariat was tasked with verifying. Japan was the only permitted buyer.

The Secretariat undertook verification missions to each of the four countries and reported an almost clean bill of health to the Standing Committee.[45] Although eight other range states disagreed with some of the Secretariat's conclusions,[46] the sales went ahead, pending a further visit to Botswana. More verification missions were undertaken to oversee the auction and import of the ivory into Japan, and to check that Botswana, Namibia and Zimbabwe had reinvested revenues into elephant conservation. A final verification mission was sent to Japan in December 1999 to check on its domestic ivory controls. The Secretariat concluded that they were satisfactory.

This intensive monitoring of ivory sales through on-site verification was unprecedented. One reason for it was the controversy surrounding the auctions and the need to demonstrate that the process was strictly controlled. As well as its verification missions, the Secretariat conducted visits to 27 elephant range states in Africa and Asia to 'secure commitment' to the international system for Monitoring the Illegal Killing of Elephants (MIKE), which is currently under development.[47] Although not admitted by the Secretariat, this was clearly in response to criticism levelled by range states that they had been largely excluded from the MIKE process[48]—developed primarily by the IUCN under the auspices of the Secretariat.

Technical expert missions, organised by the Secretariat and the Standing Committee, have increasingly been used to investigate problems relating to illegal trade in high profile endangered species, particularly rhinos and tigers, in range and consumer states. These have been followed by high-level political missions that report their recommendations to the Standing Committee and the COP.[49] Technical missions—the composition of which is decided by the chair of the Standing Committee—typically consist of one or more Secretariat staff, accompanied by experts drawn from the IUCN and TRAFFIC. They examine records, conduct interviews and visit relevant sites (accompanied by governmental representatives).

Non-compliance response system

The CITES non-compliance response system has evolved over several years through COP resolutions and practice. It uses 'carrots', mostly technical assistance, strongly backed by 'sticks' in the form of trade sanctions. The Standing Committee has frequently recommended—on Secretariat advice—the suspension of trade in

Box 1 'Country-specific' non-compliance response for parties experiencing major implementation problems[1]

A) When the Secretariat requests information on an alleged infraction, parties should reply within one month or indicate a date when it can be supplied.
B) If the requested information has not been filed within one year, parties should provide the Secretariat with justification for non-response.
C) The Secretariat must work with parties to try to solve major implementation problems and to offer advice or technical assistance.
D) If a solution cannot be achieved, the Secretariat brings the matter to the attention of the Standing Committee, which may pursue it in direct contact with the party concerned. If a party does not implement Standing Committee recommendations, other parties may be advised to impose sanctions on trade in CITES-listed species with the non-compliant party.
E) The Secretariat keeps parties informed through notifications and its report of alleged infractions.

NOTES 1 Paraphrased from CITES Resolution, 'Compliance and Enforcement', Conf. 11.3 (April 2000) (formerly Resolution Conf. 7.5, October 1989). Unusually, parties have also been advised to suspend trade in CITES-listed species with three non-parties—Equatorial Guinea, El Salvador and Grenada—whose unregulated trade was undermining the convention. All of these states are now CITES parties.

CITES-listed species with offending countries, using the provision allowing parties to adopt stricter domestic measures as the legal basis. Yet, despite its key role in non-compliance response, the Standing Committee is inaccessible to most NGOs. While transparency has improved with the publication of the Committee's proceedings on the CITES website, as of October 2001 the only NGOs generally permitted to attend its meetings are the IUCN and TRAFFIC.

Two types of carrot and stick response can be identified: 'country-specific' and 'species-specific'. Within the country-specific category, further distinctions can be made between the basic procedure elaborated in 1989 for parties experiencing major problems with implementation of the convention overall, and other procedures that have evolved to address non-compliance by parties in specific areas. Within the 'species-specific' category, a distinction can be made between the review and response mechanism for significantly traded Appendix 2 species, and *ad hoc* responses that have been instigated for high profile endangered species.

Country-specific non-compliance response

In 1989, at the suggestion of the WWF, a non-compliance response procedure was introduced for parties experiencing major implementation problems (see box 1).

Although the Secretariat used a similar procedure before 1989, the existence of a formal resolution has strengthened the non-compliance response.[50] Since 1989, several cases of parties with implementation problems, including two European Union (EU) members—Greece and Italy—have been brought before the Standing Committee, resulting in suspensions of trade in CITES-listed species (see table 1). In comparison, during the 1980s, there was reluctance to act firmly against powerful but non-compliant consumer states, notably Japan and EU nations. Nearly all countries that have been subject to trade suspensions over the years have responded (at least on paper). Exceptions are the UAE, which temporarily withdrew from the convention and still presents a problem with respect to compliance, and the Democratic Republic of the Congo (DRC), which was subjected to a CITES trade suspension in June 2001.[51]

Of the procedures that have evolved to deal with non-compliance, the national legislation project, initiated in 1992, has been the most successful. Parties' legislation has been reviewed by the IUCN Environmental Law Centre and TRAFFIC USA, and has been categorised according to whether it meets all, some or none of the basic requirements for CITES implementation.[52]

Table 1 **Countries subjected to trade suspensions in CITES-listed species, 1985–2000**

Country	Recommended	Lifted
Bolivia	1985–86	1987
United Arab Emirates[1]	1985	1990
El Salvador*[2]	1986	1987
Equatorial Guinea*[3]	1988	1992
Thailand	1991	1992
Grenada*[4]	1991	1992
Italy	1992	1993[5] 1995[6]
Greece	1998	1999
Guyana	1999	1999
Senegal	1999	2000
Democratic Republic of the Congo	2001	s/f[7]

NOTES * Non-parties at the time suspensions were imposed; 1 Withdrew from CITES between 1988 and 1990; 2 Joined CITES in 1987; 3 Joined CITES in 1992; 4 Joined CITES in 1999; 5 Temporary lifting of trade suspension; 6 Permanent lifting of trade suspension; 7 Trade suspension still in force.

Table 2 **National legislation project by region**[1]

Region	Cat.1[2]	Cat.2[3]	Cat.3[4]	Analysis[5]
Africa	3	20	23	2
Asia	3	9	12	3
Central and South America & Caribbean	6	15	7	3
Europe	19	7	5	1
North America	3			
Oceania	3	1		1
Total	37	52	47	10

NOTES 1 Information as of April 2000; 2 category 1; 3 category 2; 4 category 3; 5 analysis ongoing.
SOURCE Doc. 11.21.1 Annex 2 prepared by the Secretariat for COP 11, 10–20 April 2000.

The COP (on Secretariat advice) set deadlines for parties in the second and third categories to enact adequate CITES legislation. Technical assistance was offered to those that needed it. Some complied and upgraded their legislation, although the majority did not. Eventually, the COP recommended that trade in CITES-listed species should be suspended, at the discretion of the Standing Committee, with seven non-compliant third category parties identified as having a significant level of CITES trade if they did not comply by 9 June 1998.[53] The countries concerned were: Egypt, Guyana, Indonesia, Malaysia–Sabah, Nicaragua, Senegal and the DRC. The Secretariat was given the role of verifying progress.[54] Five states responded to the mere threat of sanctions, while Guyana and Senegal took remedial action within months of trade sanctions being applied.[55]

CITES is unique among MEAs in its use of trade restrictions against parties solely on the grounds that they have inadequate implementing legislation. The national legislation project revealed that about 75 percent of parties reviewed between 1992 and 1999 did not have the full range of national legislative and administrative measures needed to implement CITES.[56] The combination of carrots, in the form of technical assistance, and sticks, in the form of threatened trade sanctions, has proved effective. Parties are slowly improving their legislation, but with 68 percent of parties still falling into categories 2 and 3 as of April 2000 there is some way to go.[57]

At COP 11, four more parties were identified as possible candidates for trade sanctions—Fiji, Turkey, Vietnam and Yemen. All other category 2 and 3 parties were required to enact CITES legislation by COP 12 in November 2002. The task of deciding whether trade suspensions should be recommended against non-compliant parties has been delegated to the Standing Committee, with the Secretariat verifying progress in upgrading legislation. A legal capacity-building strategy has also been approved. For instance, national experts will be trained at regional workshops.[58]

Trade suspensions have also been recommended against parties that persistently fail to comply with reporting requirements. Failure to report, as well as the submission of inaccurate and incomplete reports, was highlighted by the Secretariat as a major area of concern at COP 11.[59] On its advice, the COP decided that trade in CITES-listed species should be suspended with parties that have failed to provide annual reports for three consecutive years without adequate justification.[60] Fifty-three mostly developing country parties were later warned by the Secretariat that if their annual reports were not received by specified dates they might be subject to a Standing Committee recommendation to suspend trade.[61] In the event, however, the Committee, expressing discomfort with the COP decision, did not propose sanctions for the 20 countries that failed to respond to the warning. Instead, it instructed the Secretariat to prepare for consideration at its next meeting an analysis of the actions that might be taken in response to problems of non-compliance, such as the late or non-submission of annual reports, prompting questions over the extent of the Committee's discretion in implementing COP recommendations.

Parties failing to designate Scientific Authorities have also been subject to trade suspensions. Following a COP 10 resolution recommending that parties not accept export permits from countries that have not informed the Secretariat of the establishment of their Scientific Authorities, the Secretariat warned 10 states that they should designate Scientific Authorities by particular deadlines to avoid sanctions.[62] Parties were notified in March 1999 that export permits should not be accepted from Afghanistan and Rwanda until information about their Scientific Authorities had been published in the CITES Directory.[63] Neither of these countries appears to have complied.[64] Meanwhile, a programme to provide assistance to Scientific Authorities to improve their implementation of the convention is currently being developed by the Secretariat in association with the IUCN.

Species-specific non-compliance response

The main form of species-specific non-compliance response is through the significant trade review mechanism for Appendix 2 species. Dating back to 1983, the mechanism, introduced initially for animals, has become increasingly complicated as a result of successive revisions and the introduction of plants. In essence, it involves selection by the WCMC of a candidate list of significantly traded species using the CITES database; selection from the list by the Animals and Plants Committees of species to be reviewed through desk studies by consultants, usually from the IUCN and/or TRAFFIC; and categorisation of the species according to whether CITES trade controls are being implemented.

If sufficient information is available on a particular species, the relevant Animals or Plants Committee consults with the Secretariat and makes primary recommendations (such as export quotas) and secondary recommendations (such as field studies). Parties are given 90 days to implement primary recommendations and 12 months to introduce the less urgent secondary recommendations. If too little is known about a species, range states are given two years to carry out status assessments, during which time conservative quotas are set. Once the assessments are complete, the Animals and Plants Committees make primary and secondary recommendations in consultation with the Secretariat, with the same deadlines for their implementation. If range states fail to apply the quotas, complete the status assessments or employ the primary or secondary recommendations within the specified time limits, the Secretariat can recommend to the Standing Committee that 'all Parties immediately take strict measures, including as appropriate suspension of trade in the affected species with that Party'.[65] The Secretariat is responsible for verifying implementation of recommendations, and reporting on species previously reviewed or eliminated from the process, in order to allow for their reintroduction into the mechanism, if necessary.

The non-compliance response element, enabling the Standing Committee to recommend suspension of trade in affected species for non-compliant parties, was introduced in 1992 (initially for animals). The following year, the Standing Committee recommended that imports of specified species from 16 states should be suspended until the Secretariat had determined that primary and secondary recommendations had been implemented.[66] The Committee also agreed that non-

parties could be subject to the process.[67] Since then, the list of parties subject to species-specific trade suspensions has been continually updated, as states comply, or fail to comply, with primary and secondary recommendations. As of COP 11, Standing Committee recommendations for suspension of imports affected 16 species and two genera (groups of species), and involved 16 countries, three of which were non-parties.[68]

The other form of species-specific response for high profile endangered species has been employed on an *ad hoc* basis for rhinos and tigers that have been driven to near extinction by illegal trade in their body parts. Following intense NGO lobbying and calls for sanctions against consumer states, the rhino, and later the tiger, were made special projects of the Standing Committee. A tentative recommendation for parties to consider sanctions against China and Taiwan was made, and minimum protection measures were agreed for implementation within a time limit.[69] Subsequently, technical missions visited consumer states to verify progress, followed by political missions reporting to the Standing Committee. The outcome was a recommendation for trade sanctions against Taiwan but not against China—a decision that some observers criticised as inequitable. The process was helped by the US certification of China and Taiwan under the Pelly Amendment (passed by the US Congress in 1967), resulting in a ban on imports of wildlife products from Taiwan.[70] Eventually, all consumer countries responded to pressure and went some way toward improving trade controls.

In response to the need for further action on tigers, the Standing Committee authorised more technical and political missions. The technical mission was led by the Secretariat and included staff from TRAFFIC and members of Environment Canada's wildlife enforcement division. Meanwhile, the chair of the Standing Committee led the political mission.[71] They resulted, *inter alia,* in the creation of a Tiger Enforcement Task Force (TETF), composed of enforcement officials from range and consumer states and co-ordinated by the Secretariat. Aiming to combat illicit trade in tigers and their parts, the TETF will provide technical advice on wildlife crime and illicit trade, as well as intelligence support to parties. India, which was heavily criticised by the political mission and narrowly avoided the imposition of trade restrictions, hosted the first meeting of the TETF in April 2001.[72]

Conclusion

The CITES compliance system has evolved over many years through the accretion of 'soft law' and practice. Central to its operation are the Secretariat and the Standing Committee. The former wields considerable power, since not only does it review and verify information, but it also makes recommendations to the COP and the Standing Committee, which on occasion are far reaching and are often acted on. This distinguishes CITES from other more recent MEAs, such as the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer and the 1997 Kyoto Protocol to the 1992 United Nations Framework Convention on Climate Change. These accords delegate (or propose to delegate) recommendatory functions on compliance to a special implementation or compliance committee made up of state party representatives from different regions.[73]

While it is recognised that there cannot be a single formula for all compliance systems, some form of implementation or compliance committee, in addition to a secretariat, is now an accepted institutional necessity for MEAs that commit parties to specific undertakings. The CITES Standing Committee performs this task as part of an increasingly busy agenda, which squeezes compliance matters between finance, administration and other delegated executive functions. Of necessity a political body, the Committee has sometimes been criticised for dealing with non-compliant countries inequitably, and, in the case of national reporting, for failing to address the issue at all. A dedicated compliance or implementation committee, preferably composed of independent experts, or at least party representatives with relevant expertise, may go some way towards addressing these shortcomings. The lack of such a committee for CITES also prevents experts (generally lawyers and law enforcement officers) from influencing the convention in a consistent and formal way, and concentrates power in the hands of the Secretariat. This can be an advantage if the Secretariat's power is applied neutrally and within the bounds of its mandate. While this is generally the case, the Secretariat has occasionally over-stepped its remit: its unilateral decision to reform the infraction report is just one example. The International Institute for Sustainable Development commented in December 2000 that, 'Despite the Secretariat's self-description as "humble servants to the Parties", many believe that it is subtly stretching its powers to a level of involvement not witnessed in other international environmental fora'.[74]

A compliance or implementation committee would not only formally empower other experts, but it would also focus more attention on, and, significantly, generate funding for improving state party implementation of CITES.

The CITES compliance system has made increasing use of trade sanctions against non-compliant parties and non-parties. The sanctions have generally elicited the required response. Yet, given that there is no systematic, only *ad hoc,* on-site verification for checking that parties have complied, the true success of the system cannot be assessed. It needs to be judged against the inherent weaknesses of the compliance system. One weakness is poor annual reporting by the parties, undermining the convention's main information base. Other flaws include the lack of transparency of the Standing Committee through exclusion of NGOs (except the IUCN and TRAFFIC) from meetings and the inadequacy of national implementation. While the latter is slowly improving as a result of the national legislation project, there is no equivalent programme aimed at systematically reviewing and improving the capacity of parties to enforce their legislation—a capacity that is widely assumed to be poor, particularly among developing countries. All these weaknesses need to be redressed if CITES is to achieve its goal. Not only will the compliance system benefit, but, more importantly, the wildlife that the convention aims to protect stand more chance of surviving into the future.

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Endnotes

[1] The contents of this chapter have been extracted and summarised from a forthcoming book by the author: *Policing Trade in Endangered Species: The CITES Treaty and Compliance,* Earthscan/Royal Institute of International Affairs, London (spring 2002).

[2] Organisation for Economic Co-operation and Development (OECD), 'Experience with the use of Trade Measures in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)', 1997. See www.oecd.org.

[3] Ronald B. Mitchell, 'Compliance Theory: An Overview', in James Cameron, Jacob Werksman and Peter Roderick (eds.), *Improving Compliance with International Environmental Law*, Earthscan, 1996, p. 17.

[4] Mitchell, p. 17.

[5] As of 2000, the regional representatives on the Standing Committee are:

- **Africa** Burkina Faso, South Africa, Tanzania and Tunisia;
- **Asia** China and Saudi Arabia;
- **Central and South America and the Caribbean** Ecuador, Panama and St Lucia;
- **Europe** France, Italy and Norway;
- **North America** United States; and
- **Oceania** Australia.

Other Standing Committee members are Switzerland, the Depositary of the convention, and Chile, the host of the next COP (COP 12).

[6] CITES Resolution, Establishment of the Standing Committee of the Conference of the Parties, Conf. 11.1 Annex 1, April 2000.

[7] CITES Article XII.

[8] CITES Article II.1.

[9] CITES Article II.2.

[10] CITES Article II.3.

[11] OECD, p. 17, quoting CITES trade statistics from the Wildlife Conservation Monitoring Centre, Cambridge.

[12] CITES Article VII.

[13] Simon Lyster, *International Wildlife Law,* Grotius, 1985, p. 256; Peter H. Sand, 'Commodity or Taboo? International Regulation of Trade in Endangered Species', *Green Globe Yearbook,* 1997, p. 22; Gwyneth G. Stewart, 'Enforcement problems in the endangered species convention: reservations regarding the reservation clauses', *Cornell International Law Journal,* 1981, vol. 14 , p. 429; Paul Matthews, 'Problems Related to the Convention on the International Trade in Endangered Species', *International and Comparative Law Quarterly,* 1996, vol. 45, p. 421; Valerie Karno, 'Protection of endangered gorillas and chimpanzees in international trade: can CITES help?', *Hastings International and Comparative Law Review,* 1991, vol. 14, pp. 989–1015:1002.

[14] Sand, p. 22.

[15] Willem Wijnstekers, *The Evolution of CITES: A Reference to the Convention on International Trade in Endangered Species of Wild Fauna and Flora,* CITES Secretariat, 1995, p. 11 and p. 303; Sand, p. 22; Martijn Wilder, 'Quota systems in international wildlife and fisheries regimes', *Journal of Environment and Development,* 1995, vol. 4, no. 2, p. 55.

[16] CITES Article X.

[17] Cyrille de Klemm, *Guidelines for Legislation to Implement CITES*, IUCN Environmental Policy and Law Paper No. 26, IUCN–The World Conservation Union, 1993.

[18] CITES Articles II.4 and VIII.1.

[19] CITES Article XIV.1.

[20] CITES Article IX.1.

[21] CITES Articles III and IV.
[22] The Infractions Reports prepared for COP 7, 8 and 9 noted that 15, five and 10 parties, respectively, had not identified Scientific Authorities.
[23] Farhana Yamin and Annabella L. Gualdoni, 'A case study of a regional approach to compliance with CITES in southern Africa', in James Cameron, Jacob Werksman and Peter Roderick (eds.), *Improving Compliance with International Environmental Law*, Earthscan, 1996, pp. 187–218:188.
[24] The International Criminal Police Organisation.
[25] CITES Article VIII.7. Wijnstekers, p. 191.
[26] CITES Article VIII.
[27] John Caldwell and Lorraine Collins, 'A Report on Annual Reports Submitted by the Parties to CITES', CITES Doc. 10.26 Annex, prepared for COP 10, 9–20 June 1997. Updated by Jonathan Harwood, 'A Report on Annual Reports Submitted by the Parties to CITES', CITES Doc.11.19 Annex 2, prepared for COP 11, 10–20 April 2000.
[28] Many annual reports contain some or all of the information required in biennial reports. CITES Doc. 7.19, 'Report on National Reports under Article VIII, Paragraph 7, of the Convention', prepared by the Secretariat for COP 7, 9–20 October 1989; CITES Doc. 9.24 (Rev.), 'National Laws for Implementation of the Convention', prepared by the Secretariat for COP 9, 7–18 November 1994.
[29] CITES Article XII.
[30] The many resolutions on reporting back this up. See CITES Resolutions Conf. 2.16 on 'Periodic Reports' (1979), Conf. 3.10 on 'Review and Harmonization of Annual Reports' (1981), Conf. 5.4 on 'Periodic Reports' (1985), and Conf. 8.7 on 'Submission of Annual Reports' (1992); also see Resolution Conf. 11.17, 'Annual Reports and Monitoring of Trade' (2000).
[31] CITES Doc. 8.17 (Rev.), 'Report on National Reports Under Article VIII, Paragraph 7, of the Convention', prepared by the Secretariat for COP 8, 2–13 March 1992.
[32] Harwood.
[33] CITES Article XII.
[34] John Lanchbery, 'Long-term trends in systems for implementation review in international agreements on fauna and flora', in David G. Victor, Kal Raustiala and Eugene B. Skolnikoff (eds.), *The Implementation and Effectiveness of International Environmental Commitments,* International Institute for Applied Systems Analysis, 1998, p. 71.
[35] Sand, p. 25.
[36] Rosalind Reeve, *CITES and Compliance: Past, Present and Future*, David Shepherd Conservation Foundation, 2000, p. 24 and p. 27.
[37] CITES Article XIII.
[38] CITES Resolution Conf. 9.8 (Rev) (June 1997), now incorporated into Resolution Conf. 11.3 'Compliance and Enforcement' (April 2000).
[39] CITES Doc. 8.19 (Rev.), 'Review of Alleged Infractions and Other Problems of Enforcement of the Convention', prepared by the Secretariat for COP 8 (hereinafter 'COP 8 Infractions Report').
[40] CITES Doc. 10.28, 'Review of Alleged Infractions and Other Problems of Implementation of the Convention', prepared by the Secretariat for COP 10 (hereinafter 'COP 10 Infractions Report').
[41] Sand, p. 25.
[42] CITES Doc. 11.20.1, 'Review of Alleged Infractions and Other Problems of Implementation of the Convention', prepared by the Secretariat for COP 11 (hereinafter 'COP 11 Infractions Report').
[43] Reeve, *CITES and Compliance: Past, Present and Future*, p. 21.
[44] For a description of the sales and verification missions, see CITES Doc. 11.31.1, 'Experimental Trade in Raw Ivory of Populations in Appendix II', prepared by the Secretariat for COP 11.
[45] CITES Doc. SC.41.6.1 (Rev) Annex 2, 'Report of the Secretariat's Mission to Verify Compliance with

Decision 10.1, Part A by Botswana, Japan, Namibia and Zimbabwe', prepared for SC41, 8–12 February 1999.
[46] CITES Inf. SC.41.12, Letter to the Standing Committee from Burkina Faso, Chad, Congo-Brazzaville, Ghana, Kenya, Liberia, Mali and Zambia, presented to SC41. Germany, India and Italy also expressed concern that the conditions for the ivory sales had not been fulfilled.
[47] CITES Doc. 11.31.2, 'Monitoring of Illegal Trade and Illegal Killing', prepared by the Secretariat for COP 11.
[48] CITES Inf. SC.41.12.
[49] Reeve, p. 42.
[50] Several notifications have referred to the implementation monitoring procedure as providing for the Secretariat to take a 'more active role in identifying enforcement problems concerning the implementation of the Convention'. See Notification to the Parties No. 595, 'Secretariat Investigations Officer' (1990); Notification to the Parties No. 630, 'CITES Enforcement Co-ordination' (1991); Notification to the Parties No. 636, 'Thailand: Ban on CITES Trade' (1991).
[51] Reeve, *Policing International Trade in Endangered Species.*
[52] CITES Doc. 10.31 (Rev.), 'National Laws for Implementation of the Convention', prepared by the Secretariat for COP 10.
[53] CITES Doc. 10.31 (Rev.).
[54] CITES Decision 10.115, Directed to the Secretariat 'Regarding implementation of Resolution Conf. 8.4', June 1997.
[55] Notification to the Parties No. 1999/75, 'Senegal: Recommendation to Suspend Trade', 21 October 1999; Notification to the Parties No. 1999/78, 'Guyana: withdrawal of the recommendation to suspend trade', 5 November 1999; CITES Doc. 11.21.2, 'National Laws for Implementation of the Convention: Measures to be Taken with Regard to Parties without Adequate Legislation', prepared by the Secretariat for COP 11; Notification to the Parties No. 2000/004, 'Senegal: withdrawal of the recommendation to suspend trade', 31 January 2000.
[56] CITES Doc. 11.21.1.
[57] CITES Doc. 11.21.1.
[58] Reeve, *The CITES Compliance System*.
[59] Harwood.
[60] CITES Decision 11.37, Directed to Parties 'Regarding annual reports', April 2000.
[61] CITES SC45 Doc. 13.1, 'Late or Non-Submission of Annual Reports', prepared by the Secretariat for SC45, 19–22 June 2001.
[62] CITES Resolution Conf. 10.3, 'Designation and Role of the Scientific Authorities' (1997). CITES Doc. SC. 41.15, 'Designation of Management and Scientific Authorities', prepared for SC41.
[63] Notification to the Parties No. 1999/24, 'Parties that have not designated Scientific Authorities', 12 March 1999.
[64] According to the directory on the CITES website, www.cites.org.
[65] CITES Resolution Conf. 8.9 (Rev.), 'Trade in Specimens of Appendix II-Species taken from the Wild' (2000), and CITES Decisions 11.106/11.117, 'Regarding implementation of Resolution Conf. 8.9 (Rev.)', (2000).
[66] Notifications to the Parties No. 737, 'Significant Trade in Animal Species Included in Appendix II: Recommendations of the Animals Committee', 20 April 1993, and No. 775, 'Significant Trade in Animal Species Included in Appendix II: Recommendations of the Animals Committee', 23 November 1993.
[67] 'Twenty-Ninth Meeting of the Standing Committee: Summary Report', 1–5 March 1993, p. 14.
[68] CITES Doc. 11.41.1 Annex 2, 'Implementation of recommendations of the Animals Committee made in accordance with Resolution Conf. 8.9', prepared by the Secretariat for COP 11.
[69] 'Decisions of the Standing Committee on Trade in Rhinoceros Horn and Tiger Specimens', in 'Thirtieth Meeting of the Standing Committee: Summary Report', 6–8 September 1993, p. 29.

[70] The US Pelly Amendment to the Fishermen's Protective Act of 1967 establishes a process that allows any person or entity to petition the US government to certify that nationals of a country are diminishing the effectiveness of an international fisheries programme or an international endangered or threatened species programme. If this determination (formally called a certification) is made, then the US president has discretionary power to impose trade sanctions against that state.

[71] CITES Doc. SC.42.10.4, 'Tiger Technical Missions', prepared by the CITES Tiger Missions Technical Team for SC42, 28 September–1 October 1999.

[72] 'UK Action Boosts the Fight to Protect Tigers', Foreign and Commonwealth Office, Department of the Environment, Transport and the Regions, press release, 31 October 2000; Environment News Service, 'New task force set to tackle tiger poaching', 3 April 2001, available at ens.lycos.com.

[73] The Montreal Protocol on Substances that Deplete the Ozone Layer has an Implementation Committee that deals with non-compliance, while the Kyoto Protocol to the United Nations Framework Convention on Climate Change is developing a compliance system that proposes a Compliance Committee with an enforcement and a facilitation branch.

[74] 'A Brief Analysis of the CITES Technical Committees Meetings', *Earth Negotiations Bulletin*, 21/17, International Institute for Sustainable Development, 18 December 2000. See www.iisd.ca.

peace agreements

9

Peace operations and the military dimensions of verification

Trevor Findlay

Despite the enormous range and volume of research into peace operations that has been carried out since the early 1990s and the increasing importance of verification and monitoring in the implementation of peace agreements, verification and monitoring remain a neglected backwater of study in the peace operations field. The conceptualisation of verification and monitoring with regard to peace agreements owes more to traditional arms control theory than to thinking about conflict resolution, while practice often owes more to standard military concepts of operations than to any innovations designed specifically with verification and monitoring in mind.

This chapter considers the verification and monitoring of peace agreements, with a focus on the military elements, whether carried out by an observer mission, a peacekeeping operation or some other type of peace undertaking mounted by the international community or some part of it. Such missions will be designed to help implement an agreement between warring parties, whether it be a simple ceasefire or a comprehensive peace agreement, using a mixture of incentives and disincentives. The latter may include some elements of peace enforcement, either through sanctions or through military action. Given such a focus, the chapter is *ipso facto* mostly concerned with United Nations (UN) operations, but other multilateral peace operations will also be considered where necessary.

Naturally, verification and monitoring can only play a role once an agreement has been reached to end armed conflict or at least curtail it. This is not to say that they cannot be attempted while fighting is continuing, as was the experience of the Kosovo Verification Mission (KVM) deployed by the Organisation for Security and Co-operation in Europe (OSCE) in 1998–99. However, such circumstances are

not ideal and usually lead to withdrawal or pressure to re-establish, or even renegotiate from scratch, the ceasefire or peace accord on which a monitoring role for outsiders is predicated.

Verification is the process by which compliance with an agreement is determined. This involves using information to make a judgement about the behaviour of the parties. While such judgements are meant in theory to be impartial, verification judgements take place in a political context: they are invariably made by a political body which perforce is obliged to take into account the political implications of any verification judgement reached.

Monitoring, on the other hand, is essentially the technical process of collecting information on which a verification judgement is to be made. It may be done remotely or on-site, by human beings or by technical means. It is, at least in theory, meant to be apolitical and impartial.

Verification theory posits several roles for verification. Although these were developed in the context of arms control and disarmament, mainly in the area of nuclear, chemical and biological weapons, they are also applicable to verification in peace operations. The three main roles of verification are: the detection of violations; the deterrence of potential violators; and confidence-building, including by allowing compliant states the opportunity to credibly demonstrate their compliance.

While 100 percent verifiability of a particular agreement is rarely achievable, verification nonetheless should raise the costs of non-compliance for a violating party. It does this by increasing the risk of exposure and subsequent sanctioning, both by other parties and by the international community generally, and by forcing a determined violator to expend more resources in attempting to conceal a violation. Verification also serves the interests of compliant parties by providing early warning of potential or actual violations, permitting them to take precautionary steps or countermeasures, and by providing a sound legal or quasi-legal basis for undertaking unilateral or collective action against violators.

Verification and monitoring in peace operations

Verification and monitoring can be applied to a whole range of elements that make up a peace implementation process, most notably electoral, human rights and civilian police aspects. However, the monitoring and verification of the military

aspects of peace operations has the longest lineage of all. Ceasefire agreements historically have often provided for monitoring by a neutral third party.

Essentially any military aspect of peace agreements can be verified, provided there is some type of accord that sets benchmarks or standards against which the behaviour of parties can be judged and verification decisions made. Oddly, even though verification judgements have been frequently made in assessing compliance with peace agreements, it is only relatively recently that the term 'verification' has been used in relation to them. There seems to have been a preference for describing peace agreements as being 'monitored', apparently because the term was perceived as not having the same connotations of rigour and coercion as 'verification'.

There are significant differences between the verification of arms control and disarmament agreements on the one hand and of peace agreements on the other. The verification of peace agreements is usually less well defined and less well organised than is the case with arms control agreements. Particularly in the case of arms control agreements dealing with weapons of mass destruction, where even minor breaches can have enormous strategic and political implications, verification systems are minutely negotiated and highly organised. In peace agreements there is almost an expectation of imperfection, since it is recognised that during the winding down of armed conflict there is often a period of prolonged uncertainty before the situation settles down. Minor infractions are often overlooked on the grounds that they may not necessarily presage the emergence of more significant challenges to an agreement and that to overreact to them might jeopardise the continuing peace process. In the implementation of peace agreements there is often an expectation that monitoring and verification activities will not be prolonged and that therefore they can be makeshift and hence easily terminated. In arms control it is at least implicitly recognised that monitoring may be required in perpetuity. More robust systems therefore tend to be instituted.

Perhaps the most crucial difference is that the monitoring and verification of peace agreements is but a small part of a larger process designed to move the status quo—the end of fighting—towards a sustainable peace. As long as the process is moving in the right direction, monitoring and verification need not be fetishised, as sometimes appears to be the case in arms control and disarmament. In arms control and disarmament, verification and monitoring are usually directed at pre-

serving the status quo once a particular level of armaments has been reached or their absence has been established.

Notwithstanding these differences, there are also strong similarities between the fields of arms control and disarmament and peace agreements. Impartiality, transparency and confidence-building are leitmotifs of monitoring and verification in both cases. Also in both cases the verification of declared items is easier than the verification of non-declared items. And finally, in both fields, monitoring and verification are devoted to discovering veracity in an essentially political context, in which allegation and counter-allegation can rapidly sour the atmosphere of trust that monitoring and verification are designed to establish and sustain.

Traditional verification and monitoring activities

The most conspicuous verification and monitoring activity and the one most often associated with the early UN peacekeeping missions, such as those in the Middle East, was the monitoring of a ceasefire line. This simply involved the stationing of peacekeepers along the line, equipped with the normal military means of surveillance and detection. As time went on, fixed monitoring positions would be established. Often the whole monitoring environment would become entrenched, static, increasingly routine and neglected in terms of funding and personnel. An example is the UN Military Observer Group in India and Pakistan (UNMOGIP), which has languished in the disputed state of Jammu and Kashmir since 1949.[1] Nonetheless, the mission continues to file reports with the UN Security Council about violations of the so-called ceasefire between the two states. Another example is the UN Disengagement Observer Force (UNDOF), established in 1974, which observes the ceasefire and buffer zone between Israel and Syria.

Such monitoring missions are not only often neglected, but they are usually detached from any political processes which may be going on around them. While, in addition to their monitoring activities, they may engage in limited local 'peacemaking', between local communities or between low-level military commanders or factions, or may even indulge in limited peace-building through assisting local communities with medical support or modest aid projects, they are essentially divorced from the larger political issues at stake. Indeed, they can often become pawns in a larger political game, as has been the fate of the inaptly named UN

Interim Force in Lebanon (UNIFIL), which has been alternately ignored, attacked and manipulated by the Israelis, the Syrians, the Lebanese and their various factions since being deployed in 1978.

Post-Cold War missions: new roles for verification and monitoring

The end of the Cold War resulted in more peace operations, of greater complexity and size, often integrating a number of implementation tasks in one operation.[2] Peace missions suddenly became an integral part of comprehensive peace processes rather than mere stopgap measures to allow political processes to begin. In these missions, such as those in Cambodia, Somalia, the former Yugoslavia, East Timor and Kosovo, monitoring and verification came to be part of a much larger undertaking rather than the main undertaking. In such missions, however, monitoring and verification have paradoxically become politically more important, because such means are used to determine not simply the compliance of the parties to the agreement, but the success of the mission and its progress through various stages of an evolving and complex peace process. Such a process often aims at nothing less than the re-establishment of democratic governance, the rule of law and respect for human rights.

For example, in Cambodia in 1994 military observers (MilObs) on the Thai–Cambodian border were able to prove through their monitoring activities that the arms embargo imposed on the Cambodian parties was being violated by Thai military personnel supplying arms to the Khmer Rouge.[3] Since Thailand was also a key party to the 1991 Paris Peace Accords on Cambodia, public exposure of Thailand risked undermining the whole peace process. The issue eventually went all the way to the UN Security Council, resulting in political pressure, mostly on a bilateral basis by the US, being applied to the Thais. Similarly, the political importance of monitoring and verification was highlighted when the UN Transitional Authority in Cambodia (UNTAC) was obliged to undertake strenuous efforts, including the dispatch of verification teams throughout the country, to verify that no Vietnamese soldiers remained there after their announced withdrawal.[4] A failure to disprove Khmer Rouge allegations in this matter would have given credence to the guerrilla group's allegations that the peace process as a whole was stacked against them, including through the illicit presence of Vietnamese forces.

The greater importance of monitoring and verification in peace operations today is due not just to a higher political salience but to the heightened media attention paid to peace operations and the instantaneity of the transmission of information. An incident that violates or is presumed to violate a peace accord can be flashed by the news media around the world before a peace mission has had time to investigate it thoroughly and make a sober assessment of its significance. Peace missions have thus been required to improve their monitoring and verification capabilities, and their capacity to deal with alleged violations.

The military aspects of verification and monitoring

While, overall, more and more aspects of peace processes are being subjected to monitoring and verification, military matters remain at the forefront. Military aspects of a peace process that may require monitoring and verification include: the ceasefire and separation of forces; the withdrawal of forces; the establishment of buffer zones or demilitarised zones; disarmament; cantonment; demilitarisation; demobilisation; the reintegration of armed personnel into society; and arms embargoes.

The increasing demands on peace operations for monitoring and verification have appeared at the same time as other demands have been imposed on the military and other components of peace operations. For instance, unlike during the Cold War, military observers can today be involved in assisting in the negotiation of accords as well as overseeing their implementation. In both Cambodia and Mozambique, UN MilObs offered technical advice on the ceasefire-monitoring aspects of the peace agreement as it was being negotiated. Such involvement helps to ensure that monitoring and verification tasks are realistic, affordable and manageable within a given time frame. This situation is quite different from that found in the arms control and disarmament world, where implementation and verification functions, for instance, within international implementation bodies, are normally kept quite distinct.

As in arms control agreements, the easiest task of monitors in peace agreements is to confirm the presence or absence of declared items or activities (for example, surrendered weaponry or numbers of troops deployed along a border). It is much more difficult to verify the existence of undeclared items or activity, since it is

impossible for verification to prove a negative. In Kosovo, for instance, although the Kosovo Liberation Army (KLA) committed itself to surrendering all its weaponry once the province came under UN and North Atlantic Treaty Organisation (NATO) control, in fact it has proved impossible to verify complete compliance with this undertaking. In Northern Ireland it has proved possible to verify that a limited number of arms identified by the Irish Republican Army (IRA) and sealed in arms dumps have not been used between visits by international inspectors and that they have been put 'beyond use'; but it has not proved possible to determine what proportion of the total IRA holdings this amounts to, since that has not been declared.[5] Verification of the total amount is not therefore in prospect. As in the Northern Ireland case, this can cause significant political problems.

Jane Boulden has identified what she terms 'multi-layered verification packages' for military monitoring operations, in which each element has its own purpose but supports all the others.[6] The package includes:

- observers;
- information provided by the parties (baseline data);
- inspections to confirm the accuracy of information (baseline inspections);
- data provided by outside parties;
- ongoing inspections;
- patrols and observation in the case of ceasefires and agreed troop levels or positions;
- aerial surveillance;
- other remote monitoring, including by automatic sensors; and
- a joint commission process.

Such 'packages' include a chain of command for dealing with reported and alleged violations. Violations that are sufficiently serious and which cannot be handled in the field are usually reported to field headquarters, both to the military commander and to the representative of the UN Secretary-General or other 'political' representative in the case of non-UN missions. Often some type of liaison body, or joint commission, comprised of representatives of the parties to the conflict as well as of the mission, will have been established to handle allegations of non-compliance. In Cambodia this was called a Military Mixed Commission. However, it may also

be a civilian body, such as the so-called Security Committee established in Somalia by the US Special Envoy to Somalia, Robert Oakley, during the US-led United Task Force (UNITAF) intervention in 1992–93.[7]

If violations are serious and persistent, UN headquarters in New York and the UN Secretary-General will be notified. Political pressure may then be applied to the party or parties concerned. If this fails to rectify the situation, the Secretary-General may report to the Security Council, which could take appropriate action, such as imposing sanctions. In any event, the Council is kept informed of all notable violations through regular reports by the Secretary-General on the progress of each peace operation in the field.

Military observers

Military observers tend to be the backbone of monitoring and verification in respect of peace accords. They are usually unarmed and may or may not be in military uniform (although they may sometimes be in civilian uniforms).[8] They may be deployed and organised separately from the regular peacekeeping contingents which may be deployed in the same theatre contemporaneously. In this way they maintain their separate identity, which can be seen as enhancing their impartiality. A MilObs force often made up of individual officers from a wide variety of nations.

Many of the problems encountered by military observers in the field reflect those which civilian police monitors encounter. They lack the level of military support that fielded battalions of peacekeepers have, their chain of command is usually less robust and they are often deployed in remote locations. They are also vulnerable to attack, hostage-taking, harassment and, perhaps surprisingly, boredom. Since they are forward-deployed and often unarmed, they are a vulnerable target for warring factions wishing to put pressure on a peace operation as a whole, as happened in Bosnia during the deployment of the UN Protection Force (UNPROFOR) in the mid-1990s.

Naval and air forces

Aside from military observers on the ground, naval and air forces are increasingly being used in monitoring and verification tasks. Naval forces have helped monitor, for example, the arms embargo imposed on the states of the former Yugoslavia.[9]

In the case of the UN Special Commission (UNSCOM) for Iraq, which for several years monitored Iraqi compliance with a key aspect of the Gulf War ceasefire agreement—Iraq's pledge to dismantle its weapons of mass destruction capabilities—the US Air Force actually loaned a U-2 aircraft to the monitoring body to assist in its verification effort. The acquisition by an international body of such a powerful monitoring tool was unprecedented.

Less powerful but nonetheless significant air monitoring capabilities are envisaged under the 1992 Open Skies Agreement. The agreement, which is likely to enter into force in the near future, opens the entire territory of each state party to aerial observation by any other state party, using unarmed fixed-wing aircraft with an agreed suite of sensors and fixed-imagery resolutions.[10] Day and night capability is available. In addition to using such capabilities for monitoring compliance with arms control and disarmament agreements, Open Skies can also be used to monitor peace agreements involving the parties. Although the sensor resolutions have been set to permit detection and identification of heavy conventional weaponry, such as tanks, helicopters and artillery pieces, they could also detect large-scale troop movements. In addition to the 25 European states that negotiated the treaty, Open Skies is currently open to any former Soviet state that did not participate in the negotiations and, after it enters into force, any member of the OSCE. In future any state may apply to the Open Skies Consultative Commission to join.

Monitoring and intelligence

Since monitoring is essentially the gathering of information, it has some similarities with intelligence-gathering. Traditionally, the UN and other international bodies have officially been averse to intelligence-gathering to support their verification functions. However, the UN has often collected information surreptitiously and unofficially, as in the case of its peacekeeping mission in the Congo in the 1960s, or relied on national contingents to provide the necessary information. Increasingly it is being recognised by the UN that intelligence information, whether it calls it that or not, is essential in the most difficult monitoring cases, such as that of Iraq. Quite apart from helping to ensure the safety of its personnel, intelligence information can immeasurably bolster the UN's credibility in determining compliance with a peace agreement.

Yet there remain continuing dilemmas over the UN's use of intelligence information and its involvement in collecting it, especially with regard to the tension between the UN's advocacy of transparency and the requirement for secrecy in intelligence-gathering. Since peace operations are designed to increase the confidence of the parties involved that the implementation of a peace process is proceeding fairly and effectively, particularly by encouraging transparency in military matters, it would appear to be counterproductive for the UN to be gathering and using secret information. The UN in any event often lacks personnel who are competent to interpret intelligence information, especially that which may be foisted on it by a party with its own agenda. It may, moreover, be impossible to use secret information for verification purposes, since a decision on non-compliance has to be based on information that can be released. A determination that a party is in serious breach of its obligations needs to be shown to be just and safe in the court of international opinion.

The use of force

The increasing use of force in peace operations, both by parties to the conflict and by the military component of peace operations, can have a profound effect on the monitoring and verification environment. The substantial use of force can render monitoring and verification activities completely useless (because conditions are changing too quickly) or impossible (because access is completely denied). The parties to a conflict may be unable or unwilling to distinguish between military observers and normal peacekeeping troops, regarding them all as part of the UN 'machine'. Military observers are vulnerable to being taken hostage or killed, as in Sierra Leone and Bosnia. They are more vulnerable even than lightly armed peacekeepers because they are unarmed and often deployed in small numbers in remote locations. States have increasingly proved unwilling to provide MilObs for UN missions as a result of the apparent increase in the dangers they face. Providing military protection for MilObs would draw resources away from other peacekeeping tasks or require larger deployments of armed peacekeepers. While technology may be able to supplant or supplement some of the monitoring functions of human observers, thereby lessening the element of danger, they are unlikely ever to be entirely replaced.

Techniques and technology

It is perhaps surprising, given the capacity of new technologies, that the monitoring and verification of the military aspects of peace operations is still so dependent on the humble human observer. Apart from improved military surveillance capabilities which come with national troop contingents (for example, night vision goggles and better communications), there has been little recognition that technology may play a larger, more systematic role in cooperative multilateral verification missions.[11] One notable exception is the long-standing non-UN mission in the Sinai, the Multilateral Force and Observers (MFO), which from its inception in 1982 has used relatively high technology, including ground sensors and aerial imagery, for monitoring and verification purposes.[12]

There are a number of ways in which technology could help improve monitoring and verification of the military aspects of peace missions in the future:

- the use of satellite reconnaissance with increasingly sophisticated sensors and improved resolution (commercial satellites are now supplying information comparable to that of the early military satellites, at low cost and to any customer);[13]
- manned or unmanned overflights at high altitudes, using such aircraft as the U-2 employed by UNSCOM, or at lower levels using such craft as the US Global Hawk unmanned vehicle or, better still, the cheap micro-craft currently under development;[14]
- ground sensors and automatic sentries, linked to monitoring centres, which can help reduce the number of ground troops needed;[15]
- information technology (IT), including data fusion techniques;
- use of the Global Positioning System (GPS), which is no longer subject to signal degradation by the US military, to pinpoint monitoring stations, objects of observation and violations more accurately;[16]
- electronic communications, including the Internet, e-mail and mobile telephony, to speed the monitoring process, the verification decision-making process and the implementation of compliance measures;
- hand-held detectors for detecting and monitoring landmines, unexploded ordnance and chemical and biological warfare agents; and
- underground radar to detect hidden caches of weapons.[17]

There are several problems for UN and other multilateral forces in attempting to deploy and use new monitoring and verification technologies. First, it can be expensive, although the cost of new technology often declines rapidly once it becomes widely available. Second, expert training is needed to permit personnel to use advanced technology, especially when troops are drawn from a wide variety of countries and military backgrounds. In UN operations training is often seriously lacking even for conventional military tasks. Third, new technology may produce information overload, overwhelming the capacity of missions in the field to successfully use the information that becomes available. Peace missions will need to invest in analytical capabilities as well as data-gathering ones. Fourth, technology may come to be deployed and used for its own sake, rather than as a useful adjunct to human capabilities. Technology may not be as flexible or creative as human monitors, who can be readily switched to different tasks, who may notice activities for which they are not programmed and who will understand the subtleties of situations better.

Monitoring the monitors: regional peace operations with UN oversight

There have now been several instances of regional peacekeeping operations being monitored by small UN monitoring missions to ensure that they fulfil their mandate properly and act according to agreed peacekeeping procedures and standards. The regional missions have in all these instances been dominated by the military component and military tasks rather than the full range of personnel and activities found in comprehensive UN missions. Hence these are mostly cases of (UN) military personnel observing the activities of other (regional) military personnel. One of the most prominent and controversial examples to date is the UN Observer Mission in Liberia (UNOMIL), which from 1993–97 observed the troubled peacekeeping operation mounted by a regional organisation, the Economic Organization of West African States (ECOMOG). Another example is the UN Mission of Observers in Tajikistan (UNMOT), which to this day monitors the activities of a peacekeeping mission fielded by the Commonwealth of Independent States (CIS). These are difficult undertakings, since regional organisations are often dominated by a local hegemon—Nigeria and Russia in the aforementioned cases—making the regional operations less multilateral than the UN would normally counte-

nance. The regional operation is thus inevitably less impartial and more subject to national political and military agendas than a pure UN operation. While the presence of another monitoring mission fielded by the UN may add an extra layer of complexity to what might already be a complex monitoring environment, by 'monitoring the monitors' such UN missions can be a cost-effective use of limited UN resources. The alternative may be the deployment of a full-scale UN mission.

Conclusion

Monitoring and verification are playing increasingly important roles in the military aspects of peace operations. As comprehensive efforts are made to resolve armed conflict through substantial peace operations, so it becomes more necessary to ensure that compliance difficulties do not jeopardise the major investment that the international community is obliged to make. Despite their increased importance, however, the basic concepts behind monitoring and verification have remained the same over the past decade. Like peacekeeping in general, monitoring missions always start from scratch, they are assembled piece by piece using voluntary contributions and they rarely have sufficient human or financial resources to undertake their mission effectively and efficiently. They tend to be low-technology operations, reliant on the unarmed, often untrained, military observer for their effectiveness. This can no longer be acceptable in situations where the stakes in achieving a successful conflict resolution outcome are so high. Hence there is a need for professionalisation, training, lessons-learned activities, centres of excellence, the drafting of operational manuals and concepts of operation, and the use of appropriate technology. There is also a need for the yawning gap in academic studies to be filled and the issues of verification and monitoring should be placed higher on the research agenda.

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Endnotes

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[5] See David Lister and Phillip Webster, 'Peace Gets Another Chance', *The Times,* 24 October 2001, p. 1.

[6] Jane Boulden, 'Monitoring and Verifying the Military Aspects of Peace Accords' in Trevor Findlay (ed.), *Verification Yearbook 2000,* Verification Research, Training and Information Centre (VERTIC), London, December 2000, pp. 175–176.

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[8] For example, the members of the International Presence in Hebron (TIPH), first deployed in 1997, wear distinctive white uniforms.

[9] See J. Ginifer, 'The UN At Sea? The New Relevance of Maritime Pperations', *International Peacekeeping*, vol. 1, no. 3, autumn 1994, pp. 320–335.

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[12] Brian S. Mandell, *The Sinai Experience: Lessons in Multimethod Arms Control Verification and Risk Management,* Arms Control Verification Studies no. 3, Department of External Affairs, Ottawa, 1987.

[13] See Bhupendra Jasani, 'Remote Monitoring from Space' in *Verification Yearbook 2000,* pp. 200–213. The US government in December 2000 licensed a Colorado company, Space Imaging, to sell extremely high-resolution photographs to customers worldwide, effectively relinquishing the monopoly that the intelligence agencies previously had over precision imagery from space (*International Herald Tribune,* 18 December 2000, p. 3).

[14] See 'Backpack Drone that Sees behind Enemy Lines', *New Scientist,* 21 October 2000, p. 10.

[15] See the report on British research into remote sentries in H. McManners, *The Times,* 4 October 1998, p. 8.

[16] US President Bill Clinton announced on 1 May 2000 that the US had switched off the built-in error signal—called Selective Availability—in the GPS. This makes the system10 times more accurate for all users. The US maintains the ability to deny access to GPS in future if it believes that US national security is threatened. See 'Getting a Better Fix', *New Scientist,* 6 May 2000, p. 5 and Statement by the President Regarding the United States Decision to Stop Degrading Global Positioning System Accuracy, White House Press Release, 1 May 2000.

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10

Verification of the Dayton arms control agreements

Dieter Rothbacher

The Dayton arms control agreements derive from the General Framework Agreement (GFA) for Peace in Bosnia and Herzegovina, initialled in Dayton, Ohio, on 21 November 1995 and signed in Paris, France, on 14 December 1995. The treaty, which ended the war in the former Yugoslavia, was brokered by American Ambassador Richard Holbrooke after a North Atlantic Treaty Organisation (NATO) bombing campaign forced the Bosnian Serbs to the negotiating table. It was signed by the Federal Republic of Yugoslavia (FRY), Croatia, Bosnia and Herzegovina (BiH) and the two so-called entities which comprise BiH—the Serbian Republika Srpska (RS) and the Muslim–Croat Federation of Bosnia and Herzegovina (FBiH). Negotiated at proximity talks held from 1–21 November 1995 at the Wright Patterson Airforce Base in Dayton, the GFA consisted of 11 articles and 11 annexes.

As part of the overall settlement package, Annex 1-B provided for confidence- and security-building measures (CSBMs) in Bosnia and Herzegovina, subregional arms control measures among the states of the former Yugoslavia and wider regional arms control measures in the Balkans. Specifically, the Annex, in three articles, mandated the Organisation for Security and Co-operation in Europe (OSCE) to help elaborate and implement three distinct instruments:

- In Article II, an agreement on confidence- and security-building measures in Bosnia and Herzegovina modelled after the OSCE Agreement on Confidence- and Security-Building Measures, the Vienna Document 1994;
- In Article IV, a subregional arms control agreement modelled after the 1990 Conventional Armed Forces in Europe (CFE) Treaty; and
- In Article V, a regional arms control agreement applicable in and around the former Yugoslavia.

The Agreement on CSBMs in Bosnia and Herzegovina

The negotiations on CSBMs in BiH, involving the Republic of Bosnia and Herzegovina, the Federation of Bosnia and Herzegovina and the Republika Srpska, began in Bonn, Germany, on 18 December 1995, under the auspices of the OSCE and with the assistance of the Personal Representative of the OSCE's Chairman-in-Office.[1] The Agreement on CSBMs in BiH was concluded in Vienna, Austria, on 26 January 1996. It entered into force immediately.

General provisions

The agreement provided for a comprehensive set of measures to enhance mutual confidence and reduce the risk of conflict. As envisaged, it drew heavily on the OSCE's Vienna Document 1994.[2] The CSBMs included in the agreement are: the exchange of military information between the FBiH and the RS; notification and observation of, and constraints on, certain military activities; restrictions on military deployments and exercises in certain geographical areas; and the withdrawal of forces and heavy weapons to cantonments or designated emplacements.

All these measures are subject to verification and inspection. Compliance issues are dealt with by a Joint Consultative Commission (JCC) composed of one high-level representative of each party and the Personal Representative of the OSCE Chairman-in-Office. The JCC may propose, consider and decide on amendments to the agreement by consensus of the parties. The area of application of the agreement is limited to the territory of Bosnia and Herzegovina.

Verification

Annexed to the agreement are seven protocols on: verification; exchange of information and notifications; existing types of conventional armaments and equipment; communications; the Joint Consultative Commission; media guidelines; and establishment of Military Liaison Missions.

The Exchange of Information is modelled on the Vienna Document 1994. The entities are expected to exchange information annually on their military forces with regard to military organisation, manpower, and major weapon and equipment systems. The latter are defined as battle tanks, helicopters, armoured combat vehicles (ACVs), look-alike ACVs, anti-tank guided missile launchers permanently or integrally mounted on armoured vehicles, artillery pieces and armoured vehicle

launch bridges (self-propelled armoured transporter–launcher vehicles capable of carrying and employing/retrieving a bridge structure).

Inspections are the basic means of verifying compliance with the provisions. Inspections are conducted by a team comprising inspectors and crew members designated by the inspecting party or by the Personal Representative of the OSCE Chairman-in-Office for each particular inspection. There are two lists of inspectors drawn up in advance. The first consists of the names of inspectors nominated by each party and approved by the other parties. The second is a list nominated by the OSCE through the Personal Representative, but which is not subject to the approval of the parties. All inspectors have equal rights and obligations.

Inspections are planned and led either by the entities or by one of five OSCE member states—France, Germany, Italy, the UK and the US—the Contact Group. If led by the two entities the team includes two to three inspectors from different OSCE countries. If led by one of the Contact Group countries, up to five inspectors from the entities are included. The inspection process is overseen and to some degree co-ordinated by the Verification Co-ordinator for Article II/IV at the OSCE in Vienna, Austria.

The following are subject to inspections:[3] (a) declared sites such as: objects of inspection, which are any formation or unit at the organisational level of brigade/regiment, wing/air regiment, independent battalion squadron or equivalent as notified in the Exchange of Information; any storage site not 'organic' to formations and units, such as maintenance units holding armament or equipment notified in the Exchange of Information; and units below the level of battalion holding conventional armament and equipment directly subordinate to a unit or formation above the level of brigade/regiment. Or (b) undeclared sites, defined as a specified area anywhere on the territory of a party, not exceeding 65 square kilometres, other than a declared site.

The implementation of the agreement has generally proceeded without major problems. From 1996 to May 2001, 75 inspections were conducted and 217 objects of inspection inspected. These missions were supported by 296 OSCE inspectors and 368 inspectors from the two entities. Thirteen visits to 18 weapons manufacturing facilities were conducted, supported by 24 OSCE experts and 76 from the parties. All on-site activities were carried out without significant problems.[4] For 2001, a

total of 10 inspections are planned. Of these, five are to be party-led, while five are to be OSCE-led.

Implementation problems

Despite the overall smoothness of the implementation process, several verification-related problems have arisen.

Access to information

OSCE inspectors are at a disadvantage *vis-à-vis* the entities because they do not have access to all of the JCC's amendments to inspection procedures. The JCC has taken approximately 30 decisions so far, some of which have directly altered the agreement. Since these decisions are incorporated in the minutes of the JCC meetings, it is currently impossible for inspectors to know whether they are following the latest procedures. However, an updated version of the agreement on CSBMs may be issued later in 2001.[5] The same problem has arisen in implementing the Sub-Regional Arms Control Agreement under Article IV, where the Sub-Regional Consultative Committee (SRCC) has the power to alter inspection procedures.

Short-notice changes to the annual inspection schedule

An annual inspection schedule is prepared by the Personal Representative based on input from the parties and has to be approved by them. After consultation with the OSCE countries providing inspectors for party-led inspections, the Verification Co-ordinator determines which states will provide inspectors. One goal is to have a balance between OSCE countries. However, this annual inspection schedule is subject to short-notice changes, which makes it difficult for countries with small verification agencies to be always in a position to nominate inspectors. OSCE inspectors scheduled on short notice may not perform as effectively as those who are well prepared in advance. This problem also exists under the inspection regime of the Sub-Regional Arms Control Agreement.

Insufficient time for inspection preparation

OSCE inspectors usually join a party-led inspection team the day before the team's arrival at the point of entry (POE). This allows them to be present only during the last stages of the pre-inspection planning and briefing. In some instances OSCE

inspectors join the team only on the day of the inspection, rendering them unable to help prepare for the inspection. This problem is exacerbated by the fact that OSCE inspectors have limited access to the information required to prepare for an inspection. Information from the Exchange of Information, for example, which is the basis for planning an inspection of a declared site, is not available to OSCE inspectors prior to their rendezvous with the inspection team. This problem also exists under the Sub-Regional Arms Control Agreement.

The Agreement on Sub-Regional Arms Control

The negotiations on a subregional arms control agreement were launched in Vienna on 4 January 1996, also under OSCE auspices and with the assistance of the Personal Representative of the OSCE's Chairman-in-Office. The Agreement on Sub-Regional Arms Control was concluded in Florence, Italy, on 14 June 1996. The signing of the agreement was witnessed by representatives of the countries of the Contact Group. It came into effect on 1 November 1997 and is of unlimited duration.

General provisions

The agreement engages the same three parties as the CSBM agreement, as well as Croatia and the FRY. It aims to establish balanced and stable defence force levels at the lowest number consistent with the national security of the parties. The area of application is the territory of Croatia, the FRY and BiH.

The Agreement establishes ceilings in five categories of conventional armaments:

- battle tanks;
- artillery pieces;
- combat aircraft;
- attack helicopters; and
- armoured combat vehicles.

It thus mirrors the relevant sections of the 1990 CFE treaty, which imposed restrictions in the same five categories of weapons on all participating states from the Atlantic Ocean to the Ural Mountains (but not, notably, the then Yugoslavia).[6] The Agreement establishes force levels for the FRY, Croatia and BiH according to a ratio of 5:2:2. In absolute terms, this limits the rump FRY to holdings equal to

approximately 75 percent of those of the former Federal Republic of Yugoslavia, while Croatia and BiH are each limited to holdings equal to 30 percent of those levels.[7] Two-thirds of BiH's 30 percent are allocated to the FBiH and one-third to the RS.

The agreement also provides for: specific armament reduction methods; extensive exchanges of military information; intrusive inspections; and an implementation review through the SRCC.

Verification

The agreement is modelled on the Vienna Document 1992[8] and the CFE treaty. The parties agreed to report their holdings according to the format prescribed in the Vienna Document 1992 and to establish numerical limits of their holdings as defined in the relevant sections of the CFE treaty. The parties have the right to implement all reductions in accordance with the Protocol on Reduction or the Protocol on Procedures Governing the Reduction of Conventional Armaments and Equipment under the CFE treaty.[9]

The parties also agreed on inspection procedures, including the use of 'assistants'. Since the regime is modelled on the CFE treaty, assistance from CFE states parties was essential to the successful implementation of the regime. An assistant is an individual designated by the Personal Representative of the OSCE Chairman-in-Office to assist the parties in the conduct of an inspection and who is included on the Personal Representative's list of assistants. At the request of a party, up to three assistants may be designated.[10]

Annexed to the agreement are six protocols on:[11] inspection; reduction; procedures governing the reclassification of specific models or versions of combat-capable trainer aircraft as unarmed trainer aircraft; exchange of information and notifications; existing types of armament; and the Sub-Regional Consultative Committee.

Inspection is the only method to physically verify compliance with the provisions of: Article IV (limitations on armaments); Article V (reduction in accordance with the CFE treaty); Article VI (aircraft reclassification); and Article VIII (notification and exchange of information).

Inspections are conducted by a team of up to nine inspectors designated by an inspecting party for each particular inspection. Inspectors are drawn from each

party's accepted list of inspectors. An inspection team is never mixed; only nationals from one state party take part. They can be assisted by up to three assistants from OSCE countries.

The following are subject to inspections:[12] (a) declared sites, which are those containing one or more objects of inspection, such as: any formation or unit at the organisational level of brigade/regiment, wing/air regiment, independent battalion squadron or equivalent as notified in the Exchange of Information; any storage site not organic to formations and units, such as maintenance units holding armament/equipment limited by the agreement; units below the level of battalion holding conventional armaments and equipment directly subordinate to a unit or formation above the level of brigade/regiment; or reduction sites. And (b) undeclared sites anywhere on the territory of a party, not exceeding 65 square kilometres, other than a declared site.

By 1 May 2001 a total of 7,457 pieces of Armament Limited by the Agreement (ALA) had been reduced, as follows:[13]

- FRY: 440 battle tanks, 1,268 artillery pieces, 174 ACVs and 123 combat aircraft;
- Croatia: 3 battle tanks, 697 artillery pieces and 30 ACVs;
- FBiH: 40 battle tanks, 2,333 artillery pieces and 20 ACVs; and
- RS: 283 battle tanks, 1,952 artillery pieces, 84 ACVs and four combat aircraft.

From 1997 to March 2001, 172 missions involving 418 inspections were carried out under the agreement. These included 37 reduction missions and 124 inspections with the assistance of 498 OSCE assistants from 28 countries.[14] As of 1 May 2001, the Republika Srpska remained in non-compliance with the agreement because its holdings of 119 ACVs exceeded the ceiling by six.

For 2001, 32 declared site inspections are scheduled (11 by the FRY, seven by Croatia, seven by the RS and five by the FBiH). Two inspections scheduled for BiH are problematic (see below).[15]

Implementation problems

Several verification-related problems have arisen during implementation of the agreement. These concern the role of the assistant, the annual inspection schedule, inspection timelines, the inspection of undeclared sites and the status of BiH.

The role of the assistant

During 1996, at the beginning of implementation, the provision of assistants from states parties to the CFE treaty was essential to the success of the process. But the role of the assistants has changed over the years. The fact that the relevant procedures do not adequately reflect this changing role poses significant problems for those individuals designated to assist the parties.

The 12th meeting of the SRCC in October 1998 tasked the Personal Representative with developing Standard Operating Procedures for Assistants (SOPS).[16] During the 18th SRCC meeting the parties were asked to comment on the latest draft of November 2000. The SOPS were again on the agenda for the 19th meeting of the SRCC in June 2001.

The draft SOPS accord the assistants the same privileges and immunities as inspectors and crew members. They state that assistants will be under the operational control of the Verification Co-ordinator. But the document changes the role of the assistants insofar as they no longer 'represent either OSCE or their countries'. The SOPS oblige assistants to indicate clearly when statements are made in a personal capacity.[17] This changed mandate creates a difficult situation for assistants who see themselves as OSCE officials, tasked by their national government.

Another problem is the attempt to restrict the possibility to be designated as an assistant. According to the draft SOPS only individuals who have participated in an OSCE course on the Dayton Agreement's Articles II and IV and who have extensive inspection and escort experience under the CFE treaty can be appointed as assistants. Thus, individuals from over 20 OSCE nations which are not states parties to the CFE treaty (the OSCE has 55 states parties and the CFE treaty 30) cannot become assistants. However, in the past many non-CFE member states have been frequently contacted by the OSCE to provide assistants. One solution to this problem would be to make attendance at a Dayton inspectors training course[18] one of the selection criteria. Because some national verification centres have few staff, however, it is not always possible to allow those who have done the course to go on an inspection mission.

Even though the draft SOPS accord the same legal standing to assistants and inspectors, the privileges and immunities of the former are frequently violated. Thus their notebooks may be checked or they may be prevented from taking

notes by the host party's escort officials. To preserve the assistants' impartiality and independence, it is essential that the confidentiality of their notes be protected.

The tasks and designation of the assistants

During the initial implementation phase of the agreement, the tasks of the assistant included: assisting inspection and/or escort teams in preparing and organising for the inspection; preparing the inspection plan; identifying armaments and equipment; determining access to buildings; taking photographs; declaring ambiguities; preparing the inspection report; declaring sequential inspections; providing debriefings to the team at the end of the inspection; providing interpretations of agreement provisions; interpreting the working register in respect of reductions; and explaining export procedures.

As these tasks have become routine, they are increasingly expressing their concerns about the 'quality' of the assistants. These criticisms are justified insofar as some assistants are now ill-prepared—some, for example, only read the agreement for the first time during the mission. One solution would be to forward reports by the parties on the performance of the assistants to the Personal Representative, who will then transmit these to their home countries for comment and, if required, for action.

Finally, the term 'assistant' no longer reflects the tasks involved. Technical assistance is nowadays needed only in exceptional cases. A new term, such as guest assistant or observer, should perhaps be used.

Short-notice changes to the annual inspection schedule and timelines

The problems arising prior to and during inspections are similar to those under the Agreement on Confidence-and Security Building Measures (see above).

Inspection of undeclared sites

As of June 2001, for 'political reasons', no inspection of an undeclared site has ever been conducted.[19] The regime is further weakened by the fact that parties have carried out inspections of undeclared sites (specified area) under the Vienna Document 1999. This agreement limits inspections of undeclared sites (specified area) to military sites only, whereas the subregional arms control agreement envisaged that all sites within the inspected area, whether military, industrial or civilian,

would be open to inspection. This failure to implement the provisions for undeclared site inspections sets a bad precedent for other arms control and disarmament regimes.

The legal status of Bosnia and Herzegovina

An intractable problem related to the implementation of both the Agreement on Confidence- and Security Building Measures and the Agreement on Sub-Regional Arms Control is that the political and military integrity of BiH, which is presumed under the agreements, remains largely a fiction. Article I of the Constitution of BiH provides for the former Republic of Bosnia and Herzegovina to continue under the name of Bosnia and Herzegovina. The country continues its legal existence as a state under international law, with internationally recognised borders. The goal of creating a unified state is mirrored in Annex I-B, which assumes the establishment of trust among its citizens and ethnic groups, as well as the territorial integrity, sovereignty, political independence and international personality of BiH.[20]

But the reality on the ground is different. Although the two entities which make up the BiH—the FBiH and the RS—are not recognised internationally as separate states, it is they which have all the accoutrements of statehood. By contrast, BiH has no military forces, no verification organ and no procedures for actively conducting inspections. This prevents it from playing an active role in the implementation of confidence-building and arms control regimes. While inspections under different arms control regimes, such as the Vienna Document 1999 and the 1993 Chemical Weapons Convention, are carried out on the territory of BiH, the active inspection quota for BiH has never been implemented.

The Regional Arms Control Agreement

Article V of the Dayton GFA envisaged a wider regional arms control agreement for the Balkans in which the subregional agreement would be 'nested'. The goal would be to establish a balance of conventional forces in and around the former Yugoslavia. No deadline was set for the conclusion of negotiations. Twenty states were to participate in the negotiations—Albania, Austria, BiH, Bulgaria, Croatia, France, FRY, Germany, Greece, Hungary, Italy, the Former Yugoslav Republic of Macedonia (FYROM), the Netherlands, Romania, Russia, Slovenia, Spain, Turkey,

the UK and the US. After a long period of consultations and meetings a mandate for the negotiations was agreed in 1998. After the OSCE Istanbul Summit Meeting in 1999 the negotiations accelerated with the aim of concluding an agreement by the end of 2000. Agreement was finally reached in July 2001 on the Concluding Document of the Negotiations under Article V of Annex 1-B of the General Framework Agreement for Peace in Bosnia and Herzegovina.

The negotiations were complicated by the fact that many of the participating states were already subject to conventional arms limitations. Although all are subject to the OSCE Vienna Document 1999 on Confidence- and Security- Building Measures, only three (the FRY, Croatia and BiH) were parties to the Dayton Agreement on Sub-Regional Arms Control, 13 were CFE treaty parties,[21] and four (Albania, Austria, FYROM and Slovenia) were not subject to any conventional arms limitations. The participating states with conventional arms limitations already in place frequently expressed their concerns about having additional obligations imposed. Hence the mandate for the negotiations specifically precluded any new agreement from lowering or raising conventional arms limitations already agreed to under other agreements.

As a result of these difficulties some of the aims of the mandate were not fully attained. The Regional Arms Control Agreement actually includes no arms control measures and no binding information exchanges. Instead, it provides for voluntary CSBMs, such as: exchanges of information on defence budgets; exchanges of information on national holdings of conventional armaments; expanded military contacts; and inspections of and evaluation visits to the parties' armed forces.

The July 2001 Concluding Document is politically rather than legally binding. Since it does not enter into force until 1 January 2002, it remains to be seen whether it will be effectively implemented.

Conclusion

From the perspective of an inspector on the ground, three lessons can be drawn from the experience of implementing the CSBMs and arms control aspects of the Dayton GFA.

First, arms control treaties should be implemented according to their spirit, rather than just their letter. Verification regimes need therefore to be flexible,

since implementation according to the spirit can imply deviations from the letter. An example would be the timelines for inspection teams to reach inspection sites under both the Agreement on Confidence- and Security-Building and the Agreement on Sub-Regional Arms Control. According to the letter of the agreements, a team must arrive at an inspection site within nine hours after the site is declared. In reality, however, it might take up to 20 hours to reach the site and in some instances even longer. Strictly speaking, this means that almost every inspection conducted is in breach of the agreements. But such 'violations' have been accepted by the parties, which have, fortunately, taken a flexible approach.

A second lesson of the Dayton agreements is that a key component of arms control verification is the human factor. The effective implementation of all the Balkan agreements depends on a good relationship being established between the teams on the ground—the inspection team on the one hand and the inspected state party's representatives, the host or escort team, on the other.

Third, all arms control treaties should be living documents subject to change. Since they are entered into voluntarily and are thus 'owned' by the states parties themselves, it is they who should determine how the agreements are implemented. Even though it may be difficult to keep track of all the changes being made in the Dayton agreements, it is essential that they be communicated to all the individuals involved in a timely manner. Many changes are already being implemented but have unfortunately not yet been incorporated into the agreements themselves. Updated versions which are expected to be available in late 2001 will be helpful to both inspectors and assistants.

Overall, the future success of the Balkan agreements is inextricably bound up with the other Europe-wide CSBM and conventional arms control treaties, such as the OSCE Vienna Document 1999 and the CFE treaty. The Balkan agreements confirm many of the principles and commitments set out in these other documents and to that extent should be capable of successful implementation.

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Endnotes

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[2] Vienna Document 1994 of the Negotiations on Confidence- and Security-Building Measures, adopted by the Forum for Security Co-operation.
[3] Agreement on Confidence-and Security-Building Measures, Annex 1, Protocol on Inspection, chapter 1: Inspections, section 1: Definitions.
[4] Figures provided by the Office of the Verification Co-ordinator, OSCE, Vienna, during M-63 Dayton Arms Control Course, NATO School, Oberammergau, Germany, 14–25 May 2001.
[5] Personal communication with Senior Operations Staff Officer, Office of the Verification Co-ordinator, OSCE, Vienna, 3 April 2001.
[6] For an analysis of the CFE treaty and its modifications, see Pál Dunay, 'Verification of Conventional Arms Control', in Trevor Findlay (ed.), *Verification Yearbook 2000,* Verification Research, Training and Information Centre (VERTIC), London, December 2000, pp. 101–114.
[7] *OSCE Handbook 1999–2000,* pp. 116–132.
[8] Vienna Document 1992 of the Negotiations on Confidence- and Security-Building Measures, adopted by the Forum for Security Co-operation.
[9] Agreement on Sub-Regional Arms Control, Article V.
[10] Agreement on Sub-Regional Arms Control, Protocol on Inspection, section 1: Definitions.
[11] Agreement on Sub-Regional Arms Control, Article 1, para. 4.
[12] Agreement on Sub-Regional Arms Control, Protocol on Inspection, section 1: Definitions.
[13] Figures provided by the Office of the Verification Co-ordinator, OSCE, Vienna, during M-63 Dayton Arms Control Course.
[14] Figures provided by the Office of the Verification Co-ordinator, OSCE, Vienna, during M-63 Dayton Arms Control Course.
[15] Figures provided by the Office of the Verification Co-ordinator, OSCE, Vienna, during M-63 Dayton Arms Control Course.
[16] Draft Standing Operating Procedures, Agreement on Sub-Regional Arms Control, Office of the Verification Co-ordinator, updated version, 9 November 2000.
[17] Draft Standing Operating Procedures, Agreement on Sub-Regional Arms Control, Office of the Verification Co-ordinator, updated version, 9 November 2000.
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[19] Figures provided by the Office of the Verification Co-ordinator, OSCE, Vienna, during M-63 Dayton Arms Control Course.
[20] O. Ibrahimacid, *Supremacy of Bosnia and Herzegovina Over its Entities,* Bibliotheka Posebna Izdanja, Sarajevo, July 1999, pp. 195–201.
[21] Bulgaria, France, Germany, Greece, Hungary, Italy, Netherlands, Romania, Russia, Spain, Turkey, UK and US.

iv verification issues

II

Nuclear warhead arms control research at AWE[1]

Garry J. George and Martin D. Ley[2]

In the 1998 Strategic Defence Review (SDR),[3] the UK Ministry of Defence (MOD) carried out a wide-ranging assessment of the current and future role of conventional and nuclear weapons.[4] The ministry restated its conviction that an effective nuclear deterrent, coupled with international nuclear arms control and a rigorous nonproliferation regime, enhances national security.[5] As part of its SDR strategy, the MOD commissioned a study in September 1998 on global and multilateral[6] nuclear arms control.[7] The 18-month study, conducted at the Atomic Weapons Establishment (AWE) by a small team of specialists, aimed: to examine the capabilities necessary for a state to verify control of, and reductions in, nuclear warheads; to identify the likely technologies, techniques and skills that the UK would require if it were to become a party to any future nuclear arms control treaty; and to investigate the availability of existing skills within AWE, British industry and academia.

AWE is the warhead research, design and production authority for the UK's nuclear deterrent. It is responsible for manufacturing the warheads for the UK's *Trident* fleet and for the disassembly of earlier weapon systems, such as the WE177 nuclear free-fall bomb and the *Trident* predecessor, *Chevaline*.[8] The study was intended to exploit AWE's existing skills and its experience in monitoring and verification under the Comprehensive Nuclear Test Ban Treaty (CTBT).[9]

To conclude the study, a report entitled *Confidence, Security and Verification* was published in April 2000.[10] Its findings were tabled at the Nuclear Non-Proliferation Treaty (NPT) Review Conference in May 2000 by the then UK Minister of Foreign and Commonwealth Affairs, Peter Hain. AWE considers the document to be a milestone in the UK verification research programme—it was the first time that AWE had produced such a commentary at the unclassified level. The

report also underscored the importance of adopting an inclusive approach to global nuclear warhead arms control, one that addresses the totality of a state's nuclear weapon infrastructure.[11] AWE believes that this latter challenge should not be underestimated. How to engage other states—those outside current US–Russian arrangements—presents a major challenge to 'multilateralising' the international nuclear arms control process.

Following the completion of the study, the MOD approved a three-year Arms Control Verification Research programme at AWE, which began in April 2000. The objective is to generate greater scientific and technical understanding of nuclear arms control verification, to create a body of expertise associated with nuclear arms control verification, and to highlight potential implementation models for possible verification regimes. The project has a small permanent team that draws on wider warhead expertise at AWE. The research programme will provide the UK government with technical advice on issues likely to be encountered in any future discussions on multilateral nuclear arms control and, ultimately, treaty negotiation. In addition, the programme seeks to identify further confidence-building and transparency measures that the UK government may wish to adopt.

The programme can be compared with that started at AWE's Blacknest research centre in the 1950s, which focussed on the question of how to verify a comprehensive nuclear test ban. Both prior to and during the CTBT negotiations, AWE was in a strong position to support the UK delegation in Geneva, Switzerland, and to advise on the technical practicality of such a treaty.

In undertaking this programme, AWE recognises that there are obstacles that an effective verification regime must overcome.

- First, information related to the design and manufacture of nuclear weapons is sensitive in terms of national security and nuclear proliferation.
- Second, verification technologies and techniques may be vulnerable to sophisticated evasion methods.

One of the aims of the research is thus to investigate the design of low cost, robust verification systems that are not unacceptably intrusive or sensitive to warhead design assumptions. The research, of course, is being carried out while complying with the UK's nonproliferation obligations under the NPT.

The research framework

The objective of the AWE programme is to provide the government, particularly the MOD, with technical options to support the formulation of policy in relation to a potential nuclear warhead transparency and/or verification regime as part of an multilateral arms control process. The objective of verification is to provide high confidence that only declared activities are taking place; while the aim of transparency is to demonstrate voluntarily that only declared activities are occurring.

Transparency agreements and joint (confidence-building) experiments are considered by AWE as important aspects of realising a robust verification regime, since they can be used to familiarise prospective parties with a treaty, technical issues, and the threats to national security posed by the technologies employed in them. Transparency processes thus promote greater shared understanding and should lead to less complex treaty negotiations.

The phrase 'nuclear warhead arms control' is used here to encompass the verification of a state party's nuclear warhead infrastructure,[12] the number of stored and operationally deployed warheads, and (potentially) reductions in the number of treaty-permitted warheads. AWE believes, however, that 'accountability' rather than 'reduction' is the most important 'first step' in realising a multilateral nuclear arms control verification regime. This, in turn, leads to the conclusion that the early verification processes will need to deal with operational warheads rather than simply dismantled warheads.

AWE's work has been based on a simple research framework, which may have generic value and therefore could be adopted by other nuclear weapon states as a prelude to multilateral dialogue. The framework has three components: four strategic questions; a set of guiding assumptions; and a series of research scenarios.

Strategic questions and guiding assumptions

From the study, four basic questions were identified, which will be expanded on in the research phase and will be used to help direct assessment of a future, yet undefined, multilateral nuclear arms control agreement:

- How would such an agreement affect UK national security and the country's operational deterrent?
- What impact would it have on international nuclear proliferation?

- What role could technology play in such an accord?
- What are the potential verification regimes that such an agreement may implement and how much confidence would there be in these regimes?

Although AWE's research will focus heavily on the third point, the intention is to consider all four questions in a balanced fashion—in conjunction with UK government departments, academia and industry. AWE has also produced the following guiding assumptions that will help to shape the research scenarios:

- **Universality** UK engagement will only occur when all nuclear weapon states (according to political considerations, potentially *de jure* and *de facto*) are involved;
- **Mingling** Operational stockpiles may be stored alongside 'stockpiles' targeted for reduction, potentially creating logistic complexities;
- **Inclusiveness** To ensure the robustness of a verification regime, there will be a desire to account for all aspects of the warhead lifecycle, including testing, manufacturing, refurbishment, in-service surveillance, dismantlement and disposition;
- **Transparency** An ever increasing level of transparency will be associated with nuclear warhead operations;
- **Nonproliferation** National and international sensitivities will persist with respect to the 'leakage' of warhead information and knowledge;
- **Equivalence** A future arms control verification regime will not differentiate between offensive and defensive nuclear warheads;
- **Technology** Both Treaty Technical Means (TTM) and National Technical Means (NTM) will be considered as potential verification instruments;[13]
- **Irreversibility** It is assumed that no 'new' fissile material will be added to the warhead infrastructure and that material removed from warheads as part of a treaty disposition process will be placed under 'safeguards'.[14]

By design, the AWE programme focuses on technical verification. Work will not be concerned with the politics of treaty negotiation, the politics of implementing a verification regime, or alternative diplomatic means of reaching an 'end state'. The research will, however, address the role of the technical community in supporting these political and diplomatic processes.

Research scenarios

Research scenarios, which may differ from current 'political' assumptions about the future of nuclear arms control, are intended to facilitate thinking about technical solutions. They will not necessarily generate more accurate views of the future of arms control, but they will stimulate reasoning associated with possible verification regimes. It is hoped that discussing such scenarios will lead to greater transparency and stimulate a confidence-building dialogue with other nuclear weapon states.

Research scenarios are a tool[15] for helping AWE to consider not only alternative treaty 'end states' but also evolutionary 'way points' in nuclear arms control. Scenarios will help produce critical assessments of how arms control verification regimes may develop and operate. AWE also believes that a scenario-based approach will assist with the evolution of a technical verification vocabulary that may be shared internationally, thereby facilitating communication between nuclear weapon states. It must be remembered that there is no single nuclear design concept, no shared approach to nuclear weaponisation and no common nuclear weapon infrastructure.[16]

It is likely that operational sensitivities in the UK will be similar to those of other nuclear weapon states, especially those with a small deterrent. AWE's detailed knowledge of the UK nuclear warhead infrastructure, together with its awareness of the programmes of other states, will be used to construct 'sensitivity models' to assess the possible impact of different verification regimes on various nuclear weapon infrastructures and deployments. This will make it possible to study multilateral verification regimes involving nuclear weapon states with a variety of nuclear capabilities.

AWE intends to use sub-sets of the guiding assumptions mentioned above to identify various 'way point' and 'end state' scenarios. Those that will be considered in the research programme will range from voluntary transparency measures to a verification regime for a nuclear weapon-free world. The scenarios will thus encompass what AWE considers to be one of the most challenging aspects of verification, namely international regulation of activities involving operational warheads and 'defence related' fissile material outside of International Atomic Energy Agency (IAEA) safeguards.

For example, one 'way point' scenario might be the restriction of hitherto essentially unregulated activities required for the maintenance and deployment of a nuclear deterrent between declared sites. The 'first step' verification regime for this scenario might include such measures as: declarations of warhead and fissile material storage and processing locations; the monitoring of declared sites; and a complementary regime to detect stores and production at undeclared sites. It might also include verification of warhead production so that capacity would be limited to that declared. The aim of such a regime would be to make it increasingly difficult to reconstitute nuclear forces without warning. Redundant and disused nuclear infrastructure could also be monitored and its decommissioning verified. It is likely that treaty-recognised NTM would support such a regime, which in a multilateral treaty environment may create its own unique problems as a result of international NTM asymmetries. 'Next step' verification regimes might be identified by examining subsequent 'way point' scenarios, leading ultimately to a nuclear weapon-free world end state.[17]

Research projects

The AWE research programme has been constructed around three demanding and interdependent projects:

- **ASSERT** (Authentication of Stockpile Signature Evidence by Radiometric (and other) Technologies);
- **EMERGE** (Environmental Monitoring Evidence from Regional and Global Emissions); and
- **RENEW** (Recovery of Nuclear Evidence on Warheads).

The ASSERT project

ASSERT aims to develop techniques that will make it possible to dismantle nuclear warheads verifiably without revealing sensitive information. The fundamental approach will be to establish a 'chain of custody' to prove[18] that the warhead in question has been dismantled and that no material has been replaced or diverted. This will be done either through procedural or physical means. It is thought unlikely that the actual dismantlement process will be monitored directly, for reasons of national security.[19]

Verifying that a warhead or 'containerised package' presented for dismantlement is what it is claimed to be is known as authentication. Non-Destructive Assay (NDA) measurements of a dismantlement process and dismantled warhead components, using various technologies, will need to be correlated to those of the warhead presented for disassembly. NDA authentication measurements made as part of the ASSERT programme thus far have been directed at understanding technologies that may be used to discriminate between a genuine warhead and a potential case of deception. Work has started on evaluating information-processing techniques, such as the use of neural networks and statistical methods, to help discriminate between genuine warhead radiation emissions and simulated emissions from hoax warheads. AWE will use existing computer codes that are capable of calculating the neutron and gamma emissions from a particular design of warhead or hoax assembly. The purpose is to determine which set or combination of authentication measurements provides the best means of discrimination.

Since this work has mostly involved taking active and passive[20] NDA measurements of UK warheads and their components, the results have been skewed, for obvious reasons, towards the fissile materials used in warheads. However, the benefits of other techniques have not been ignored, such as measuring the environmental emissions during a dismantlement process, including gaseous effluent and testing smears taken from surfaces inside the dismantlement facility itself.

Work began with *Chevaline*—a unique opportunity for the UK to characterise a warhead system that will soon cease to exist. Throughout 2001, a team of specialists has been monitoring the dismantlement of *Chevaline* warheads at AWE Burghfield and the transfer and storage of components at AWE Aldermaston.[21]

Measurement techniques to record radiometric signatures from the *Chevaline* warhead have included gamma and neutron detection, use of radiographic films and infrared imaging. High-fidelity NDA measurements of *Chevaline* have now been taken, allowing a system-wide baseline of warhead and warhead sub-system signatures to be constructed. National security and proliferation concerns will probably mean that such 'unfiltered' techniques will be of limited use in a verification regime without information security barriers.[22] The amount of warhead design data that can be obtained by NDA methods is being examined to determine the potential nonproliferation risk and the threat to national security.

ASSERT will also include an assessment of the extent to which proof of dismantlement may be provided by a traceable chain of operational process documentation, such as material accountancy and health physics survey records. Such complementary processes will raise confidence (compared to the use of NDA measurements alone), especially in establishing the provenance[23] of a warhead presented for verification.

ASSERT is still in its early phases and is considered one of the most demanding elements of the AWE research programme, due to the need to carry out work under extreme time constraints in an operational environment. The original plan[24] was for passive measurements to be done on *Chevaline* in 2000–01 and on *Trident* in 2001–02, active measurements on *Trident* in 2002–03, and measurements of warhead components as the opportunity arose. The work has been expanded to include active measurements of *Chevaline* in 2001, which were not originally considered feasible. Consequently, it has been possible to use additional NDA techniques.

The technologies used in the ASSERT project have much in common with those that might be used in agreements currently under negotiation, such as the Trilateral Initiative between the US, Russia and the IAEA. Assuming it is transferable, ASSERT will thus benefit from the experience gained under the Trilateral Initiative. However, the challenge associated with authenticating a fully assembled thermonuclear warhead, of unknown design complexity and potentially mated to a carrier or reentry vehicle, is far greater than authenticating a warhead's fissile pit[25] or material in a transport or storage container—as is the case with the Trilateral Initiative.

AWE is also studying the use of portal monitoring technologies as a means of increasing confidence in any chain of custody process.[26] The monitoring of gaseous effluent emissions is also being evaluated for its usefulness in indirectly confirming dismantlement.

Finally, one of the guiding assumptions of the research project is to consider the totality of the stockpile, including the monitoring of nuclear warheads, warhead components and fissile material stores. AWE intends to investigate the role of NDA in monitoring vehicle movements between and within sites that form part of the UK's nuclear weapons infrastructure. This will allow AWE to investigate how a robust chain of custody might be maintained from a deployment or storage site to a dismantlement facility.

The EMERGE project

EMERGE examines the utility of a wide spectrum of environmental measurement and monitoring technologies, ranging from on-site to remote sensing, including the use of satellites. The goal is to evaluate the role of applicable technologies in helping to verify a possible future multilateral treaty. Such technologies may be used in three key ways: monitoring emissions from facilities that are part of the nuclear weapons infrastructure to help confirm their operational status; wide area monitoring to detect clandestine facilities and activities; and environmental measurement as part of routine and challenge on-site inspections to determine that only declared and permitted activities are taking place.

The EMERGE project began by examining emissions data from facilities and processes at AWE Aldermaston, where nuclear warhead components are manufactured, and from AWE Burghfield, where warheads are assembled and disassembled. Such data are routinely collected by AWE to ensure that it complies with health, safety and environmental regulations as required by the Health and Safety Executive's Nuclear Installations Inspectorate, the Department for Environment, Food and Regional Affairs (encompassing the Ministry of Agriculture, Fisheries and Food) and the Environment Agency. Measurements include those undertaken by health physics survey and dosimetery, and environmental monitoring groups to satisfy AWE's own assurance processes. A study has been conducted under the EMERGE project to examine the usefulness of these measurements for creating environmental signature baselines for AWE facilities. The measurements will be compared with operational activities to assess the dependability of the technique and its applicability to verification.

Remote sensing technologies with potential application for warhead verification will also be investigated, particularly those useful for wide area monitoring of a nuclear warhead processing infrastructure. Experts from the wider UK scientific and technology community will be involved. Initial attention will be focused on commercially available sensors. Both active and passive systems are being investigated, including:

- Laser Radar (LIDAR), an active technique that may be useful for detecting effluents from stacks.

- Airborne imaging, in a large number of wavelength-bands in the visible and infrared, which may be valuable for wide area searches. (The British National Space Centre has obtained images, using a commercial airborne sensor, of various sites in the UK, including industrial plants (but not military and civilian nuclear facilities). They are held at the National Remote Sensing Centre at Farnborough.)
- Airborne imaging, operating in the thermal region of the electromagnetic spectrum, which could provide information on the temperature of objects on the ground. (Agencies outside AWE are considering the feasibility of operating an American airborne imager in the UK.)
- Commercial satellite imagery. In the next few years, several commercial satellite systems with a multi-spectral capability will exist.[27] Since the data will be commercially available, images from any weapon complex will be obtainable in a variety of wavelength bands, regardless of national security concerns.

An important aspect of the AWE research programme is to make appropriate links with other technical initiatives in the UK. The goal is to ensure that experience gained, for example, in the UK's safeguards programme is appropriately utilised by AWE. Discussions have taken place with the Department of Trade and Industry's Safeguards Office to identify areas of potential collaboration. Also, as noted earlier, AWE has experience of the technicalities of the CTBT verification regime, which will also be assessed in relation to its value to the nuclear arms control research programme.[28]

The RENEW project

RENEW is directed at identifying potential verification regimes which may combine the technologies under investigation in the ASSERT and EMERGE projects. It explores wider aspects of verification besides warhead dismantlement processes, such as the verification of nuclear warhead accountancy and reductions. The programme is making steady progress with paper studies on various issues. As with much of the technical work being undertaken in AWE's programme, RENEW is dependent on classified information about in-service warheads or other proliferation-sensitive matters. It is, therefore, unlikely that many papers will be released into the public domain. However, as with the original feasibility study, AWE intends to make brief progress reports available in unclassified form.

RENEW focuses on studying systems[29] for potential verification regimes, methods of evasion, countermeasures and counter-countermeasures to evasion and the link between nuclear arms control, evasion, deterrence and strategic stability. Initial studies are assessing the ways in which the provisions of a future treaty might be circumvented by the diversion of fissile material, components or warheads to a clandestine programme. The countermeasures necessary to neutralise such evasion methods are being investigated for the purpose of designing a verification regime that provides a high degree of confidence.

Potential verification regimes are also being modelled to gain insight into the synergistic value of verification sub-processes brought together by data fusion techniques. Modelling constitutes a 'top-down' approach to system design. While necessarily idealised, models help researchers to estimate how effective various types of verification system might be in deterring evasion and to quantify the level of confidence that might be placed in them.

A possible model of a nuclear warhead production control regime (PROCORE) is being developed at AWE based, in part, on existing IAEA safeguards techniques and technologies. Obvious examples would be the use of tags and seals to maintain a chain of custody and remote monitoring of stores. PROCORE will be used to investigate how signatures of warhead manufacturing activities may help to verify declarations made by states about such activities.

Data fusion[30] techniques applicable to authentication and to other potential treaty processes, like PROCORE, are also being examined. Possibilities include information-processing methods, such as statistical procedures and neural networks, used in the field of artificial intelligence. The techniques are in common use in other areas, for example in the analysis of satellite images. Another option is to use models to fuse data from different measurement systems, which can help detect anomalies in patterns of activity. AWE intends to assess the application of neural networks to the measurement system for authenticating warheads to determine the optimum mixture of measurement techniques.

AWE is also examining techniques for verifying declarations of nuclear matériel (*sic*): fissile material, fissile sub-assemblies and assembled warheads. The confidence that can be placed in such measures must be evaluated and quantified, as the total amount of fissile material and warheads that a state has at the entry into force of

a treaty or once its implementation commences may be one of the major sources of uncertainty in any verification regime. If the accuracy of the declarations cannot be verified with sufficient confidence, additional verification steps may need to be taken to minimise the impact of the uncertainty.

One approach that may be adopted is to allow unmonitored but 'tagged and sealed' treaty-permitted movements to take place between declared facilities, but to monitor potentially unregulated fissile material entering or leaving a declared site or matériel destined for elimination under a treaty.[31] This approach, without knowing the original quantity of matériel held within a declared site, will reduce the risks associated with 'undefined' matériel. Over time, as fissile material is moved to, say, IAEA safeguards, a given nuclear site will eventually stabilise to a transparent and/or verifiable level. In the final analysis this will be zero, following the site's decommissioning. All treaty-accountable matériel detected outside of the registered facilities, and beyond agreed levels, would be, by definition, in breach of the treaty.

National capabilities survey

As part of the 18-month study, a survey was conducted to assess the availability of expertise and capacities relevant to nuclear arms control verification that already exist in the UK, including within AWE, industry, academia, the MOD and other government agencies. The survey covered three specific areas: environmental monitoring for effluent emissions; NDA; and fissile material production estimation. Environmental monitoring was subdivided into the following topics: wide area remote sensing; ground-based monitoring of liquid and gaseous effluent emissions; portable on-site inspection equipment; and laboratory-based sample analysis techniques. The survey was conducted by means of a questionnaire distributed to over 40 scientific organisations. About three-quarters responded positively.

The conclusions of the study were as follows:

- There was significant UK expertise in remote sensing by satellite or airborne means for wide area search purposes. Most of the capability is found in defence or national security-related organisations as part of the UK's 'national technical means' for monitoring arms control or disarmament agreements. Increasingly, though, commercial satellite companies are providing comparable data.

- UK ground-based capabilities for liquid and gaseous effluent monitoring are extensive and a vast amount of experience has been accumulated. However, the sensitivity of such systems is lower than that required to meet projected verification requirements.
- Portable on-site inspection (OSI) equipment is mainly for measuring radiation. Portable gamma spectroscopy is also commonly used and transportable mass spectrometers are increasingly operated in the field.
- The UK's analytical laboratory capability is extensive and instrumentation development is continuing. But there is little attempt to apply analytical techniques in the field. AWE's capabilities are better or just as extensive as those surveyed.
- The survey failed to identify new or emerging technologies for environmental monitoring of effluent emissions.
- NDA techniques are common in the nuclear industry. Although AWE has experience with most types of NDA techniques, there are others that AWE needs to gain greater experience with. Development work is also underway in the UK on chemical explosive detection techniques.
- Techniques for estimating fissile material production reside mainly with two UK companies, British National Fuels Limited (BNFL) and Atomic Energy Authority Technology (AEA-T). The university sector also has some experience in operating nuclear reactors and therefore must have relevant capabilities.
- The Department of Trade and Industry's Safeguards Office has capabilities in nuclear safeguards technologies.
- The survey also highlighted the benefits of exploiting mathematical and statistical modelling techniques and developments in the computer and artificial intelligence spheres.

Members of the research team gave a presentation on the results of the survey on 26 September 2000 at AWE to a diverse, invited audience, including those who had responded to the survey and representatives of both government and non-governmental organisations.[32]

Deterrence, stability and security

Current bilateral nuclear arms control efforts have occurred in a world where the remaining stockpiles of warheads are sufficient to maintain bipolar deterrence

(between the US and Russia). However, there is no internationally agreed understanding of what constitutes multipolar deterrence. For instance, a Strategic Arms Reduction Treaty (START) III may limit deployed US and Russian strategic warheads to some 1,500 per country, which, on a state basis, is still of a different order to the much lower numbers deployed by China, France and the UK.

Progress in arms control is intrinsically linked to national perceptions of deterrence and security. Thus, although understanding the technicalities of a verification regime will be necessary, it will not be sufficient. Other organisations have studied the nuclear deterrent relationship between Russia and the US.[33] AWE intends to discuss the subject with other institutions in the UK, specifically to address the impact of the multilateral nuclear arms control process on multipolar stability. The goal will be to examine how deterrence, strategic stability and arms control interrelate in a situation of greatly reduced nuclear warhead numbers.

Conclusion

By 2003 the AWE's arms control verification research programme will have reported to the MOD on the: suitability of technologies and systems applicable to future verification regimes, if and when they are negotiated and established; and national security and international nuclear nonproliferation sensitivities associated with potential verification technologies, methods and systems.

The MOD will review the research programme in 2003 and then decide on a future direction.

By the end of 2003 the AWE research team will have assessed all recent types of UK warheads and sub-assemblies in various operational configurations, using readily available techniques. It will have a good understanding of these techniques and their ability to meet the challenge of nuclear warhead authentication. Furthermore, the team will understand, at least from the UK perspective, the suitability and appropriateness of these techniques to multilateral treaty verification and be in a position to engage in a technical dialogue with peers in other nuclear weapon states. Emission baseline signatures relevant to a potential verification regime will have been prepared for AWE Aldermaston and Burghfield sites. Historical data will have been reviewed and the myriad environmental monitoring techniques available for this application will have been assessed.

The technologies will have been integrated into potential treaty verification models, and there will be an appreciation of expected confidence levels. To do this, an understanding of the associated uncertainties will have been gained, along with an understanding of the likely national security sensitivities of any state party. An appreciation will also have been gained of the likely impact of any future treaty on the UK nuclear stockpile and the possible proliferation threat connected to the release of sensitive information. Finally, an assessment of the value of operational records in proving that older warhead systems have been dismantled will also have been made.

Other states with relatively small nuclear forces are likely to face similar choices to those of the UK in any multilateral arms control negotiations. AWE's approach to its research work is, therefore, likely to have relevance beyond the UK. Other countries may wish to consider adopting the AWE's research framework as a prelude to multilateral transparency and confidence building, and discussion of potential verification regimes.

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Endnotes

[1] The Atomic Weapons Establishment (AWE) is the government-owned, contractor-operated company that maintains the UK's nuclear warhead capability. Information on AWE's mission and its work is available at www.awe.co.uk.

[2] The paper does not necessarily represent the views of AWE or of the UK Ministry of Defence.

[3] The Strategic Defence Review is available on the UK Ministry of Defence website at www.army.mod.uk.

[4] The term nuclear weapon is usually used in an embracing sense. In this paper the phrase nuclear warhead is more correctly limited to describing that part of a nuclear weapon system composing the 'physics package' (within which the fissile material is contained), the arming, fusing and firing mechanism, other sub-systems related to yield generation and that part of the carrier vehicle integrated with the physics package.

[5] See *SDR Supporting Essay 5,* paragraph 1.

[6] In this paper the term multilateral is used to cover the pluri-lateral scenario in which the UK is engaged in an arms control process with other nuclear weapon states.

[7] SDR chapter 4 stated that 'The effectiveness of arms control agreements depends heavily on verification. The United Kingdom has developed particular expertise in monitoring of fissile materials and nuclear tests. The plan is to add to this by developing capabilities which could be used to verify reductions in nuclear weapons, drawing on the expertise of the Atomic Weapons Establishment at Aldermaston. This will begin with a study lasting some 18 months to identify the technologies, skills and techniques required and what is available in this country'.

[8] The WE177 was retired from service in 1997. *Chevaline* (A3TK) was the UK's *Polaris*-based system, which was retired from service in 1998.

[9] SDR Supporting Essay 5, paragraph 29.

[10] House of Commons written answers, Speaker Geoff Hoon. Ministry of Defence, Strategic Defence Review, Hansard, column 293W, 14 April 2000. An electronic version of the AWE report is available at www.awe.co.uk.

[11] In the context of AWE's work, the states parties that may constitute a future nuclear weapon arms control regime is not defined. Currently there exist five *de jure* nuclear weapon states (China, France, Russia, UK and US) and three so-called threshold states (India, Israel and Pakistan). For simplicity in this paper, the term 'nuclear weapon states' is used to encompass both *de jure* and *de facto* nuclear weapon states.

[12] The term 'infrastructure' is used to encompass all of a nuclear weapon states' nuclear warhead research, design and manufacturing processes, capabilities and sites. Others have used the term 'nuclear weapon complex'.

[13] Treaty Technical Means is used here to encompass technologies specifically authorised by a treaty or treaty body and used in a transparent fashion for verification (although the data gathered may not necessarily be transmissible to all states parties). National Technical Means, although they may be recognised as a legitimate treaty instrument, are considered to be totally under the control of a state party and used in an opaque manner.

[14] No differentiation is made here between existing international (IAEA) safeguards and specific arms control processes directed at storing denatured fissile material.

[15] Information on scenario thinking and planning is readily obtainable through publications and the Internet.

[16] One particular challenge that AWE recognises is the 'scale problem'. For example, bringing Russia's nuclear weapons infrastructure 'under treaty control' will be more complex and resource intensive than in the UK.

[17] The authors recognise that the term 'nuclear weapon free world' is emotive. However, debate regarding

its definition should not be allowed to get in the way of progress to control nuclear weapons. Technology will allow the definition of what constitutes 'regulatory or treaty levels' or 'below detectable levels' to be constantly refined. But it may never be zero.

[18] As with many aspects of this work, the term 'prove' is used in a statistical and risk sense and not in an absolute deterministic sense.

[19] Many of the protocols that have potential value in terms of 'protecting' sensitive information have already been evaluated and implemented in other treaties. One particular example that AWE has experience of is the 1993 Chemical Weapon Convention's managed access procedures for on-site inspections.

[20] Passive techniques rely on the detection of emissions from an object, while active techniques require that the object be irradiated by a source of energy, for instance neutrons, a laser or a sound wave. For a review of these techniques, see Garry George *et al., Confidence, Security and Verification,* AWE, 2000, available at www.awe.co.uk.

[21] AWE Burghfield is one of the two main AWE sites. Its purpose is to assemble and disassemble warheads. Among other things, AWE Aldermaston is the location where fissile component manufacture takes place.

[22] See, for instance, D.W. MacArthur and R. Whiteson, 'Comparison of hardware and software approaches to information barrier construction', *Los Alamos Unclassified Report,* LAUR-00-2422, 2000. Information barriers have been studied and proposed for the Trilateral Initiative and the Fissile Material Transparency Technology Demonstration.

[23] The process of establishing the provenance of a warhead is considered essential in confirming that the object presented for verification has come from the declared stockpile.

[24] *Confidence, Security and Verification,* p. 40.

[25] The term pit is used to describe the fissile sub-assembly in the primary or first stage of a nuclear weapon.

[26] The AWE research programme is designed to make best use of existing technologies. For example, the IAEA's technologies will be evaluated for their value in a potential warhead verification regime, with low radiation signatures, different gamma and neutron spectra, and greater security sensitivities compared to reactor materials and waste streams.

[27] See Yahya Dehqabzada and Ann Florini, 'Secrets for sale: how commercial satellite imagery will change the world', *Carnegie Endowment for International Peace Report,* Carnegie Endowment for International Peace, Washington, DC, 2000, available at www.ceip.org.

[28] See, for instance, the CTBT text at the US Department of State website www.state.gov.

[29] The term 'system' means the collective and potentially complex properties of an assembly of components as being more than the sum of the parts. For instance, an assembly of nuclear weapon components has the collective property of yield, which the individual components do not. Combining warheads with delivery systems creates a deterrent. The synergy of the different monitoring systems in the CTBT is another example of a system property that the individual components do not possess. Thus, in arms control system studies one looks at integrating individual verification components into a 'system' that has the desired emergent properties, such as a robust chain of custody or high confidence authentication.

[30] There are many ways to describe data fusion. The following definitions are based on those found at the National Geophysical Data Center (www.ngdc.noaa.gov) 1. Data fusion is the seamless integration of data from disparate sources. 2. The opposite of data fission: Data fission could be considered the result of developing separate data sets from a single source. The data are separated after measurement for storage in different locations. Data fusion would be the process of re-joining, or integrating, these data. Data fission may be needed in an arms control regime to 'protect' national security or to satisfy proliferation sensitivities.

[31] See, for example, Robert Rinne, 'An alternative framework for the control of nuclear materials', Centre for International Security and Co-operation (CISAC), May 1999.

[32] Discussion took place on how the work could proceed, and participants welcomed the openness that

AWE has shown. A pamphlet offering a flavour of the survey responses, along with the presentation, was published in 2001 and is available at www.awe.co.uk.

[33] See, for instance, Melvin Best *et al.* (ed.), 'Strategic stability in the post Cold War world and the future of nuclear disarmament', NATO Advanced Studies Workshop, Kluwer, The Hague, 1995.

12

Non-governmental monitoring of international agreements

Oliver Meier and Clare Tenner

Over the past decade, the practice of verifying state party compliance with international agreements has expanded rapidly. The conclusion of major multilateral arms control and disarmament treaties such as the Chemical Weapons Convention (CWC) and the Comprehensive Nuclear Test Ban Treaty (CTBT), which are independently monitored by dedicated international agencies, has increased the demand for verification expertise. Unlike their predecessors, new multilateral environmental agreements (MEAs), such as the 1987 Montreal Protocol[1] and the 1997 Kyoto Protocol,[2] contain explicit provisions for verification. New verification technologies are being developed and new actors are becoming involved in monitoring compliance with international agreements.[3]

Much has been written about the role of non-governmental organisations (NGOs) in initiating and influencing negotiations on multilateral agreements.[4] However, NGOs are also increasingly involved in the implementation of such agreements, sometimes directly and sometimes by assisting states parties in implementation.[5] NGO involvement includes monitoring the activities of governments and non-state actors in order to detect and publicise breaches. In some cases NGOs assist states in bringing themselves back into compliance.

This chapter begins by describing the involvement of NGOs in the monitoring of existing or anticipated arms control and environmental agreements. It then identifies the strengths and weaknesses of treaty monitoring by such civil society actors[6] and examines the dilemmas facing them in undertaking such activities. Finally, the concluding section suggests ways in which the interaction between official verification mechanisms and non-governmental actors can be improved.

Although much of the evidence presented here is anecdotal, we hope to show that NGO monitoring and official verification mechanisms are complementary

and that verification can be strengthened if the two work hand-in-hand, while maintaining their autonomy.

NGO involvement in monitoring multilateral agreements

NGOs collect, analyse and disseminate data relevant to compliance with international agreements:

- officially, as part of a formal international verification mechanism;
- quasi-officially, loosely linked to official mechanisms; or
- informally, outside official verification mechanisms.

Official roles for NGOs

In some cases, NGOs have been able to establish formal links to official verification mechanisms. While such links are rare in the field of arms control, MEAs are more open to involvement by civil society actors, who often play a central role in the monitoring of such agreements. Since the mid-1980s it has become standard practice in MEAs to give individuals and groups the right to observe official meetings, unless states parties object.[7] NGOs usually also have access to official documents and sometimes the right to make statements to meetings of states parties.

NGOs with an official role in the verification of an MEA tend to have been deeply involved from the outset in its inception and negotiation. Examples are the two 'flagship' wildlife agreements, the 1973 Convention on International Trade in Endangered Species (CITES) and the 1971 Ramsar Convention on Wetlands. Both make formal provision for the participation of NGOs in their implementation and verification procedures.

CITES provides for 'suitable' NGOs to assist the Secretariat 'to the extent and in the manner [the Secretariat] deems appropriate'.[8] National reports under CITES are supplemented by information compiled by NGOs involved in two monitoring mechanisms. First, the Wildlife Trade Monitoring Unit (WTMU), operated by the World Conservation Monitoring Centre (WCMC), is under contract to the CITES Secretariat to monitor trade records of wildlife species listed in the appendices to the Convention. The WTMU maintains a database extending back to 1975 which contains over half a million records. These records allow the imports and exports of CITES parties to be cross-checked. When records do not match, the WTMU

reports the anomaly to the CITES Secretariat. Second, Trade Records Analysis of Fauna and Flora in Commerce (TRAFFIC) collects information on illegal trade in wildlife and transmits such information directly to the Secretariat and national authorities.[9] Both organisations were established by NGOs, although the WTMU is now a part of the United Nations Environment Programme (UNEP).[10]

The World Conservation Union (IUCN)—a distinctive government/non-government hybrid—essentially acts as the secretariat to the Ramsar Convention.[11] The Ramsar Secretariat has signed memoranda of co-operation with other NGOs, such as Wetlands International, Birdlife International, the Nature Conservancy and the Society of Wetlands Scientists.[12]

The 1993 North American Agreement on Environmental Cooperation (NAAEC) permits public exposure of governments which fail to enforce domestic environmental laws in Canada, Mexico and the US. Under the Citizens Submissions on Enforcement Matters mechanism, individuals and NGOs can submit documented assertions that an NAAEC party is failing to enforce its environmental law to the North American Commission for Environmental Cooperation. The Commission may investigate the claim and publish a factual record of its findings.[13] NGOs have attempted to use the NAAEC to highlight non-compliance by the three countries with some multilateral environmental agreements to which they are party.[14]

Under the Kyoto Protocol on climate change, NGOs may be eligible to submit evidence directly to the agreement's Compliance Committee. The rules for that Committee are not yet agreed, but the latest draft states that during a compliance proceeding 'competent intergovernmental and non governmental organisations may submit relevant factual and technical information to the relevant branch'.[15] The Committee is not obliged to do anything with such information, but, according to the draft, 'may seek expert advice', including from NGOs.

Interaction between NGOs and official arms control and nonproliferation institutions is, by comparison, limited. Under most multilateral agreements, the formal contribution of NGOs to implementation is restricted to statements delivered to meetings of state parties. For example, it has become common practice in the review conferences for the Nuclear Non-Proliferation Treaty (NPT) and the Biological and Toxin Weapons Convention (BWC) to set half a day aside for NGO statements to the plenary.[16]

A somewhat more expansive role for NGOs is envisaged in respect of agreements that bridge arms control and international humanitarian law. The International Committee of the Red Cross (ICRC) safeguards and promotes humanitarian treaties, such as the 1949 Geneva Conventions and their 1977 Protocols, the 1954 Hague Convention on the Protection of Cultural Property During Armed Conflict, the 1980 Convention on Certain Conventional Weapons (CCW) and its protocols, the 1997 Ottawa Convention banning anti-personnel landmines and the 1998 Statute of the International Criminal Court. In trying to assist states to implement such agreements, the ICRC has encouraged them to establish national inter-ministerial committees on international humanitarian law. These are responsible for taking all necessary measures, including the monitoring of national obligations. These committees are open to participation by non-governmental experts, but NGOs hardly ever seize the opportunity.[17]

The sole example of a formal agreement between a non-governmental body and an international arms control verification organisation is that between the Stockholm International Peace Research Institute (SIPRI)—an independent institute established and largely funded by the Swedish government—and the Preparatory Commission for the Organization for the Prohibition of Chemical Weapons (OPCW), which set up the verification system for the CWC. The two institutions exchanged letters which established rules for sharing (unclassified) information. The exchange of letters was repeated after the CWC entered into force in 1997.[18]

Quasi-official roles

Frequently, NGOs interact with formal verification systems quasi-officially, but without the benefit of a treaty provision or a formal mandate from the official verification organisation concerned. Most of these NGOs provide information relevant to non-compliance.

Under some MEAs, NGOs are able to submit evidence of non-compliance to the verification organisation, secretariat or compliance committee. Such documents are distributed to member states and may be considered official documents if the relevant body so decides. One example is the 1980 Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) which, as part of the 1959 Antarctic Treaty System, is dedicated to conserving marine life in the Southern

Ocean. NGOs which are members of the Antarctic and Southern Ocean Coalition (ASOC) have used the document submission procedures under the CCAMLR to name countries or citizens of countries that they consider to be in non-compliance with the convention. For example, ASOC in the early 1990s reported violations by the Russian fishing industry which Russia ultimately admitted.[19]

NGOs can also have indirect input into the official system by assisting parties with their reporting. In 1999 the Environmental Investigation Agency (EIA), a London-based NGO, purchased communication and surveillance equipment to help Kenyan Wildlife Service rangers monitor elephant poaching, which is illegal under CITES.[20] Some MEAs expressly encourage NGO involvement in the preparation of national reports. The Fifth Conference of the Parties to the Convention on Biological Diversity in May 2000 agreed new reporting guidelines for parties' second national reports, recommending that they be prepared through a consultative process involving all relevant 'stakeholders', presumably including NGOs.

Compared to their role in MEAs, NGOs generally have a less formal role under arms control and nonproliferation agreements. Under the Ottawa Convention,[21] which provides only a rudimentary verification mechanism, NGOs have assumed a quasi-formal role in monitoring the landmine ban. Landmine Monitor, a coalition of NGOs, collects information on national compliance and assesses progress and problems in implementation. The network consists of 115 researchers from 95 countries and produces an annual report, currently in its third edition, covering every country in the world.[22] Landmine Monitor works closely with governments and is funded in large part by them, but is not formally recognised either in the treaty or by the treaty's implementation bodies.[23]

However, as an initiative of the International Campaign to Ban Landmines (ICBL)—a driving force behind the Ottawa Convention—Landmine Monitor's findings carry significant weight. They are tabled at the annual conferences of states parties and introduced by an ICBL representative. Alleged state party violators are named, as are signatories that have allegedly violated the spirit of the agreement and, unusually, non-states parties that would be in violation had they signed the treaty. At the Third Conference of States Parties, held in Managua, Nicaragua, in September 2001, one state party, Uganda, was accused, along with six signatories (Angola, Burundi, Eritrea, Ethiopia, Rwanda and Sudan), of having used mines.

Another example of an NGO providing information for a treaty-based verification system is the interaction between the Center for Nonproliferation Studies (CNS), Monterey Institute of International Studies, and the International Atomic Energy Agency (IAEA). The CNS maintains five databases of current and archived information, based on open-source data compiled from over 340 source publications, on the global proliferation of weapons of mass destruction and their delivery systems.[24] The IAEA uses information from these databases (and other open sources) to supplement its own data from states' declarations and on-site activities. Inconsistencies between official data and open sources can trigger further verification activities.[25]

Unofficial roles

In the majority of cases, NGOs monitor compliance with an international agreement completely outside the formal system. These 'citizen watch' activities take place with regard to both environmental and arms control agreements. They range from collecting and analysing open-source information to monitoring test sites on the ground or watching whaling boats.

Such independent monitoring efforts are often based on the systematic collection and evaluation of open source information. The information collated can be disseminated to expose non-compliant behaviour and embarrass governments into compliance.[26] To do this NGOs often have their own publications[27] as well as working directly with the media and modern communication technologies like the Internet. There is now a myriad of cost-free, issue-specific e-mail list servers and newsletters which distribute verification-related information globally.[28]

In addition, some NGOs make their information directly available to international institutions and national and international decision-makers, including diplomats and the staff of international verification agencies. They also play a watchdog role at the national level, alerting governments to infractions, investigating illegal operations and pressuring state authorities to improve domestic laws and enforcement.

NGOs analyse the work of verification institutions in both environmental and arms control regimes. This includes following the proceedings of such institutions, attending meetings when they are permitted to, disseminating information about their work and—last but not least—highlighting deficiencies and making proposals for improving their operations.[29]

The strengths of NGO monitoring

NGOs have strengths which commend them for a more substantial role in the monitoring of international agreements.

Access to information

Official verification procedures often depend on limited information. States parties determine what kind of information can be used by their official verification organisations. NGOs, though, are free to use whatever information and information sources they wish. Under most arms control agreements NGOs have little or no access to confidential information supplied by states to international verification organisations[30] and depend for their monitoring activities entirely on information obtained outside the formal system. This limitation is increasingly turning into a strength. In many cases, open-source information can prove just as effective as officially declared information in detecting breaches of international commitments.[31]

In the environment field there has been a movement towards freedom of access to information in recent years which has helped NGOs gather information from government sources. For example, Principle 10 of the 1992 Rio Declaration on Environment and Development provides that: 'At the national level each individual shall have appropriate access to information concerning the environment that is held by public authorities . . . Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided'. This principle is enshrined in the 1998 Convention on Access to Information, Public Participation in Decision Making, and Access to Justice in Environmental Matters (the Aarhus Convention) which gives the citizens of the parties rights in environmental matters.[32] The Convention requires all public authorities to disclose information related to the state of the environment and to the environmental impact of policies and projects.

NGOs can also use information provided by 'whistle-blowers' to expose breaches of international commitments or norms. One of the most dramatic examples is that of Alexandr Nikitin, who exposed information on radioactive contamination of the Arctic seas resulting from accidents involving nuclear submarines belonging to Russia's Northern Fleet. The report was published by the Bellona Foundation, a Norwegian NGO working on environmental and arms control issues.[33] Andrei Zolotkov, a former Russian radiation safety engineer, also provided NGOs with

information exposing Soviet dumping of high-level nuclear waste in the Arctic seas. This information was presented by Greenpeace to the 1991 Consultative Meeting of the parties to the London Dumping Convention[34] and was partly responsible for triggering a wide array of regulatory responses from the parties.[35]

The use of remote sensing technologies by NGOs to detect treaty violations is a relatively new development,[36] made possible partly by improvements in the availability and quality of commercial satellite imagery. It has been successfully used to detect violations of major arms control agreements.[37] Seismic networks established for scientific research purposes can also be used to monitor compliance with the nuclear test ban.[38]

NGOs can sometimes collect their own information on-site and may even have access to locations that are out of bounds to official verification mechanisms. It was, for example, an NGO which in 1998 initiated an on-site investigation of the Iraqi chemical weapons attack on the Kurdish town of Halabja that had taken place 10 years earlier.[39]

In the environment field, NGOs often gather their own information when official monitoring appears to be inadequate. For example, NGOs have independently collected data on elephant poaching following the resumption of sales of ivory under CITES. The World Wide Fund for Nature's (WWF) Southern Africa Regional Programme Office has carried out its own aerial survey of elephants in Zimbabwe which showed a large number of carcasses, indicating increased poaching.[40]

The use of a wider range of information sources can expose weaknesses in the formal verification procedures of MEAs. The formal monitoring procedures set up for ivory sales under CITES in 2000, based on relatively limited official reporting, did not show a rise in elephant poaching. The EIA considered the system too weak and used open sources, such as the WWF aerial survey, to show both a dramatic increase in poaching and a rise in major illegal ivory seizures worldwide. Furthermore, it alerted the CITES Secretariat to inconsistent reporting of ivory stocks by Zimbabwe and alleged that this was done by corrupt government officials.[41]

Assessment capabilities

The ability of NGOs to assess the implementation of international commitments can rival that of governments or international organisations. The non-governmental

International Waterfowl Research Bureau (IWRB), for example, plays a central role in monitoring compliance with the Ramsar Convention on Wetlands because of its technical competence. The IWRB even developed the computerised database of Ramsar sites for the Secretariat.[42]

In many cases the sheer number of NGOs and the size of their membership provides an effective means to monitor international commitments. This strength can be multiplied if NGO monitoring efforts are coordinated internationally, either by an umbrella NGO or by an international agency. Thus, TRAFFIC International is able to provide a considerable amount of compliance information in respect of CITES because it has 22 offices worldwide, connected to a network of local and regional NGOs.[43] Landmine Monitor has researchers, mostly based *in situ,* investigating the landmine situation in every country.

NGOs can also enlist the help of citizens around the world in establishing a global network of monitors. The prohibition against the use of biological weapons (BW) is being *de facto* verified by the international community of doctors and epidemiologists as they monitor for unusual outbreaks of disease. These efforts, which are undertaken with the goal of improving public health, are co-ordinated by the World Health Organization (WHO) and an NGO, the Federation of American Scientists (FAS).[44]

In many instances, peer review processes guarantee the accuracy of information provided by NGOs. Those working on the same issue check the veracity of each other's assessments. These, in turn, will be scrutinised by the media and, most intensely, by governments and the relevant international organisations. Scientific peer review, for example, is at the core of non-governmental assessments of seismic events which are alleged to be nuclear tests.[45]

Speed

Since NGOs do not have to act within formal verification procedures, they can provide relatively quick assessments of (non-)compliance. This can be essential when grave violations of treaties are suspected, for example, those relating to weapons of mass destruction. The Internet and other modern communication technologies disseminate NGO assessments instantaneously. VERTIC helped pioneer this in the test ban monitoring field with regard to a Chinese nuclear test in October

1993. Through a mixture of 'techno-detective work, policy inference, bureaucratic hassles, and electromagnetic glitches' the organisation was the first to warn that a test was about to happen and to provide details of the actual explosion only three hours after it had been conducted.[46]

Focus

Unlike official verification systems, which have to monitor treaties universally, and perhaps more like national intelligence agencies, NGOs can focus their verification efforts on specific areas and countries of concern. Some nuclear test sites are now monitored from space by NGOs which buy commercial satellite photographs and post them on the Internet.[47] The EIA has focused its elephant poaching investigations on Zimbabwe, a country of particular concern.

Scope

NGOs themselves define the scope of their monitoring efforts and, unlike verification agencies, are not bound by narrow interpretations of their mandates. Generally they are concerned not only about compliance with the letter of an agreement, but also with its spirit.[48] Greenpeace, for example, has for many years monitored the compliance of 'problem states' Norway and Japan with the 1946 International Convention for the Regulation of Whaling (ICRW). Even though these two countries are formally in compliance with the treaty, Greenpeace publicises their whaling practices because it believes they are unacceptable.

NGOs are also free to monitor non-parties to an accord, including sub-state actors, such as companies and rebel forces. Thus, Landmine Monitor monitors the compliance of all states with the Ottawa Convention whether they have signed it or not. NGOs thus help to universalise the norms contained in such treaties.

Political independence

Accusing powerful states of non-compliance may be politically difficult both for international verification organisations and for states parties to an agreement. Politically independent NGOs, however, may feel no such inhibitions. Members and funders of NGOs often expect these organisations to criticise all states, including those which are usually able to use their power and influence to avoid criticism by other states.[49]

Because NGOs generally do not have access to political decision-making procedures, their main recourse is to embarrassing governments or other treaty parties into better behaviour. 'Naming and shaming' is not only an effective means of exposing treaty violations; it can also help deter non-compliance. This is well illustrated by the European Union's environmental directives, which were often poorly implemented by member states until compliance information started to become public. Exposure to public scrutiny and criticism led many member states to improve their performance.[50] And it was only after public exposure by NGOs that Australia and other countries cut the number of landmines retained for training purposes under the Ottawa Convention.

The weaknesses of civil society monitoring

In addition to having notable strengths, NGOs can be hampered by a range of external or self-imposed limitations.

Limited access to information

Lack of access to official information or to locations of suspected or potential treaty violations limit NGO monitoring efforts in some fields. Many violations of arms control agreements occur, for instance, at or near military facilities. NGOs and independent scientists are usually not allowed to monitor the nuclear test ban at or near test sites. In the environmental area, too, NGOs will often not have ready access to remote locations where treaty transgressions may occur.

Limited reporting

Many NGOs focus on monitoring their own governments. Comparatively few have an international perspective or the resources to monitor treaties globally. Non-governmental attempts to monitor treaty-relevant developments comprehensively are rare. Prime exceptions are the *Landmine Monitor Report* and the monitoring of states parties' implementation of CITES by TRAFFIC.

States with open political systems tend to have more NGOs and they are able to operate freely.[51] Since it is easier to monitor their host countries, it tends to be the compliant rather than non-compliant states which are most closely scrutinised. There is also a North–South divide, with more and better endowed NGOs in developed than in developing countries. Those in developing countries are often

funded and/or managed by developed country headquarters. Even *Landmine Monitor Report,* the most comprehensive attempt at civil society monitoring, generally contains better information on developed states which are in compliance than on those developing states which are the cause of compliance concerns. The Climate Action Network has just 42 member organisations in Africa compared to 84 in Western Europe.[52]

Many NGOs focus on issues that are likely to attract maximum press exposure rather than those of less public interest. The alleged threat of depleted uranium is much more attractive to the press than the negotiations on a protocol to verify the BWC, although the latter is far more important to human welfare than the former. Major compliance issues relating to weapons of mass destruction or environmental or wildlife protection are attractive and can easily be 'sold' to the media. They in turn create public interest and help garner new supporters for the NGO cause. Relatively minor compliance issues, such as non-payment of dues or delayed declarations, are often ignored by NGOs, even though these can, in the long run, pose a serious threat to an international agreement.

Inconsistency

International verification agencies are mandated to track treaty-relevant behaviour continuously. NGOs, however, often have relatively short attention spans and switch issues as they wish. Their monitoring priorities are often not dictated by consistent criteria but by funding opportunities and the preferences of board members, leaders or members.[53] One result is that NGO interest usually peaks around major events, such as review conferences, or when suspicions about high-profile treaty violations emerge. Attention to newly negotiated treaties may fall away once the day-to-day business of implementation begins. For example, NGO attendance at the Conference of States Parties to the 1979 Convention on the Conservation of Migratory Species of Wild Animals fell from 30 organisations in 1985 to only 10 in 1994.[54] Just as official verification organisations may have difficulty sustaining their focus, so do NGOs, especially if treaty violations are expected to be rare.

Unreliability

The reliability of information supplied by NGOs varies considerably. This may be partly explained by a lack of access to official information, resources and technical

expertise. But the ethos, leadership, composition and membership of NGOs also matter. Some are volunteer organisations whose members may not have the time and resources to consistently check the reliability of their information. Others may just be inattentive or careless.

Bias

In choosing the focus and scope of their activities, NGOs may display a political bias in reporting compliance issues. NGOs disagree among themselves, for instance, over whether certain nuclear weapon research activities, such as subcritical nuclear testing, constitute a breach of the letter and/or spirit of the CTBT. NGOs can also be manipulated and used by governments.[55] Their political independence is relative: organisations depend on funding from members and/or foundations, and sometimes governments, with their own political priorities. Many NGOs rely on the media to publicise their findings, obliging them to focus on subjects of interest to journalists and to simplify the issues involved. The media can readily misunderstand, exaggerate or misuse information provided by NGOs, especially those unskilled in handling the media.

Conclusions

NGOs have a unique contribution to make to the monitoring of international agreements. Their strengths enable them to identify and highlight treaty violations in ways that established verification mechanisms cannot. Many of the inherent shortcomings of NGO monitoring efforts are obvious and can be taken into account by those using the information.

More serious from a verification point of view are the political dilemmas that NGOs must tackle if they want to move beyond unofficial monitoring roles and become involved with official political mechanisms.

There is a trade-off between political independence and involvement with official bodies. From an NGO perspective, there are benefits to be gained from such involvement, such as better access to information, enabling them to assess problems more accurately and potentially improving the quality of their work. Recognition by international organisations as partners gives them additional legitimacy and may attract additional funding or members. Most are aware of the fact that 'high-

level support is not always necessary . . . but usually little is accomplished without at least some of it'.[56]

NGOs are also aware that 'while you can bite the hand that feeds you, you cannot afford to bite it off'. They may thus self-censor their work for fear of being excluded from official mechanisms. NGO monitoring activities can also become too dependent on official data, impairing NGO's judgement. For example, while TRAFFIC was only allowed to use data provided to the formal system to carry out its official mandate of monitoring elephant poaching, the EIA, using a range of independent sources, was able to identify increased poaching more accurately.[57]

NGOs, just like governments, have to weigh the benefits of publicly accusing states of non-compliance against the benefits of working quietly behind the scenes. Exposing non-compliant behaviour through press releases and other media activity can have great political impact and satisfy the demands of journalists or organisation members. Media coverage can also be used as an indicator of 'success' for funding applications and to publicise the results of individuals' research or campaigning efforts. But such a strategy can be problematic and potentially counter-productive in the long run. Being politically aggressive can undermine the basis for co-operation with governments and international agencies and endanger access to information. Quietly working with the parties involved, trying to find solutions to compliance problems and reporting carefully and in a balanced manner can avoid these problems. But it is less spectacular, creating the public impression that an NGO is not taking a position on the issue and is too close to the official system.

NGOs remain vulnerable and the legitimacy of their role in treaty implementation is not widely accepted. While states are accountable to other parties to treaties and (at least in most cases) to their citizenry, NGOs may derive their legitimacy from a number of sources. Grassroots NGOs speak on behalf of their membership, which may range in size from the tens to the millions. If an organisation works internationally it may derive additional legitimacy from representing diverse constituencies, but there may not always be a mechanism allowing the range of views to be heard. Non-membership NGOs are usually accountable only to their funders, which can be philanthropic organisations, governments or other NGOs, and their governing boards. In these cases it is primarily the quality of the work produced by an NGO that legitimises it.

It is clear from even cursory observation of current political and technical trends that the capacity of NGOs to monitor international agreements is likely to increase. The information revolution is at the heart of this development. First, the amount of open-source information (on which NGOs rely for their monitoring activities) will increase both relatively and absolutely.[58] Improvements in their ability to process and transmit information, as well as better access to remote sensing data, will also enable NGOs to monitor relevant developments better.

This is reinforced by political trends. The number of NGOs is increasing exponentially. They are becoming more professional and often more subtle in their approach to treaty implementation. International organisations are increasingly opening themselves up to interaction with civil society actors.[59] On the down side, closed societies and developing countries, from China to Iran, remain suspicious of NGOs and oppose their involvement in treaty monitoring.

Increasingly, though, the question is no longer whether but how formal and informal mechanisms can interact to make verification more efficient and effective. A few lessons can be learned from comparing NGO involvement in arms control and in environmental agreements. NGO monitoring is most effective when:

- they coordinate their monitoring activities internationally;
- they have good access to official declarations and other relevant information;
- there is a clear legal basis for the interaction between official verification mechanisms and non-governmental actors and/or the verification mechanism provides a role for NGOs; and
- international organisations and states parties are open to NGO contributions.

While it is important that NGOs and international organisations maintain their autonomy and focus on their relative strengths, verification can be strengthened if the international organisations:

- become as transparent as possible, thereby giving NGOs more access to data and information;
- provide better channels for NGOs to supply information to international organisations. While some do have NGO liaison officers, they are usually concerned with procedural issues rather than providing opportunities for interaction on matters of substance; and

- establish clear rules for interaction between NGOs and formal international organisations. In some cases, there may be merit in concluding arrangements detailing the rights and obligations of both sides. This could alleviate some of the difficulties arising from the current *ad hoc* co-operation, which puts NGOs at the mercy of political consensus in the verification regimes' decision-making bodies.

At the same time, NGOs can increase the likelihood that information they provide will be used by official verification organisations if they keep in mind the latter's requirements and constraints. Information should be relevant, appropriately referenced and wherever possible comprehensive and consistent. NGOs should seek to maintain the highest standards of integrity when compiling and using information, especially when accusing states of non-compliance. NGOs need to be as transparent and professional in their operations as they wish governments and international organisations to be.

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Endnotes

[1] 1987 Protocol on Substances that Deplete the Ozone Layer to the 1985 Convention for the Protection of the Ozone Layer.

[2] 1997 Protocol to the 1992 United Nations Framework Convention on Climate Change.

[3] Verification is a process which establishes whether states are in compliance with their treaty obligations. Verification regimes have three goals: detecting cases of non-compliance in a timely manner, deterring non-compliance, and providing a framework for co-operation and confidence-building. See Trevor Findlay, 'Introduction: the Salience and Future of Verification' in Trevor Findlay (ed.), *Verification Yearbook 2000,* Verification Research, Training and Information Centre (VERTIC), London, December 2000, pp. 15–22.

[4] The literature on the role of NGOs in the fields of arms control and the environment is now abundant. Examples include Elmar Altvater, Achim Brunnengräber and Markus Haake (eds), *Vernetzt und verstrickt,* Westfälisches Dampfboot, Münster, 1999; Elin Enge and Runnar I. Malkenes, 'Non-Governmental Organisations at UNCED: Another Successful Failure?' in Helge Ole Bergesen and Georg Parmann (eds), *Green Globe Yearbook of International Co-operation on Environment and Development,* Oxford University Press, Oxford, 1993, pp. 25–35; Matthew Evangelista, *Unarmed Forces: The Transnational Movement to End the Cold War,* Cornell University Press, Ithaca, NY and London, 1999; Cathleen S. Fisher, 'Reformation and Resistance: Nongovernmental Organizations and the Future of Nuclear Weapons', *Stimson Center Report no. 29,* The Henry L. Stimson Center, Washington, DC, May 1999; Ann M. Florini (ed.), *The Third Force: The Rise of Transnational Civil Society,* Japan Center for International Exchange and Carnegie Endowment for International Peace, Tokyo and Washington, DC, 2000; Margaret E. Keck and Kathryn Sikkink, *Activists Beyond Borders: Advocacy Networks in International Politics,* Cornell University Press, Ithaca, NY and London, 1998; Kal Raustiala, 'States, NGOs, and International Environmental Institutions', *International Studies Quarterly,* vol. 41, no. 4, 1997, pp. 719–740; Philippe Sands, 'International Law, the Practitioner and Non-State Actors' in Michael Anderson (ed.), *The International Lawyer as Practitioner,* British Institute of International Comparative Law, November 1998; and Nina Tannenwald, 'The Bomb and Its Discontents', *International Studies Review,* vol. 1, no. 3, fall 1999, pp. 105–188.

[5] Rebecca Johnson differentiates between three types of NGOs: elite, public movement campaigns and non-violent direct action. Only the first two are relevant to treaty monitoring, although 'elite' research organisations predominate. See Rebecca Johnson, 'Advocates and Activists: Conflicting Approaches on Nonproliferation and the Test Ban Treaty' in Florini (ed.), pp. 49–81 and 52–53.

[6] This is another term for 'societal verification', 'the involvement of civil society in monitoring national compliance with, and overall implementation of, international treaties or agreements'. See Dieter Deiseroth, 'Societal Verification: Wave of the Future?' in *Verification Yearbook 2000,* p. 265.

[7] Raustiala, p. 723.

[8] Convention on the International Trade in Endangered Species (CITES), Article 12.1.

[9] John Lanchbery, 'Long-Term Trends in Systems for Implementation Review in International Agreements on Fauna and Flora' in David Victor, Kal Raustiala and Eugene Skolnikoff (eds), *The Implementation and Effectiveness of International Environmental Commitments,* MIT Press for the International Institute for Applied Systems Analysis (IIASA), Cambridge, Mass., 1998, p. 71.

[10] The history of these organisations is convoluted and illustrates the degree to which NGOs and the formal systems are related in the environment field. TRAFFIC was founded in 1978 by the World Wildlife Fund (WWF) and the International Union for the Conservation of Nature (IUCN). The WCMC was established later, by the IUCN, WWF and UNEP, under TRAFFIC. In 1990 TRAFFIC and WCMC became separate organisations and in 2000 the WCMC became part of UNEP. See www.wcmc-unep.org; and Lanchbery, p. 71.

[11] Raustiala, p. 723.
[12] www.ramsar.org.
[13] www.cec.org.
[14] One submission awaiting a decision from the Council alleges that the US government is failing effectively to enforce part of its Migratory Bird Treaty Act (MBTA) which prohibits the killing of migratory birds without a permit. NGOs, including the Centre for International Environmental Law, claim that the MBTA implements four international treaties aimed at protecting migratory birds. See www.ciel.org.
[15] United Nations Framework Convention for Climate Change (UNFCCC) document UNFCCC/CP/2001/2/Add. 6 Article 8, paragraphs 4/5.
[16] NGOs usually try to collaborate on statements to meetings of states parties. Many official disarmament conferences, however, still either take place behind closed doors (for instance, CTBT Preparatory Commission meetings) or give NGOs access only as observers (for example, meetings of the Conference on Disarmament in Geneva, Switzerland).
[17] Private communication. Information about these mechanisms can be found on the ICRC website at www.icrc.org.
[18] Private communication with Jean Pascal Zanders, Stockholm International Peace Research Institute (SIPRI).
[19] Glenn Wiser, *Transparency in Twenty-First Century Fisheries Management,* Center for International Environmental Law (CIEL), Washington, DC, July 2000, p. 31.
[20] 'From the Frontline: Allan Thornton Reporting from Kenya', *The Investigator,* winter 1999/2000 (www.eia-international.org).
[21] Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction.
[22] See www.icbl.org; and the chapter by Angela Woodward in this volume.
[23] VERTIC has also produced a guide to assist states parties in completing their compliance reports under Article 7 of the treaty. See www.vertic.org.
[24] See cns.miis.edu.
[25] Anita Nilsson, 'Information Review and Evaluation in the Framework of the Strengthened Safeguards System' in Carlo Foggi (ed.), *Proceedings of a Seminar on Modern Verification Regimes: Similarities, Synergies and Challenges,* European Safeguards Research and Development Association (ESARDA), Helsinki, Finland, 12–14 May 1998, pp. 163–66.
[26] Civil society actors lack other, traditional means of power. Therefore, 'transnational civil society exercises influence through its ability to make someone, policy makers or publics, listen and act. The currency of its power is not force, but credible information and moral authority' (Ann M. Florini and P. J. Simmons, 'What the World Needs Now?' in Florini (ed.), p. 11).
[27] Examples of NGOs providing regular and comprehensive information on compliance include the SIPRI Yearbook, the *Programme for Promoting Nuclear Non-Proliferation's Newsbrief* (on nuclear developments), the *Bulletin of the Harvard–Sussex Program on CBW Armament and Arms Limitation* (on chemical and biological weapons developments) and VERTIC's own periodical, *Trust and Verify*. See www.ppnn. soton.ac.uk (the PPNN Newsletter is now discontinued); fas-www.harvard.edu; and www.vertic.org. The Climate Action Network Europe produces *Hotspot,* which monitors implementation of the UNFCCC.
[28] For example, *Proliferation News* published by the Non-Proliferation Project, Carnegie Endowment for International Peace, Washington, DC; *ChemBio Weapons and WMD Terrorism News* published in Washington, DC, by the Office of the Center for Nonproliferation Studies of the Monterey Institute of International Studies; and *RANSAC Nuclear News* published by the Russian American Nuclear Security Advisory Council.
[29] For example, VERTIC's mission is 'to promote effective and efficient verification as a means of ensuring confidence in the implementation of international agreements and intra-national agreements with

international involvement'. Along with verification, VERTIC also concerns itself with the negotiation, monitoring and implementation of such agreements and the establishment of confidence-building measures (CBMs)to bolster them. See www.vertic.org.

[30] Declarations are usually treated as confidential. The exception is the Ottawa Convention. States' declarations are now posted on the website of the UN Department for Disarmament Affairs. See domino.un.org/ottawa.nsf. See also Trevor Findlay and Angela Woodward, 'State Compliance with the Ottawa Convention', *Trust and Verify,* no. 90, March 2000, pp. 1–3. Some information submitted by states parties as part of CBM provisions may be accessible, as in the case of the CBMs under the BWC. See Marie Isabelle Chevrier and Iris Hunger, 'Confidence-Building Measures for the BTWC: Performance and Potential', *The Nonproliferation Review,* vol. 7, no. 3, fall/winter 2000, pp. 24–42.

[31] Open source information is that which is freely available and unrestricted. This includes information from the media, such as newspapers and journals, and publications of specialised institutions. Sometimes human sources, such as observers on the ground, and individual and organisational contacts are also included. Databases can be an important open source, even if they are commercial. See Oliver Meier, 'The Use of Open Source Information in Multilateral Arms Control and Disarmament Regimes' in *Proceedings of the Third INMM/ESARDA Workshop on Science and Modern Technology for Safeguards,* ESARDA, Tokyo, Japan, 13–16 November 2000 (forthcoming).

[32] The Convention was signed at the Fourth 'Environment for Europe' Ministerial Conference in Aarhus, Denmark, in June 1998. Forty member states of the UN Economic Commission for Europe (ECE) and the European Union have signed it, and it is expected to enter into force in 2001.

[33] Nikitin was subsequently charged with treason by the Russian authorities and acquitted after a long imprisonment (see www.bellona.no). Another example is the collaboration of the Institute for Science and International Security (ISIS) in Washington, DC, with Iraqi defector Khidhir Hamza, a former Iraqi nuclear weapons scientist. See, for example, David Albright and Khidhir Hamza, 'Iraq's reconstitution of its nuclear weapons program', *Arms Control Today,* vol. 28, no. 7, October 1998, www.armscontrol.org. More information on whistle-blowers is available at www.whistleblower.org.

[34] Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter, London, 1972.

[35] Olav Schram Stokke, 'Nuclear Dumping in Arctic Seas' in Victor, Raustiala and Skolnikoff (eds), p. 495.

[36] One of the first attempts at using remote sensing technology was made in 1986 when the Natural Resources Defense Council, a US non-governmental organisation, and the Soviet Academy of Sciences signed an agreement that led to the installation of seismic monitoring equipment near one of the Soviet test sites, Semipalatinsk in Kazakhstan, and at the US Test Site in Nevada. Even though the agreement was opposed by the US Administration of President Ronald Reagan, as well as by Soviet hardliners, US and Soviet scientists operated seismic stations near a Soviet test site during a nuclear test moratorium and were later allowed to monitor Soviet tests from 600 miles away. See, for example, Philip G. Schrag, *Listening for the Bomb: A Study in Nuclear Arms Control Verification Policy*, Westview Press, Boulder, CO, San Francisco and London, 1989.

[37] One of the largest publicly available databases of treaty-related satellite imagery is the Federation of American Scientists' website, www.fas.org. Others include that of ISIS at www.isis-online.org; and www.globalsecurity.org. Some commercial companies offer satellite imagery for sale over the Internet, including Space Imaging at www.spaceimaging.com; and Terra Server at www.terraserver.com. For a good summary of the role of commercial satellite imagery, see Yahya A. Dehqabzada and Ann M. Florini, *Secrets for Sale: How Commercial Satellite Imagery Will Change the World*, Carnegie Endowment for International Peace, Washington, DC, 2000.

[38] Already more than 1,000 seismic stations transmit data openly, in near-real time and without delay or restriction. The number of these stations is expected to grow to as many as 10,000 over the next 10

years. The CTBT's International Monitoring System, by comparison, consists of 170 seismic stations. See *Report of the Independent Commission on the Verifiability of the CTBT,* London, October 2000, www.ctbtcommission.org; and Gregory van der Vink and Terry Wallace, 'Open Data, International Law, and the Nuclear Test Ban Treaty', *Seismological Research Letters*, vol. 70, no. 6, November/December 1999, pp. 663–65.

[39] See 'Testimony of Dr Christine M. Gosden Before the Senate Judiciary Subcommittee on Technology, Terrorism and Government and the Senate Select Committee on Intelligence on 'Chemical and Biological Weapons Threats to America: Are We Prepared?', US Congress, Washington, DC, 22 April 1998, www.senate.gov.

[40] WWF Southern Africa Regional Programme Office (WWF-SARPO), 'Aerial Survey of Elephants and Other Large Animals in the Zambezi Valley Floor and Dande Safari Area/Guruve Communal Lands', October/November 1999.

[41] 'Lethal Experiment: How the CITES Approved Ivory Sale Led to Increased Elephant Poaching', Environment Investigation Agency, April 2000, www.eia-international.org.

[42] Lanchbery, p. 75.

[43] Lanchbery, p. 75.

[44] Projects such as the non-governmental ProMED mail and the WHO's Global Outbreak Alert and Response Network rely on doctors, medical staff and others reporting regularly on outbreaks of disease. They can be found at www.who.int; and osi.oracle.com. The Food and Agricultural Organization (FAO) and the World Organisation for Animal Health also maintain databases on crop and animal diseases. See www.fao.org; and www.oie.int. For a summary see Mark Wheelis, 'Investigating disease outbreaks under a protocol to the Biological and Toxin Weapons Convention', *Emerging Infectious Diseases,* vol. 6, no. 6, November/December 2000, www.cdc.gov.

[45] See, for example, Lynn R. Sykes, 'False and Misleading Claims about Verification during the Debate on the Comprehensive Nuclear Test Ban Treaty', *FAS Public Interest Report*, *Journal of the Federation of American Scientists*, vol. 53, no. 3, Washington, DC, May/June 2000.

[46] Vipin Gupta and Philip McNab, 'Sleuthing from home', *Bulletin of the Atomic Scientists,* December 1993, pp. 44–47.

[47] The FAS has published lists of (former) Chinese, Indian, Pakistani and Russian test sites. Its Internet site also contains aerial imagery and analysis of such imagery of WMD infrastructure in all relevant countries. See www.fas.org.

[48] Raustiala, p. 729.

[49] 'We are not hamstrung by existing bilateral relations or the existing baggage that most governments carry into their dealings and their assessment', says Gareth Evans, President and Chief Executive of the International Crisis Group, a private multinational organisation which monitors regional crises and reports its findings to governments, the media and the public. He is quoted in Barry James, 'Crisis group aims to fill diplomatic reporting gap', *International Herald Tribune,* 12 January 2000. See www.crisisweb.org.

[50] 'International Environment: Strengthening the Implementation of Environmental Agreements', United States General Accounting Office Report to Congressional Requesters, GAO/RCED/92-188, Washington, DC, August 1992, p. 6.

[51] In 2001, 58 countries restricted Internet access. See the website of Reporters sans Frontières, www.rsf.fr. While access to communications technology is increasing, the gap between North and South remains.

[52] *Climate Action Network International NGO Directory 2000,* Climate Network Europe, Brussels, 2000. This, of course, is a problem for official verification organisations as well, which often concentrate monitoring efforts on countries that are not of concern from a compliance perspective.

[53] Funding is, however, relatively stable for larger NGOs. A 1997 study of US foundations' funding of NGOs in the field of peace and security found that 'a stable core of larger funders have consistently sustained

programmes in peace, security, and international relations'. Shifts in funding seem to be affecting newer and smaller NGOs most. See Mary E. Lord and Mary Soley Stewart (eds), *Trends in Peace and Security Grants: A Study of Funders' Response to the Post-Cold War Era,* ACCESS: An International Affairs Information Service, Washington, DC, 1997, p. 11.

[54] Lanchbery, p. 74.

[55] In 1986 a group of highly regarded US experts were invited to Moscow to receive a briefing on an outbreak of anthrax that had occurred in1979 in Sverdlovsk and was suspected to have been related to a clandestine BW programme. After the visit and a recipricol visit by two Soviet physicians to the US in 1988, the US scientists concluded that the Soviet explanation—that contaminated meat was the cause—was plausible, but required more information to verify. Only after two visits to Sverdlosvk in June 1992 and August 1993 were the US scientists able to conclude definitively that the outbreak was linked to a Soviet BW facility. See Matthew Meselson *et al.,* 'The Sverdlovsk anthrax outbreak of 1979' in Joshua Lederberg (ed.), *Biological Weapons: Limiting the Threat*, Belfer Center for Science and International Affairs, BCSIA Studies in International Security, MIT Press, Cambridge, Mass. and London, 1999, pp. 193–209; and Ken Alibek, *Biohazard: the Chilling True Story of the Largest Covert Chemical Weapons Program in the World—Told from Inside by the Man Who Ran It,* Random House, New York, 1999.

[56] Florini (ed.), p. 214.

[57] 'From the Frontline: Allan Thornton Reporting from Kenya', *The Investigator,* winter 1999/2000, www.eia-internatinal.org.

[58] Andrew Rathmell argues that in the past the ratio between open ('white') and classified ('black') information was 80:20. Now the ratio is more likely to be 90:6:4 ('white':'black':'grey'). See Andrew Rathmell, 'The information revolution and verification' in *Verification Yearbook 2000,* p. 217.

[59] At the time of writing more than 2,000 NGOs were registered with the UN Economic and Social Council (ECOSOC) as having consultative status. See www.un.org.