no 19

WMD Verification and Compliance: The State of Play

SUBMITTED BY FOREIGN AFFAIRS CANADA AND PREPARED BY VERTIC

WMDC
THE WEAPONS OF MASS DESTRUCTION COMMISSION
www.wmdcommission.org

This paper has been commissioned by the Weapons of Mass Destruction Commission. Its purpose is to function as food-for-thought for the work of the Commission. The Commission is not responsible for views expressed in this paper.

Weapons of Mass Destruction Commission (WMDC)
The WMDC is an independent international commission initiated by the Swedish Government on a proposal from the United Nations. Its task is to present proposals aimed at the greatest possible reduction of the dangers of weapons of mass destruction, including both short-term and long-term approaches and both non-proliferation and disarmament aspects. The Commission will issue its report in early 2006.

The commissioners serve in their personal capacity. The Commission is supported by a Secretariat based in Stockholm, Sweden.

Weapons of Mass Destruction Commission
Postal address: SE-103 33 Stockholm, Sweden
Visitors' address: Regeringsgatan 30–32
E-mail: secretariat@wmdcommission.org
Website: www.wmdcommission.org

WMD VERIFICATION & COMPLIANCE

THE STATE OF PLAY

A study for the Weapons of Mass Destruction Commission (WMDC),
submitted by the Foreign Affairs Canada
prepared by
The Verification Research, Training and Information Centre (VERTIC)
London

23 October 2004

Written by Trevor Findlay with the assistance of Erik Asplund, Andreas Persbo and Angela Woodward

Introduction

This study considers the current state of play of verification and compliance arrangements in respect of multilateral arms control and disarmament agreements relating to so-called weapons of mass destruction (WMD). The study covers the principal WMD agreements and the means by which compliance with them is monitored and verified, along with the means by which compliance is ensured in case of a suspected violation. It is assumed that WMD comprise nuclear, radiological, chemical and biological weapons and their means of delivery. The study does not deal with export/import controls on WMD or their components, international controls on ballistic or other types of missiles, or multilateral treaties dealing with the deployment of weapons in outer space.

Verification

Verification is the process of gathering and analyzing information to make a judgement about compliance or non-compliance with a treaty or agreement. It aims to build trust between the parties or participants, assuring them that their agreement is being implemented effectively and fairly. Verification achieves its objectives by three means: detection; deterrence; and confidence-building. Increasingly verification systems are being expected to take account of the non-compliant activities of non-state actors, whether they base themselves in the territory of a state party or engage in activities which have an impact on a state party. Monitoring, which is sometimes equated with verification, is in this study meant to refer to the technical process of gathering information, whether by technology or by humans.

The role that judgement plays in any verification process is often murky, sometimes deliberately so. In some systems verification clearly involves verification professionals making a judgement about the evidence obtained by their monitoring systems or other means such as inspections. These conclusions are then passed to a higher, political body which makes the definitive judgement about compliance or non-compliance, in addition to considering what steps might be necessary to bring a non-compliant state into compliance. In other cases professional staff simply forward the information they have obtained to a higher treaty authority to make the compliance judgement. Even here, however, there will usually be some sorting and selection of data, which may involve judgements, explicit or implicit, about the likelihood that non-compliance has occurred.

Compliance

When a party is abiding by its obligations under an agreement it is said to be in compliance. ‘Compliance’ is also used to describe the process used to deal with questions relating to compliance and non-compliance, which, for some, runs the whole spectrum from monitoring at one end through to attempts to enforce

compliance at the other. Complicating the picture, a non-compliance case may require verification additional to that which exposed the non-compliance question in the first place. For instance a more targeted inspection might be necessary. At the other extreme, a compliance process may simply involve consultations between the parties to resolve the question at issue. Such questions can include:

- a suspicion of non-compliance;
- an allegation of non-compliance; or
- a discovery or finding of non-compliance.

A compliance process should enable the parties to successfully address all types of compliance issues and be able to take action or recommend the taking of action to deal with them. In particular, it should be able to:

- distinguish between genuine allegations of non-compliance and those based on ambiguous or misleading information or which are made for political or other purposes;
- determine that actual non-compliance has occurred;
- differentiate between minor (sometimes known as 'technical') non-compliance and substantial non-compliance; and
- determine what non-compliance is unintentional and what is deliberate.

The relationship between verification and compliance

As indicated above, verification and compliance processes cannot always be clearly separated. A verification mechanism may be used to verify ongoing compliance by parties. It should also be able to inform or trigger a compliance process, as well as providing information to confirm or refute an allegation of non-compliance. On-site inspection techniques used regularly in a continuous treaty verification process in one context (such as the taking of samples) may be used in other contexts during a fact-finding mission or challenge inspection to prove or disprove a specific allegation of non-compliance.

Above all, verification and compliance processes should be mutually reinforcing. If conducted well, they should give states increasing levels of confidence about treaty implementation and about the commitment of other parties to the fulfillment of their obligations. As in the case of an effective verification system, the existence of a credible compliance system can be an incentive to states to join a treaty (although in a small number of cases it may be a disincentive).

A verification and compliance system cannot legally deal with states that have chosen not to become party to a treaty. It also cannot substitute for credible enforcement measures. Verification and compliance systems are reliant on continuing political, financial and technical support from treaty parties. Verification, which in large part is a technical undertaking, is only as good as the tools it is provided with. Just as military technology and technology that might be used for both peaceful and non-peaceful purposes (dual-use) constantly advances,

verification is also dependent on advances in monitoring and other relevant technologies and techniques in order to remain effective.

This study will provide a snapshot of the current state of the art and science of verification and compliance not just for its own sake, but as background to consideration of future needs in the evolving international security environment.

Nuclear Weapons

Among the current verification systems relating to nuclear weapons are those that verify the ban on nuclear testing; those that verify the nonproliferation of nuclear weapons and those that deal with nuclear reductions or nuclear disarmament (to date by particular states only).

The Comprehensive Nuclear Test Ban Treaty (CTBT)

The 1996 Comprehensive Nuclear Test Ban Treaty, which bans nuclear tests in all environments, envisages the creation of a Comprehensive Nuclear Test Ban Treaty Organization (CTBTO) to verify compliance. Although the treaty has not yet entered into force,[1] its verification system is being steadily developed and progressively implemented by a Preparatory Commission (Prepcom), established in November 1996, and located in Vienna, Austria. The Prepcom will transform itself into the permanent CTBTO at entry into force of the treaty.

The PrepCom comprises a plenary body of all states that have signed the treaty and a Provisional Technical Secretariat (PTS). The Plenary has two working groups: Working Group A deals with budgetary and administrative matters, while Working Group B deals with verification issues. There is also an Advisory Group of experts to advise the Commission and its subsidiary bodies on financial, budgetary and administrative matters. The PTS is responsible for establishment and operation of an International Monitoring System (IMS) and an International Data Centre (IDC); preparing the on-site inspection (OSI) regime; and for the administration and legal affairs of the PrepCom. Created in March 1997 with only nine staff members, the PTS had by April 2004 grown to 274 staff members from 70 states.[2]

[1] As of 29 September 2004 there were 173 signatories, of which 118 had ratified. Of the 44 Annex 2 states required to ratify before entry into force, 33 have done so, leaving 8 that have signed but not ratified and three (India, Pakistan and North Korea) which have not yet signed. The US Senate rejected ratification in 1999 and the current administration of President George W. Bush is opposed to pursuing ratification.

[2] Annex IV to the Report of the Twenty-Second Session of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization: Report of the Executive Secretary for the Period January-April 2004, CTBT/PC-22/1/Annex IV, 29 June 2004, p. 13.

The verification regime

In terms of its global reach and interconnectedness, the CTBT verification system the most ambitious envisaged for a multilateral arms control or disarmament agreement. With at least a notional goal of 2007 for its completion, the system is already exceeding the verification capabilities envisaged by its designers and when finished is likely to be significantly more powerful.

International Monitoring System

The International Monitoring System (IMS) will eventually comprise 321 monitoring stations and 16 radionuclide laboratories located in some 90 countries. Two hundred and one of the stations belong to the system's primary network, which will provide data to the IDC on a continuous basis. Four types of stations are being set up: seismic, infrasound, hydroacoustic (the three waveform technologies) and radionuclide. These are able to detect tests in different environments and contribute synergistically to verifiability.[3]

The establishment of the IMS poses management and engineering challenges unprecedented in arms control verification, with stations scattered around the globe, many in remote and inaccessible locations. Some of the stations already existed when the IMS was envisaged, but most have had to be constructed from scratch or substantially upgraded.

The PTS has made excellent progress towards making the IMS fully functional, estimating that the system will be approximately 83% complete by 2006.[4] By early 2004 site surveys had been completed for 91 percent of the planned stations and laboratories (293 out of 321). In addition 81 monitoring stations (26 primary seismic, 11 auxiliary seismic, 4 hydroacoustic, 17 infrasound and 23 radionuclide)[5] and 4 radionuclide laboratories had been certified as satisfying all technical specifications.[6] Another 80 stations are under construction or are the subject of contract negotiations. Currently some 85 stations are contributing data to the IDC. The first system-wide performance test will take place in April-June 2005.

The IMS will perform better than the conservative estimates of the Group of Experts (GSE) during the CTBT negotiations in the early 1990s. Even in its

[3] Seismic monitoring is most capable of detecting underground tests, although it might also be able to discern atmospheric tests conducted at low altitudes. Hydroacoustic technology primarily monitors the oceans for underwater nuclear tests. Infrasound is most effective in detecting atmospheric tests, but may also discern some underwater and shallow underground events. Seismic and acoustic detection technologies might not, however, in certain cases, provide enough conclusive data to reveal whether a large conventional explosion or a small nuclear test has taken place. Radionuclide stations, by detecting radioactive particles emanating from a nuclear explosion, could then be the most powerful tool in clarifying the nature of an event.

[4] Annex II to the Report of the Twenty-Second Session of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization: Report of Working Group B, CTBT/PC-22/1/Annex II, 28 June 2004, p. 6.

[5] Information from the PTS, Vienna.

[6] At Seibersdorf, Austria, Helsinki, Finland, Bruyeres-le-Chatel, France, and Christchurch, New Zealand.

unfinished state the probability of detecting a one kiloton explosion by seismic means is very high (militarily significant tests are likely to have yields of at least 5-10 kilotons). Overall the IMS may detect explosions as low as 10-25 tons.

The non-seismic verification technologies will increase verifiability further, while OSIs will be used to resolve doubts about highly suspicious events. The global network of scientific seismic stations which are not part of the IMS will add further substantial capability to CTBT verification worldwide (some observers, including those at the Washington-based Incorporated Research Institutes for Seismology (IRIS), maintain that the non-IMS system's capability exceeds that of the IMS).[7]

Added to these verification capabilities are the National Technical Means (NTM) of individual countries, in particular those of the United States, which runs its own network of seismometers, radionuclide detectors and satellite-based sensors for detecting nuclear tests. US laboratories are currently working on a second-generation satellite system to replace the original Vela system (which detected the purported characteristic nuclear 'flash' in the south Atlantic in September 1979 that was alleged to be a South African and/or Israeli nuclear test). Satellite photographs may also reveal nuclear test preparations such as the drilling of shafts, as occurred in the cases of Brazil and South Africa (even though the CTBT does not ban test preparations, in practice convincing evidence of a likely future violation is unlikely to be ignored).

International Data Centre and Global Communications Infrastructure

The International Data Centre (IDC) was inaugurated in January 1998 and started to transmit data in May that year. It receives, collects, processes, analyses, reports on and archives data from the IMS, including from the certified radionuclide laboratories. The IDC seeks to associate various signals from a common source (an 'event'); to estimate the parameters of the source (such as time, location and magnitude) and to highlight uncertainties associated with them; to identify or distinguish the nature of the event; and, if the event is suspicious, to attribute it to a particular party.

The CTBTO's dedicated satellite-based Global Communications Infrastructure (GCI), functional since mid-1999, transmits data from the IMS monitoring stations, in near real time, to the IDC in Vienna and, in turn, transmits IDC data to national authorities. The data received by the IDC is processed immediately, with the first automated products released within two hours. An automatic Standard Event List is produced through the automated processing of seismic, hydroacoustic and infrasound data, which is analysed and revised to generate a Revised Event Bulletin (REB). An REB can be compiled between four and six days after the event. The radionuclide data takes up to two weeks due to the need to physically collect samples from the stations for appraisal. The aim is increasingly to automate

[7] 'Global Seismographic Network (GSN)', Incorporated Research Institutions for Seismology, www.iris. edu/about/GSN/.

this process using new technology. States signatories may request either the raw data or information in bulletin format.

On-site inspections

Once the CTBT has entered into force, any state party may request an OSI in the event that a suspected nuclear explosion is detected either by the IMS or by NTM. The purpose of an OSI is to clarify whether there has been a nuclear explosion and to gather information that might help to identify the violator. The CTBTO will not have a permanent inspectorate, but will draw on experts, pre-nominated by states parties, who have received prior training, periodically upgraded, by the CTBTO. The CTBTO will have its own equipment and Operational Manual for conducting inspections. Training, testing and procurement of equipment, tabletop exercises and field experiments are continuing in preparation for entry into force.

Slow progress is, however, being made on the Operational Manual, despite the Prepcom according it its 'highest priority'. Significant disagreement remains about the level of detail that should be included. Some states, which fear that OSIs will be used to spy on installations and activities irrelevant to the CTBT, wish to constrain the rights and options of the inspectors. Others believe that tying the hands of the inspectors too much will reduce their effectiveness in undertaking their verification tasks. Attempts by the working group that is negotiating the manual to shorten the draft, which is hundreds of pages long, have made little headway. Negotiations have been hampered by US withdrawal from the CTBTO's OSI work after the Bush Administration decided not to ratify the treaty.[8] Some observers argue that should entry into force of the treaty become imminent, political backing will materialise to permit agreement on the manual.

Organizational evolution

Significant organizational change will occur at the nascent CTBTO in the near future:

- the scheduled retirement in July 2005 of the inaugural Executive Secretary of the Prepcom, Wolfgang Hoffmann of Germany; discussions have begun among state signatories about a successor, marked by pressure from developing states for a candidate from their group to be appointed
- new appointments to directorships of the On-Site Inspection and International Data Centre Divisions
- a mass loss of experienced PTS personnel from 2005 onwards due to the 7-year service limit designed to ensure a 'non-career' service.

As a result of these changes and the fact that the organization is now seven years old, the Prepcom has commissioned an external review of the organization's structure to be completed by May-June 2005. This will be an opportunity to recalibrate the CTBTO for a new phase of its life-cycle: moving from the

[8] In addition the US has withheld funding from the work, although it continues to participate in and pay its assessed contributions for all other aspects of the Prepcom's operations.

establishment and build-up phase into one of testing and evaluation and towards provisional operation and maintenance.

Finance

The CTBTO's budget has risen from US$27.7 million in 1997 to US$88.5 million in 2003. A steep rise in the first few years reflected the rapid growth of the new organisation and the high establishment costs of a global verification system. Since 1999 the budget has remained relatively steady when corrected for inflation, falling to zero real growth in 2003. The rate of collection of assessed contributions from member states remains unusually high for an international organization, with approximately 90–97 percent of the budget collected annually (94.5% in 2003).

The planned budget for 2005 is currently approximately US$51.5 million and €42.5 million (due to the fall in the US dollar, the Prepcom has adopted a split budget, making precise comparisons with previous years difficult). The budget envisages zero real growth and includes no provision for staff increases or expansion of programmes.

Non-entry into force and verification and compliance

As a result of its non-entry into force, the CTBT faces the unusual prospect of being a treaty with a fully-fledged verification system, but without the legally binding character that would permit compliance with its provisions to be officially verified.

The effect that non-entry into force may have on the CTBT's verification system and vice versa is complex. Article IV provides that at entry into force of the treaty, 'the verification regime shall be capable of meeting [its] verification requirements'. Taken literally, this means that the IMS and other components of the verification system should be ready on the day that the accord enters into force. There has thus been a natural inclination, both on the part of the Prepcom and the PTS, towards completing the verification system as soon as it possible.

However, some states are now beginning to question whether, in light of the protracted, and perhaps indefinite delay in achieving entry into force, work should continue at the same pace as in the past. Counter to this argument is the view that the regime is providing constantly improving verifiability as well as increasingly valuable scientific and civil benefits (which the Prepcom is intent on encouraging). Moreover, the costs are likely to drop when the system is fully operational and efficiencies resulting from synergies can be identified.

Some observers have called for consideration to be given to provisional entry into force of the CTBT, both for its own sake and to allow the verification system to become fully functional and useable. From a verification perspective it would be preferable for the verification system to be used in an official, legally binding way. Provisional entry into force would, however, relieve the pressure on states which have not signed and/or ratified.

In a sense a formal move towards provisional implementation is unnecessary as significant elements of the regime are already being provisionally implemented. The nascent verification body is in place, the monitoring system is largely functional and states are already receiving data from the system. States can use such information unilaterally or collectively to help determine that a nuclear test has taken place.

Compliance mechanisms

The CTBT is unusual among multilateral arms control regimes in that a compliance issue may only be triggered by a state party (or parties), not by the verification organization itself.[9] In comparison, the International Atomic Energy Agency (IAEA) and the Organisation for the Prohibition of Chemical Weapons (OPCW) may, on the basis of the verification information they obtain, raise concerns about a state party's compliance.

There is no evidence that any signatory state has violated the CTBT, so a non-compliance case has yet to arise.[10] Until the treaty enters into force it would not be possible in any case to trigger the formal consultation, clarification and compliance mechanisms provided using the Executive Council. Yet even without entry into force, there is nothing to prevent any state from seeking bilateral consultations with another state or states about a compliance question or requesting a meeting of the PrepCom if it believes that a nuclear test has been carried out by a state signatory. The PrepCom could decide to become involved in a compliance issue if enough signatories so wished. If that did not work, any state could apprise the UN Security Council of the matter. So strong is the taboo against nuclear testing that entry into force of the treaty—while highly desirable—may not be absolutely necessary for the verification and compliance system to function virtually as planned.

The Nuclear Non-Proliferation Treaty (NPT)

Unlike the CTBT, which is to be verified by a purpose-built verification organization, compliance with the 1968 Nuclear Non-Proliferation Treaty is largely verified by an organization—the IAEA—which was founded before the NPT was concluded. Moreover, the IAEA is not involved in verifying compliance with all of the NPT's obligations: notably the disarmament obligations of the nuclear weapon states (NWS) parties. Periodic NPT review conferences, and latterly annual preparatory meetings for such conferences, are the sole forum for

[9] Article IV, Section C of the treaty on consultation and clarification lays out the process, stressing that states must attempt to clarify and resolve compliance issues among themselves first before seeking the assistance of the organization.

[10] States that sign a treaty are expected not to undermine its object and purpose—in this case that surely means refraining from conducting a nuclear test.

collective monitoring of compliance by all parties with all of their obligations under the treaty.

The International Atomic Energy Agency

As a verification organization the IAEA, established in 1957, is unique in that its verification role is forced to compete, both politically and in terms of allocation of finances and resources, with another primary role, that of promoting the peaceful uses of nuclear energy. Its assistance to states in the peaceful uses field has actually made its verification task more difficult, by at best increasing its verification task and at worst contributing to the proliferation of nuclear weapons. The Agency is also unusual in being involved in verifying compliance with several arms control and disarmament agreements simultaneously, including those that have established nuclear weapon-free zones in various regions.

The IAEA has faced more serious cases of non-compliance than any other multilateral arms control or disarmament regime. Its most serious failure was its inability to detect Iraq's massive violation of its NPT and safeguards obligations before 1989. This led to a seachange in the concept of nuclear safeguards although one which has yet to be universally applied. Institutionally the Agency is currently in better shape than for some years. It has performed creditably in Iraq since the first Gulf War and is better funded and more proactive than ever before.

The Agency is governed by a powerful 35-member Board of Governors, comprising member states most advanced in nuclear technology as well as those that are the principal producers of nuclear source material. It has a Secretariat, based in Vienna, headed by a Director General, and a General Conference of all member states which meets once a year. It also has operational and offices in Toronto and Tokyo and runs or supports research centres and scientific laboratories in Vienna and Seibersdorf, Austria, Monaco and Trieste, Italy. The Standing Advisory Group on Safeguards Implementation (SAAGSI) provides technical advice. The regular budget for 2004 is US$285.5 million, of which US$102 million is for nuclear verification. Nuclear safety and security, which today is closely associated with nonproliferation efforts and is gaining increasing attention, is allocated, in addition, US$22.4 million. The Agency currently has 2200 multidisciplinary professional and support staff from more than 90 countries. There are currently 556 inspectors, the largest number in the Agency's history.

Full-scope safeguards

Each non-nuclear weapon state (NNWS) party to the NPT is required by the treaty to conclude a 'comprehensive' or 'full-scope' safeguards agreement with the IAEA.[11] As of July 2004, a surprisingly large number—42 out of 189 states parties—did not have such agreements in force.[12] (The non-NPT states parties,

[11] Based on a model provided in a 1972 IAEA document. See 'The structure and content of agreements between the Agency and states required in connection with the Treaty on the Non-Proliferation of Nuclear Weapons', INFCIRC/153 (Corrected), IAEA, Vienna, June 1972.
[12] Safeguards current status, 30 July 2004, www.iaea.org/worldatom.

India, Israel and Pakistan, all have non-comprehensive safeguards agreements that apply only to certain facilities and/or materials).

Under such agreements, non-nuclear weapon state (NNWS) parties declare to the IAEA all their nuclear facilities (which, by definition, are assumed to be for peaceful purposes) and inventories of all nuclear materials. These are subject to verification ('safeguarded') by the IAEA to ensure timely detection of the diversion to non-peaceful purposes of a 'significant quantity' of nuclear material.[13] Traditional safeguards focus on accountancy and control of nuclear materials, through which the IAEA confirms that quantities of declared nuclear materials remain at safeguarded sites or can otherwise be accounted for. In addition to nuclear accountancy, the Agency uses routine on-site inspections (OSIs) and passive 'containment and surveillance' measures such as tamper-resistant seals and surveillance cameras. States parties recognised as nuclear weapon states (NWS) by the NPT (China, France, Russia, the UK and US) are not required to accept comprehensive safeguards, but all have made 'voluntary offers', accepting safeguards on certain facilities as a token of goodwill.

Shortcomings of classical safeguards

When agreed in the 1970s classical safeguards were considered an adequate political compromise in balancing intrusiveness and comprehensiveness with cost and respect for national sovereignty. While never regarded as foolproof, the passage of time has revealed serious shortcomings. The most fundamental was that the IAEA could only inspect or monitor materials and facilities declared to it by states parties, allowing would-be proliferators to develop substantial undeclared nuclear capabilities undetected, either co-located with declared facilities or completely separately. While a so-called special inspection (the equivalent of a 'challenge' inspection in other disarmament regimes) could be requested in cases where there was strong suspicion of malfeasance, political expediency rendered these impossible to invoke. The Board of Governors has done so only once, in 1993, in regard to North Korea, which refused to cooperate.

A second limitation is that nuclear safeguards permit states to assemble many of the elements of a future nuclear weapons programme, such as a uranium enrichment capability, as long as they declare them to be for peaceful purposes and subject them to safeguards. Having mastered all of the relevant technologies, a state can legally withdraw from the NPT on three months' notice and begin to produce nuclear weapons perfectly legally. This is what it is feared Iran is currently attempting to do.

[13] The IAEA defines a 'significant quantity' as eight kilograms of plutonium and uranium-233, 25 kilograms of uranium-235 enriched to 20 per cent or more, 75 kilograms of uranium-235 enriched to less than 20 per cent, 10 tonnes of natural uranium and 20 tonnes of depleted uranium and thorium. See IAEA, *The Evolution of IAEA Safeguards,* International Nuclear Verification Series, no. 2, Vienna, 1998, p. 53.

A third weakness of classical safeguards stemmed from the assumption that the intensity of verification of any state party should be determined by the size of its nuclear industry, not by the likelihood of its non-compliance. This has led to the expenditure of considerable resources on verifying states with large, well-developed nuclear industries, like Canada, that are not of proliferation concern, while distracting attention from those that are, such as Iran.

Strengthened safeguards

While there had been debates about strengthening safeguards since their inception, the greatest catalyst of reform was the discovery after the 1990 Gulf War of just how close Iraq had come to acquiring nuclear weapons—despite nuclear safeguards. In reaction, in December 1993 the Board of Governors launched the '93+2' programme, so-called because it was expected to be completed within two years. Part 1 involved enhancements that could be initiated by the IAEA within its existing mandate and legal authority, while Part 2 comprised measures that would be possible only by establishing a stronger legal basis for the Agency to act. Part 2 measures evolved into the Additional Protocol.

IAEA initiatives under its existing authority

The IAEA began to apply so-called Part 1 measures in 1995 to all states with full-scope safeguards agreements. These measures include requesting additional information on facilities that formerly contained nuclear materials subject to safeguards but no longer do so, or which are expected to do so in future; increasing the level of remote monitoring of movements of nuclear material; expanding the use of unannounced inspections; and collecting environmental samples at sites to which the Agency already has access. These efforts have been aided by the greater use of open source information, including commercial satellite imagery, as well as by intelligence provided by third parties and increased information supplied by states parties themselves.

Additional Protocols

In May 1997 the Board of Governors agreed a Model Additional Protocol to Safeguards Agreements.[14] The Protocol provides for increased transparency by extending states parties' declaration and reporting obligations to the entire life cycle of a state's nuclear industries. This stretches all the way from nuclear mining and processing to the storage of nuclear waste, including the activities of private firms involved in the nuclear fuel cycle, as well as sites that house nuclear material intended for non-nuclear purposes. The Additional Protocol requires states parties to report on the production of nuclear-related equipment, nuclear-related imports and exports, nuclear fuel cycle-related research and development, and future plans for nuclear facilities.

The Additional Protocol also expands the IAEA's rights to conduct inspections of states parties' nuclear industries, most importantly through 'complementary access'. This permits the Agency to inspect any part of a declared nuclear facility,

[14] See INFCIRC/540 (Corrected), May 1997.

instead of only designated 'strategic points' accessible under full-scope safeguards. This can also be applied to nuclear-related sites, such as those that use unsafeguarded nuclear materials. Complementary access may be coupled with short-notice access to all facilities at a nuclear site and with the possibility of collecting environmental samples outside declared locations.

The Additional Protocol increases the IAEA's capacity to ensure that states parties' declarations are complete, as well as significantly improving its prospects for detecting undeclared nuclear material and activities. This offers a vastly improved basis for deterring a state from engaging in prohibited activities.

Integrated safeguards

The increased financial and personnel burden is a potential obstacle to the implementation of strengthened safeguards. Integrated safeguards seek to ease this problem by enhancing the efficiency of safeguards overall and in relation to particular states, thereby enabling the Agency to focus its efforts where they are needed most.[15] The conceptual framework for integrated safeguards was completed in March 2002 and the development of practical approaches to implementation, including in particular countries, is continuing.

Integrated safeguards involve two distinct approaches. The first involves decreasing reliance on traditional labour-intensive OSIs through increased use of remote sensing devices and automated systems, as well as by refining verification modalities and techniques. The second seeks to 'customise' verification for individual states by identifying redundancies and consolidating and rationalising measures, thereby reducing the verification burden for both the state and the IAEA. This includes minimising, wherever possible, the effort expended on verifying previously verified material.[16] For instance, the Agency has decided to reduce the frequency of inspection of Japan's light-water nuclear power reactors from quarterly to annually. Integrated safeguards will only be applied to states that have both a full-scope safeguards agreement and an Additional Protocol, since both are needed before the Agency can identify potential verification synergies, and which annually fulfil other conditions.

Progress and problems in implementing strengthened safeguards

After a decade of efforts, the record of strengthened safeguards is mixed. Enhanced safeguards that fall under the IAEA's existing authority have only slowly supplemented classical safeguards. Progress has also been slow in terms of the negotiation, signing, ratification and entry into force of Additional Protocols.

---

[15] For a comprehensive analysis see Jill N. Cooley, 'Integrated nuclear safeguards: genesis and evolution', in *Verification Yearbook 2003,* VERTIC, London, 2003, pp. 29–44.

[16] Scope for the harmonisation of safeguards in particular cases will depend on factors like the state's nuclear fuel cycle, the relationship between nuclear facilities, the effectiveness of the state's accounting and control system for nuclear materials and the IAEA's ability to conduct unannounced inspections successfully. See 'Strengthening the effectiveness and improving the efficiency of the safeguards system and application of the Model Additional Protocol', IAEA document GC(45)/23, 17 August 2001, p. 6.

As of August 2004, a decade after '93+2' began, only 90 Additional Protocols had been approved by the Board of Governors, only 84 had been signed and only 59 had been brought into force.[17] Integrated safeguards have proceeded even more slowly: as of June 2004 they were being implemented in only four countries: Australia, Indonesia, Japan and Norway,[18] although the Agency expects to begin implementing them in the near future in Canada, Hungary, Poland, Slovenia and Uzbekistan.

Among the key NPT states parties that do not yet have Additional Protocols in force are two NWS, Russia and the United States, which have signed but not yet ratified (the US Senate approved ratification in March 2004, but ratification is awaiting the passage of national implementation legislation). Iraq and North Korea, which have been found in non-compliance with both the NPT and their nuclear safeguards agreements, have not signed an Additional Protocol. Iran and Libya have now done so, with the former pledging to act as if the agreement were already in force.

The failure of particular states to adopt strengthened safeguards does not necessarily indicate an intent to acquire nuclear weapons. It may simply result from preoccupation with other priorities, legislative or other technical difficulties, political or bureaucratic indifference or incompetence in the state concerned. Some hold-outs, such as Brazil, that are in full compliance with their existing obligations, resent being pressed to accept increased verification when other countries retain nuclear weapons, despite being bound under Article VI of the NPT to work towards their elimination, or when others have attempted to acquire nuclear weapon capabilities under cover of safeguards.

Another factor in the slow take-up rate of additional protocols is a lack of concern about the dangers of nuclear nonproliferation and the importance of strengthened safeguards. This is most common among states that have relatively minor nuclear activities. However, this attitude may leave such countries vulnerable to unregulated and even undetected nuclear activities being conducted on their territory, including nuclear smuggling. Recognition of this problem has led the IAEA to develop a Small Quantities Protocol, which involves simplified procedures for states that have limited or no amounts of nuclear material to report. The UN Security Council in April 2004 also recognized this problem by adopting Resolution 1540 which mandated all UN member states to adopt national implementation measures to prevent nuclear (and other WMD-related) materials falling into the hands of terrorists and other non-state actors.

There is also resistance to strengthened safeguards from states concerned about the much higher degree of transparency and intrusiveness involved. This is particularly evident among the NWS. In addition to excluding all of their weapon-

[17] See www.iaea.org/worldatom/programmes/safeguards/sg.protocol.html.
[18] Http://www.iaea.org/Publications/Reports/Anrep2003/safeguards.pdf and http://www.iaea.or.at/NewsCenter/Statements/2004/ebsp2004n003.html.

related nuclear activities from strengthened safeguards (as in the case of traditional safeguards), they have offered little, if anything, in the way of expanded voluntary safeguards on their peaceful nuclear activities. This sets a bad example to the NNWS and reinforces suspicions that the NWS have no intention of ever abandoning their nuclear arsenals. Other countries, like Brazil, are concerned that commercial proprietary information, in its case a new uranium enrichment process invented by the Brazilian Navy, may be at risk from the new measures required by the Additional Protocol.

In December 2003, IAEA Director General Dr Mohamed ElBaradei, in his annual report to the UN General Assembly, argued that the only way, ultimately, to prevent NNWS from illicitly acquiring their own plutonium and high enriched uranium for weapons purposes, whether under putatively peaceful and safeguarded programmes or otherwise, is to restrict enrichment and reprocessing activities by individual states. He suggested examining the merits of producing fissionable materials multilaterally in a limited number of locations. These ventures would be under safeguards and would supply nuclear materials, also under safeguards, for peaceful purposes. President George W. Bush made a less ambitious proposal in February 2004 for denying states which currently do not reprocess plutonium or enrich uranium the right to do so in future, in return for guaranteed supply of such fissionable materials.[19]

IAEA verification experience in the 'special cases'

The IAEA has gained verification experience not just in respect of day-to-day safeguards activities in relation to compliant states but also in regard to several special cases, including those involving serious non-compliance. This experience has equipped the Agency to some extent for future verification tasks including the long-proposed Fissionable Material Treaty (FMT) or Fissionable Material Cut-Off Treaty (FMCT), as well as in regard to the verified disposal of fissionable material from dismantled nuclear warheads and ultimately the verification of nuclear disarmament. These are all significant capabilities in terms of the current state of verification.

South Africa: verifying nuclear disarmament

In the early 1990s South Africa declared that it had dismantled its arsenal of six nuclear devices and nuclear weapon production facilities and sought IAEA verification of this fact. This was the first time the Agency had been involved in such an exercise, forcing it to develop procedures to deal with information relating to actual nuclear weapons development. The Agency had access to both civilian nuclear facilities and what was left of military nuclear facilities after the South Africans had dismantled them. After a series of inspections of installations and materials and examination of documents the Agency was able to declare in 1994 that the history of South African fissile material production had been established

[19] George W. Bush, 'Address on weapons of mass destruction proliferation', remarks at the National Defense University, Washington DC, 11 February 2004, www.whitehouse.gov/news/releases/2004/02.

and that all such remaining material had been put under safeguards. In addition the Agency was able to gain insight into advanced South African weapon research projects, such as those for the production of tritium and lithium-6, that had raised proliferation questions.[20] The Agency was also involved in verifying the sealing of two shafts drilled for conducting nuclear tests in the Kalahari Desert, a task that today would probably be given to the CTBTO.

Iraq: cooperation with UNSCOM and UNMOVIC

IAEA verification activity in Iraq, in addition to its normal safeguards activity, was even more intensive and ground-breaking than its work in South Africa. After the first Gulf War the Agency was mandated by the UN Security Council to verify, in cooperation with the UN Special Commission (UNSCOM), that Iraq was ridding itself of its nuclear capabilities, for which it established an Iraq Action Team, later the Iraq Nuclear Verification Office (INVO).

Not only did the IAEA conduct wide-ranging inspections to ensure that Iraq had declared all of its nuclear activities, the most intrusive the Agency had ever conducted, but it also engaged in the unprecedented supervised and verified destruction of designated nuclear facilities. Unlike UNSCOM, which dealt with Iraq's chemical, biological and missile capabilities, the IAEA was essentially able to close the file on Iraq's nuclear capability and attest to its verified destruction or control.

When UN inspectors re-entered Iraq in late 2002 under the aegis of the UN Monitoring, Verification and Inspection Commission (UNMOVIC), the IAEA was again mandated to continue with its nuclear brief. Again it was able to verify, with more confidence than UNMOVIC was in regard to CBW, that the nuclear file was essentially closed and that Iraq did not have nuclear weapons or the capability to rapidly produce them.[21]

The IAEA gained invaluable experience from its work in Iraq. It was able to use and refine new techniques, particularly environmental sampling, which have been of benefit in implementing strengthened safeguards generally. It also learned lessons from being involved in the type of hostile verification environment that it does not normally encounter (although it did to some extent in North Korea). In cooperation with the two Security Council-mandated bodies it was also able to develop appropriate verification protocols for intrusive inspection situations, participate in multidisciplinary inspections and training exercises and again get a

[20] See G. Dillon and Dimitri Perricos., 'Verification and correctness of inventory: experience gained in the verification of the completeness of the inventory of South Africa's nuclear installations and materials', *International Nuclear Safeguards 1994: Vision for the Future*, IAEA, Vienna, 1994, pp. 231-42.

[21] Since the US invasion of Iraq the Agency has been grudgingly permitted to return for limited periods and has verified that all of the nuclear material remaining there when the war started remains accounted for, although it has also verified that much of the previously inspected and sealed nuclear equipment has been dismantled and found its way into scrap yards in Jordan and the Netherlands.

foretaste of the tasks involved in verifying complete nuclear disarmament. Finally, it was able to professionally and speedily deal with intelligence information supplied by permanent members of the Security Council which purported to reveal Iraqi nuclear weapons development but which proved false or misleading. This enhanced the credibility of the IAEA's verification judgements in the subsequent cases of Iran and Libya.

North Korea: identifying non-compliance

Unlike the cases of South Africa, Iraq, Iran and later Libya, where the IAEA was as surprised as anyone else about the extent of the nuclear weapon-related activities eventually uncovered, in North Korea the Agency was at the forefront of discovering non-compliance. In 1993, soon after the country's comprehensive safeguards agreement entered into force, the IAEA began routine inspections to verify the initial data declaration submitted by North Korea. The Agency discovered disturbing inconsistencies which the North Koreans were unable to clarify to the Agency's satisfaction. As a result the Agency invoked, for the first and only time to date, its right to request a special inspection. The North Koreans refused, setting off a continuing compliance crisis.

Subsequently the Agency had its first experience of verifying a freeze on a nuclear programme when, under the 1994 US-North Korea Agreed Framework, it was asked to seal the nuclear facility at Yongbyon and safeguard the nuclear materials at the site. However the Agency was never given the opportunity of comprehensively verifying North Korea's purported nuclear freeze and in 2002 its inspectors were expelled, its remote surveillance cameras disabled and the seals at Yongbyon broken. If and when there is a settlement to the current crisis the Agency may be permitted to resume a verification role in the country.

Libya: verifying nuclear dismantlement

The IAEA's role in Libya was carried out in different circumstances again. When Libya announced in December 2003 that it had decided to abandon its WMD capabilities, the US and UK had already been in consultations with the Libyan government for some time and had carried out inspections of Libyan nuclear facilities. There was also apparently an attempt to marginalize the IAEA's involvement in Libya. Following IAEA protests, agreement was reached in January 2004 on a division of responsibilities: while the IAEA would work to verify and dismantle Libya's capabilities, the UK and US would remove and/or destroy the various components. The US at an early stage removed documentation relating to nuclear weapons, as well as equipment such as centrifuges, and materials.

The Libyan experience is adding further to the IAEA's verification repertoire. In addition to inspections, the Agency was again able to use its increasingly powerful environmental sampling techniques, as it has done in the cases of Iran and Iraq. Due to the fact that the Libyan programme, like that of Iran's, was in part supplied by an illegal nuclear smuggling effort led by the 'father' of the Pakistani nuclear

weapon programme, A.Q. Khan, the IAEA also has become involved in attempting to track the extent and nature of this activity. This is another first for the Agency.

Iran: attempting to verify non-compliance

To date the IAEA has acquitted its verification role in respect of Iran with professionalism and persistence. It has clearly applied its enhanced verification techniques and technology to the case. This permitted the Agency to reveal, for instance, that centrifuge equipment was contaminated with uranium enriched to a much higher level than the Iranians admitted and forcing them to reveal that the equipment had been imported rather than made in Iran. The Agency was further able to verify that the source of the enriched uranium was not Iran. If and when Iran's Additional Protocol is implemented, the Agency stands to gain experience for the first time of applying the measures provided for in that agreement to a state that is already widely suspected of non-compliance.

Excess fissionable material verification (IAEA/US/UK Trilateral Initiative)

Moves have been underway for almost a decade to have the IAEA verify fissile material removed from dismantled weapons in both the US and Russia. Launched in 1996, the so-called Trilateral Initiative involved the three parties in examining the technical, legal and financial implications of the Agency assuming the task of verifying that such material was not returned to weapons use and that other fissile material declared surplus to defence programmes was also not diverted. Under its voluntary offer the US already has some such materials under safeguards. A Model Verification Agreement was finalized in September 2002 as the basis for bilateral accords between the Agency and the two states. A deadlock remains, however, over funding for the programme.

Verification funding: increased resource demands

In the past decade the verification burden on the IAEA has increased substantially, leading to increased pressure on resources and finances. New verification burdens have included:

- the placing under IAEA supervision of considerable quantities of fissile material and numbers of nuclear facilities in the Soviet successor states, many of them verification-intensive due to their former military nature
- intensive verification activities in Iraq, Iran and now Libya
- involvement in monitoring US efforts to repatriate poorly protected fissionable material in unstable countries such as the states of the former Yugoslavia and former Soviet Union
- the implementation of strengthened safeguards, including Additional Protocols (while integrated safeguards are intended to cut the costs of strengthened safeguards, and still promise eventually to do so, their introduction necessitates an initial investment of time and resources).

For more than a decade the IAEA operated under zero real growth restrictions imposed by the Western states. In 2003 the Agency at last had the first significant

boost to its verification budget since the 1980s when the Board of Governors agreed a $US15 million increase to $245 million. The bulk of the increase went to verification. The IAEA budget for 2004 is $268.5 million. These increases enable the Agency to fund safeguards activities without having to resort to supplemental funding (up to $19 million in recent years). It will also provide an improved financial basis for strengthened nuclear safeguards. The increase, moreover, as helped de-link verification spending from spending on technical cooperation to developing countries.[22]

Compliance mechanisms

Strangely for such an important legal instrument, the NPT makes no mention of compliance and establishes no compliance mechanism of its own. Review conferences are provided for to review the general implementation of the treaty, but no mention is made of convening special sessions in case of non-compliance. This is a major lacuna in such an important treaty and compares unfavourably with, for instance, the nuclear weapon-free zone treaties. Although Canada and others have proposed a standardized compliance reporting mechanism for all NPT state parties[23] even this modest idea has not met with the approval of the NWS.

In the NPT compliance is also only implied in respect of nuclear safeguards which the treaty delegates to the IAEA. However the IAEA Statute establishes that the compliance body within the Agency is the Board of Governors. Both the Statute and safeguards agreements stipulate that if states violate their safeguards agreements with the Agency the Director-General can refer the case to the Board for 'appropriate action'.[24] The Board may also order the state to take certain action if it deems verifiability to be in jeopardy or if the Agency finds itself unable to verify compliance.[25] If it finds a state in possible or actual non-compliance with its safeguards agreement with the Agency it may take certain action, such as seeking clarification, complementary access (under the Additional Protocol), a special inspection or punitive action such as the suspension of technical assistance and/or other membership privileges. However, the most powerful sanctions may only be imposed by the UN Security Council, to which the Board of Governors may send a compliance case. One oddity is that the Board of Governors is able to judge non-compliance with agreements to which the IAEA is itself a party.

The compliance role of the IAEA is complicated by the fact that the Agency's membership does not coincide with NPT membership. Non-NPT parties India, Israel and Pakistan are all IAEA members, indeed founder members in 1957, and

[22] Another financial challenge was solved recently when Japan agreed to end the withholding of its assessed annual financial contribution to protest the IAEA's decision to stop asking recipients of technical cooperation to contribute 5% of the value of their projects.

[23] See 'Reporting by States Parties: Working Paper submitted by Canada', NPT/CONF.2005/PC.1/Wp.3, 9 April 2002.

[24] 'The structure and content of agreements between the Agency and states required in connection with the Treaty on the Non-Proliferation of Nuclear Weapons', IAEA document INFCIRC/153, Vienna, 1971, para. 9.

[25] INFCIRC/153, paras 18-19.

all have the opportunity to serve on the Board of Governors, as India has done continuously.[26] This leads to a surreal situation in which compliance with a treaty is judged by states which themselves have not assumed such obligations. Another difficulty is that states may remain on the Board of Governors even when their non-compliance is being considered, as has occurred in the case of Iran. The US has proposed that states which find themselves in such a situation be suspended from Board membership.

The compliance record of the IAEA has been mixed. In the case of Iraq it missed Iraq's original violations but was then accorded a pivotal role in ensuring Iraq's compliance with its disarmament obligations after the first Gulf War in cooperation with UNSCOM and UNMOVIC. Director-General ElBaradei was outspoken both in publicly assessing the extent of Iraq's compliance in the nuclear area and in rebutting unsubstantiated allegations of non-compliance. In the North Korean case it was the Agency which, with assistance from other states, detected and confirmed North Korea's non-compliance. However further action was then taken out of its hands (and out of the Security Council's) and dealt with through a North Asian multilateral framework. In the case of Libya, the Agency missed the evidence of non-compliance (in the absence of the extra tools that an Additional Protocol would have provided), but has, after an initial US/UK attempt to sideline it, been fully involved in assessing Libyan non-compliance ever since Libya made its admissions public.

In contrast, the Iran case has followed a classic non-compliance path so far: using outside information and its own verification tools the Agency has determined that Iran may be in non-compliance and has worked with the Iranians to rectify the situation, while the Board of Governors has pressured Iran to comply and threatened referral of the case to the Security Council if it fails to do so. Exactly what the Council would if this happens remains to be seen.

Regional nuclear verification (EURATOM)

The European Atomic Energy Community (EURATOM), a regional agency created in 1957, comprises members of the European Union. Its safeguards system is very similar, although not identical, to the IAEA's. Like the IAEA's, it is based on materials accountancy and on-site inspections. The IAEA and EURATOM conduct joint inspections, collaborate in developing, testing and implementing new methods and techniques and have a liaison committee to ensure coordination and cooperation. The IAEA, however, remains the final decision-maker on substantive compliance questions.

[26] North Korea was also a member until it withdrew in June 1994.

Bilateral Nonproliferation Regimes (Argentina/Brazil)

The Argentine-Brazilian Agency for Accounting and Control of Nuclear Materials (ABACC)[27] is the only bilateral nuclear verification agency to date. ABACC was established by the 1992 Agreement on the Exclusively Peaceful Use of Nuclear Energy (the Guadalajara Treaty) between Argentina and Brazil. ABACC is responsible for the application of a Common System for Accounting and Control of Nuclear Materials to all nuclear materials and facilities in the two countries. ABACC's safeguards include the standard ones of nuclear material accounting, examination, containment and surveillance. A 1994 Quadripartite Agreement between Brazil, Argentina, ABACC and the IAEA stipulates that Argentina and Brazil are subject to full international safeguards covering all nuclear material. The agreement was modelled on the EURATOM agreement: ABACC implements the safeguards, but the IAEA is responsible for oversight of compliance. ABACC and the IAEA also carry out joint inspections, procedures and training and share information and inspection equipment.

ABACC's secretariat is located in Rio de Janeiro and has an administrative staff of approximately eighteen, including eight professionals. The ABACC Secretary-Generalship alternates between a Brazilian and an Argentinean, with the deputy post taken by the state that does not have the headship. ABACC has access to 88 inspectors, divided evenly between Argentineans and Brazilians. In 2003, 44 inspections were carried out in Brazil and 64 in Argentina, culminating in 400 inspector days in the field. In 2004 ABACC's budget will be US$2.7 million, a 3% increase over 2003.

ABACC is regarded as one of the most important cooperative mechanisms ever established by Brazil and Argentina and is a potential model for other dyads. The concept has been informally explored by South Korea.[28]

Nuclear Weapon-Free Zones

Extensive areas of the globe have been declared, by treaty, to be nuclear weapon-free zones (NWFZ).[29] Negotiated and signed by regional organizations of states, such treaties prohibit parties from acquiring nuclear weapons or other nuclear devices or assisting other states in acquiring nuclear weapons. The treaties all have protocols open for signature by the NWS committing them not to use nuclear

[27] The Spanish name is Agencia Brasileño-Argentina de Contabilidad y Control de Materiales Nucleares. The Brazilian name is Agência Brasileiro Argentina de Contabilidada e Controle de Materiais Nucleares.
[28] See paper on 'Applying ABACC Experiences to Korean Peninsula: Possibilities and Action Plans' http://www.isis-online.org/publications/dprk/cheon.pdf.
[29] Although the 1959 Antarctic Treaty, the 1967 Outer Space Treaty, the 1971 Seabed Treaty and the 1979 Moon Treaty do not exactly fit the definition of nuclear weapon-free zones, they all prohibit either all military activity or the deployment of nuclear weapons in environments or areas where such activities have not yet commenced. All have provision for some form of on-site inspection, after consultation and clarification, in order to deal with compliance concerns. With the exception of the Antarctic Treaty, such provisions have not been used.

weapons against the zone parties, deploy nuclear weapons in the zone or on the territories of the zone member states or in some cases transport nuclear weapons through the zone. While the provisions of the treaties and their verification and compliance arrangements vary, all rely on IAEA safeguards to verify the non-nuclear status of member states and all either establish a new structure or agency to deal with compliance questions or use an existing regional body.

Latin America and the Caribbean

The 1967 Treaty of Tlatelolco established a nuclear weapon-free zone in Latin America and the Caribbean and an Agency for the Prohibition of Nuclear Weapons in Latin America (known as OPANAL from its name in Spanish), to oversee its implementation. OPANAL comprises a General Conference, a Council and a tiny Secretariat, based in Mexico City, headed by a Secretary-General. Although the treaty originally permitted the OPANAL Council to organize the conduct of so-called special inspections in cases of suspected non-compliance, it was amended in 1992 to limit the Council's role to requesting the IAEA to make an inspection. Information obtained during such an inspection will be forwarded to the Secretary General of OPANAL only after it has been sent by the IAEA Director General to the IAEA Board of Governors.

South Pacific

The 1985 Treaty of Rarotonga also uses an existing regional body, the Pacific Islands Forum (PIF) Secretariat, in Suva, Fiji, as its secretariat. Each party is required to report to the PIF Secretariat any 'significant event' on its territory relating to the implementation of the treaty. The treaty also establishes a Consultative Committee, comprising representatives of the parties, to be convened periodically. States may ask the PIF Secretary-General to convene a meeting of the Committee to discuss any matter relating to treaty implementation. A compliance process may also be initiated via the Consultative Committee and the PIF, including the option of OSIs.

Africa

The 1996 Treaty of Pelindaba, which has not yet entered into force, envisages the establishment of an African Commission on Nuclear Energy, apparently to be located in South Africa, to deal with reporting, consultations and exchanges of information. The Commission will meet annually and may also meet in extraordinary session. Parties must provide the Commission with annual reports of any nuclear activities or other activity relating to the treaty. The treaty has quite elaborate compliance provisions. If a party believes that another party is in breach of its obligations, it must bring the matter to the attention of that party. If the matter is not resolved adequately, the complainant may take the issue to the Commission. If the Commission determines that the situation warrants it, it may ask the IAEA to undertake an OSI and may send representatives as part of the inspection team. Based on the IAEA's report, the Commission will determine whether a treaty violation has occurred. If the Commission reaches such a conclusion, the treaty parties will meet in extraordinary session. If necessary, the

session may decide to pass the matter to the African Union for further action. The AU may, in turn, decide to pass the matter to the UN Security Council.

South-East Asia

The 1995 Treaty of Bangkok also establishes a commission to oversee implementation. It comprises representatives from all parties and meets as necessary. The Commission has an Executive Committee charged with overseeing the verification process, considering requests for consultation and clarification and fact-finding. Parties have the right to seek clarification from another party about possible non-compliance or request the Executive Committee's assistance. States may ask the Executive Committee to send a fact-finding mission to another party's territory if there is a possible non-compliance situation. If the Executive Committee determines that a violation has occurred, the non-compliant state will be required to bring itself into compliance. If it does not, a meeting of the Commission may submit the issue to the IAEA, the UN Security Council or the UN General Assembly for further action.

Central Asia

The 2002 Treaty of Samarkand, which has not yet entered into force, creates a nuclear-weapon free zone among the former Soviet republics of Central Asia: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. It also requires states parties to uphold nuclear security and safety standards at least as effective as those elaborated in the 1980 Convention on the Physical Protection of Nuclear Material. Annual consultative meetings are envisaged, along with extraordinary meetings if requested by any party, in order to 'review compliance or other questions related to ... implementation'. Otherwise the treaty is silent on how non-compliance is to be handled.

Chemical Weapons

The principal disarmament agreement in the chemical weapons (CW) area is now the 1993 Chemical Weapons Convention (CWC). A previous treaty banning the use of chemical and biological weapons, the 1925 Geneva Protocol, remains in force but it had no verification and compliance mechanisms. What was intended to be a temporary verification mechanism for the Protocol was initiated by the UN General Assembly in 1982. However, given the existence of a comprehensive verification regime for chemical weapons—the CWC's Organization for the Prohibition of Chemical Weapons (OPCW)—the current state of the Secretary-General's mechanism will only be considered in the section relating to biological weapons below. The role of UNSCOM and UNMOVIC in chemical and biological weapons verification in Iraq will be discussed in the section on those two mechanisms, also below.

The Chemical Weapons Convention (CWC)

The 1993 Chemical Weapons Convention, which entered into force in 1997, prohibits states from using, developing, producing, acquiring, stockpiling or retaining chemical weapons, and from transferring them directly or indirectly. The treaty requires parties to destroy, within ten to fifteen years of the convention entering into force, all their CW and CW production facilities, as well as any chemical weapons abandoned on another party's territory.

Organization for the Prohibition of Chemical Weapons (OPCW)

The OPCW, which began operating in 1997, is located in The Hague, Netherlands. It consists of a Conference of the States Parties, an Executive Council and a Technical Secretariat. The Conference, which oversees the implementation of the treaty, meets annually and may also convene in special session on request. The Executive Council, the executive body, is responsible to the Conference. It has 41 members elected by the parties according to geographic region and meets in regular session three to four times a year. The Technical Secretariat is responsible for implementing the verification regime, including processing declarations and carrying out on-site inspections. The Director-General of the OPCW oversees the Secretariat's daily operations. The current annual budget of the OPCW is approximately €60 million. The organization has a staff of approximately 500, including 200 inspectors.

The CWC established a comprehensive, intrusive multilateral verification system, comprising declarations, various types of OSI, and some off-site sampling, designed to ensure that CW is not produced by military or civilian industrial facilities. Different levels of verification are applied to different chemicals depending on the estimated likelihood that they will be used as or for chemical weapons. Destruction of existing CW occurs at designated facilities subject to the continuous presence of inspectors and continuous on-site monitoring using technical means.

The convention provides for routine and challenge inspections, as well as investigations of alleged CW use. Initial inspections are conducted to confirm the validity of the data provided by parties in their initial declarations of their CW holdings and/or capabilities, whether past or present. Systematic, routine inspections are conducted at declared CW storage, production and destruction facilities, as well as civilian facilities that use chemicals listed in the three schedules and certain non-scheduled chemicals.

Challenge inspections may be carried out at short notice at the request of any party if it suspects that a violation has occurred. A request for a challenge inspection is submitted to the Director-General and the Executive Council. The challenging state must support the request by providing sufficient information. The Council must decide, within 12 hours of the request, whether the request is valid (rather than frivolous or abusive). The inspected party will be notified at least 12 hours prior to the arrival of the inspection team at the designated point of entry. These inspections could potentially be highly intrusive. The inspected state, however, has the right to propose alternative ways of demonstrating its compliance and may take measures to protect sensitive installations, and prevent disclosure of confidential information not related to the convention. Before a challenge inspection, parties may undertake an informal consultation and clarification process either bilaterally or with the participation of the OPCW. The information obtained during a challenge inspection is given to the Director-General who must distribute it to all state parties and to the Council for further action. There have been no challenge inspections to date.

Performance to date

Initially the OPCW appeared to be a model multilateral verification organization. The organization was readily established, a new, purpose-built headquarters building was constructed and occupied and the necessary staff recruited. Several states declared CW stockpiles and the organization began verifying their destruction, while also gearing up for industry inspections. However within a few years the organization began to experience both managerial and financial difficulties. In April 2002 the first Director-General, José Bustani of Brazil, was dismissed; he was replaced in July 2002 by Rogelio Pfirter of Argentina. In 2000-2001 the OPCW faced a financial crisis that had been brewing since entry into force. This was partly due to poor financial governance and management and delayed reimbursement of verification costs by certain states parties. Many of these immediate difficulties have now been remedied.

Although some of the organisation's failings could be attributed to its leadership, the treaty's governing bodies, the Executive Council and the Conference of States Parties, as well as states parties individually, were also responsible. The first

Review Conference for the CWC, held in April/May 2003, six years after the treaty's entry into force, provided an opportunity to rectify the problems.[30]

Given the novelty and complexity of the convention's verification goals, it is not surprising that there were teething problems and that implementation had to confront some harsh realities. One is the inherent difficulty of establishing, from scratch, a verification organization for a type of weapon that had previously been largely unregulated by international law. A second has been the differing and evolving views of states parties on the priorities for the convention. A third reality has been the inability or unwillingness of states parties to carry out in full their obligations under the convention, in terms of declaring and destroying their chemical weapons, declaring, and co-operating in the monitoring of, their peaceful chemical industry and in providing unstinting political, technical and financial support to the OPCW.

Finally, there have been major changes in the way the global chemical industry is organised since the convention was negotiated. While many large-scale single product facilities remain in developed countries, many have moved to developing countries where costs are cheaper. At the same time there has been a trend in the industrialized countries towards smaller facilities able to switch production between various products at short notice to meet the demand of more complex markets. Such flexible facilities also, unfortunately, make it easier to switch to the production of CW or CW precursors.

The verification balance askew

One casualty of these realities has been the balance struck in the convention between the resources and effort devoted to verifying the declaration and destruction of existing CW stockpiles and that devoted to verifying that new CW and CW capabilities do not emerge.

The convention provides for verification of the declarations of CW stockpiles by CW possessor states, of the transportation where necessary of such stockpiles to secured sites and of the retention of the stockpile at those sites until their destruction. It also provides for continuous monitoring of the destruction process to ensure that no CW is retained or diverted. These provisions come into force immediately a state party declares any CW and continue until the weapons are completely destroyed. Destruction of all declared CW stocks was to begin 2 years after entry into force and be concluded 10 years after entry into force—by the end of April 2007.

At the same time, it was intended that industry and other inspections (such as university, defence research and other laboratories) would commence immediately after state party declarations of relevant production of chemicals listed in

[30] For a comprehensive report on the OPCW's difficulties and suggested remedies that was prepared for the first review conference see 'Getting verification right: proposals for enhancing implementation of the Chemical Weapons Convention', VERTIC, London, 2002.

Schedules 1, 2 and 3 had been made. In addition, inspections of facilities producing Discrete Organic Chemicals (DOCs), organic chemicals not listed in the schedules to the convention, were set to start in 2001, the fourth year after entry into force. By this stage the industry inspection regime would be expanding as the destruction programme was gearing up towards completion. The industry inspection system would continue in perpetuity: indeed there is no implication in the CWC that at any stage industry verification should be a secondary activity to CWC destruction verification.

Contrary to this vision, in the first five years of the convention, verification activity concentrated largely on existing CW stocks, former CW production facilities and CW destruction plants, while industry inspections were relatively neglected. Since the first review conference there has been some progress in rectifying these imbalances. However destruction of existing stockpiles has been subject to continuing delays and postponement, meaning that the OPCW will be involved in verifying destruction long after it had intended.[31]

One of the other significant issues that has confronted the OPCW is its possible role in reducing the risk of terrorists acquiring and using chemical weapons. To some extent the CWC did encompass measures to deal with this by emphasizing the requirement for national implementation measures by states parties. The OPCW has been active in encouraging and assisting states to have the requisite national measures in place, including penal sanctions for individuals and organizations that flout the goals of the convention. The OPCW closely monitors states' progress and provides legal and other assistance. While the OPCW has a clearly defined role in ridding the world of CW stockpiles that might be seized by terrorists for their ready use, the peaceful global chemical industry is so vast that achieving total security of all chemicals and chemical precursors that might be used by terrorists to make their own chemical weapons is impossible. Such security must be provided by industry itself with the support and encouragement of governments.

Similarly the OPCW is not mandated to be involved in controlling imports and exports of chemicals and dual-use equipment and its verification system is therefore not geared toward this goal. The Australia Group, an informal grouping of like-minded states which coordinate their export control policies, is outside the convention framework. Nonetheless its existence causes some friction with developing country CWC states parties, which argue that as treaty members in good standing they should not be subject to such additional constraints on their economic development. While this is a constant refrain in meetings of states parties, the issue has to date not constrained the operation of the OPCW or its verification regime.

[31] As of April 2004, only 12.37 percent of the 71,000 metric tons of declared CW had been destroyed. The 6 states that have declared CW are Albania, India, Libya, Russia, South Korea and the US.

Compliance mechanism
The OPCW's Executive Council has the authority to determine whether a situation of non-compliance exists and what action should be taken. The matter may be referred to the Conference of States Parties. In situations of serious non-compliance the Conference may suspend the party in question, recommend collective measures against it, or refer the issue to the UN General Assembly or UN Security Council.

The most egregious example of non-compliance to date has been the lack of progress in the destruction of the Russian and American CW stockpiles, by far the largest. The reasons have been political, organizational, environmental, technical and budgetary. Neither of the two countries, which together account for 95 percent of the world's declared chemical weapons, are likely to meet the extended 2012 deadline for destruction of their entire stockpiles. In this case however it is clear that both states intend to comply eventually. The Council has responded therefore by extending the destruction deadlines rather than attempting to impose sanctions.

A case of deliberate non-compliance, particularly the hiding of substantial stockpiles from OPCW inspectors or the secret manufacture of new chemical weapons would be a much more serious breach of the convention. To date there is no firm evidence that any state party has done so. The US has, however, publicly accused Iran of such a violation, but without producing evidence and without raising the issue in the Executive Council or requesting a challenge inspection (although it did so at the first CWC Review Conference, along with accusing Sudan and Libya, two non-states parties at the time, of having CW). Some observers have argued that without a challenge inspection being called in the near future, the option will atrophy. Others contend that conducting a challenge inspection for the sake of it, without proper evidence to justify it, will jeopardize the future exercise of such an option.

Biological Weapons

Geneva Protocol: the UN Secretary-General's fact-finding mechanism

The 1925 Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare bans the use of chemical and biological weapons (CBW) as a means of warfare, but does not have provisions for monitoring or verifying compliance. The UN Secretary-General has a presumed inherent authority under Article 99 of the UN Charter to conduct fact-finding missions to inform himself of any situation which threatens international peace and security. In 1982[32] and 1983[33] the UN General Assembly specifically endorsed this authority in regard to investigating the alleged use of chemical, biological and toxin weapons. This was intended to provide a provisional procedure for verifying compliance with the Geneva Protocol pending the adoption of the CWC. In 1988 the Security Council in 1988[34] endorsed the procedure, which significantly, is applicable to all UN member states.

The 'mechanism' itself was essentially a virtual one, comprising lists of experts nominated by states to be available for fact-finding missions; a list of laboratories available to do sample analysis; and guidelines for the conduct of missions agreed by a group of experts in 1989. The UN Department for Disarmament Affairs (UNDDA) was requested to maintain the lists. The guidelines contain information on assessing whether to proceed with a particular fact-finding mission, inspection techniques and modalities, expertise that it would be useful to have on a mission and procedures for accrediting laboratories for analyse samples.

The Secretary-General has made use of the mechanism on several occasions, in relation to alleged chemical, biological or toxin use in Afghanistan and Indochina (1981 and 1982); Iran (1984-1986, 1988); Iran and Iraq (1986), Iraq (1988); Mozambique and Azerbaijan (1992). In the Afghanistan and Indochina cases, as the fact-finding team was not permitted access to the states concerned it could only conduct interviews and sample analysis in neighbouring states. Iran and Iraq each granted access during their eight-year war to allow verification of alleged CW use by the other country. The government of Azerbaijan itself invited a fact-finding mission on its territory to help it to prove its compliance.

The mechanism remains available, but has atrophied. The lists of experts and laboratories were last updated in 1989.[35] In advance of the BWC Experts Meeting in July 2004 the UNDDA requested member states to help update them, but few have responded. Meanwhile the UK has proposed several ways of reviving the

[32] UN General Assembly resolution 37/98D, 13 December 1982, A/Res/37/98D (1982).
[33] UN General Assembly resolution 42/37C, 30 November 1987, A/Res/42/37C (1987).
[34] UN Security Council resolution 620, S/Res/620, 26 August 1988.
[35] UN document A/44/561, 4 October 1989.

mechanism, with particular attention to BW, given that verification of allegations of us of CW is now possible under the CWC.

Biological Weapons Convention (BWC)

The 1972 Biological Weapons Convention has no verification system and only weak compliance provisions. Each state party is obliged to take steps nationally to ensure that it complies with the treaty, such as passing national implementation legislation, but there is no multilateral body to encourage and monitor such efforts. Despite decades of efforts these shortcomings have not to date been rectified.

Efforts to close the verification gap

In 1986 the US rebuffed a formal Soviet proposal for a verification protocol to the BWC. In 1991 French-led Western pressure for improved verification led to a compromise, whereby a technical and scientific study of possible verification measures was launched.[36] The Ad Hoc Group of Verification Experts (VEREX), which met from 1992–93, identified, examined and evaluated 21 initiatives, concluding that a combination of on-site and off-site measures was worth pursuing. In 1994 a Special Conference of States Parties, after considering the VEREX report, established a new, more political, Ad Hoc Group (the AHG). Open, like VEREX, to all states parties, the AHG was mandated to consider appropriate initiatives, including possible verification measures, and to draft proposals. These would be incorporated, as appropriate, in 'a legally binding instrument', which was assumed would be a protocol to the BWC.

The ill-fated BWC protocol

The AHG commenced its work in 1995 and moved into negotiating mode in 1997, producing an unwieldy compilation of 'measures to promote compliance'. At the behest of the US the word verification was avoided, even though the draft contained many of the verification measures that proponents wanted. The chief advocates were Australia, Brazil, Canada, South Africa and the members of the European Union (EU), especially the UK. Sceptics included China, Iran, Pakistan and the US, and on particular issues, Japan, Germany and Russia. Negotiations on the draft took place between 1997 and 2001 and intensified as the deadline of the Fifth BWC Review Conference approached in November 2001. In April 2001 the Chairman of the AHG, Ambassador Tibor Tóth of Hungary, tabled a 200-page compromise draft text.[37]

The draft envisaged the establishment of an international Organization for the Prohibition of Biological Weapons (OPBW), on a lesser scale than the OPCW, but which would nonetheless be charged with monitoring and verifying compliance with the BWC. States parties would be required to declare certain facilities, such

[36] See Nicholas Sims, 'Verifying biological disarmament: towards a protocol and organisation', in *Verification Yearbook 2000,* VERTIC, London, 2000, pp. 93–94.
[37] See Oliver Meier, 'A biological weapons protocol: verification lite?', *Trust & Verify,* no. 97, May–June 2001, pp. 1–2.

as commercial research and production plants and larger bio-defence establishments. 'Triggers' for such declarations would include the facility's bio-safety level, as well as whether it worked with specified agents that could be used to develop biological weapons. Declared facilities would be subject to non-challenge 'visits' to enhance transparency and to increase confidence in the accuracy of the declarations. Consultations could be held to clarify ambiguous or suspicious information. Field investigations could be instigated in the event of an unusual outbreak of disease or suspected use of BW, while facility investigations could be launched to assess whether production of biological weapons was occurring. The draft also envisaged measures to strengthen technical cooperation and to increase scientific exchanges among states parties.

Although no delegation endorsed Tóth's draft in its entirety, no delegation rejected it either and de facto it became the negotiating text. While less than perfect, the protocol would at the very least have:

- created greater transparency than currently exists;
- increased the possibility of challenge OSIs in the case of suspected manufacture or use of BW;
- provided a standing international forum for any state party to air its compliance concerns; and
- established a relatively cheap verification organisation tasked with keeping global attention focused on the BW threat.

At the July 2001 meeting of the AHG, the last scheduled gathering, the US delegation rejected both the draft protocol and the entire 'approach' that it represented.[38] It announced, moreover, that it could not conceive of any changes that would improve the draft text to make it acceptable. It was both too strong and too weak. Paradoxically, the relative weakness of the verification regime was of the United States' own making: it had continuously sought to water down the draft on the grounds that it regarded the BWC as inherently unverifiable.

The 'new process'

Ultimately the AHG membership was unwilling to proceed with a BW protocol in the absence of the US. Instead they acceded to US wishes and effectively abandoned the negotiations. This suited many other states, such as China, Iran and Russia, which, while unhappy with the protocol, would not have opposed its adoption outright had the US supported it. For their part, many developing countries see the BW problem as irrelevant to them, or at least of low priority, and had been attempting to use their agreement to improved verification as a bargaining chip to obtain increased assistance from the West in biotechnology.

Although the AHG was never been officially terminated, the fifth BW Review Conference in November 2002 agreed on a 'new process' of discussions by annual expert meetings, followed by meetings of states parties to consider their outcome.

[38] See Trevor Findlay, 'Bush ditches the BW protocol', *Trust & Verify,* no. 98, July–August 2001, pp. 1–3.

This process aims to promote 'common understanding and effective action' on five issues. The sixth Review Conference in 2006 is to assess the product of this intersessional work programme and decide on further action. The issues are:

- adoption of necessary national measures to implement the prohibitions set forth in the convention, including enactment of penal legislation;
- national mechanisms to establish and maintain security and oversight of pathogenic micro-organisms and toxins;
- enhancing international capabilities to respond to, investigate and mitigate the effects of alleged use of biological or toxin weapons or suspicious outbreaks of disease;
- strengthening and broadening national and international institutional efforts and existing mechanisms to survey, detect, diagnose and combat infectious diseases that affect humans, animals and plants; and
- the content, promulgation and adoption of codes of conduct for scientists.

The Bush administration is now so averse to any multilateral effort to improve the BWC that it has exerted strong influence over the new process to ensure that discussions do not stray into negotiations and that no substantive outcome materializes.

This was tested in the first of the Expert Meetings, held in Geneva from 18–29 August 2003, which discussed national implementation legislation[39] and bio-safety and security. Although the US is strongly in favour of both relatively benign measures, it wishes to pursue even these outside of a multilateral framework, dealing instead with states bilaterally and within groupings of 'likeminded' nations. The first annual Meeting of States Parties to consider the work of an Expert Meeting, held in November 2003, was thus anodyne in its conclusions, simply providing a factual account and no recommendations for future work. The second annual round of Experts Meetings, held in July 2004, saw a better working atmosphere, although the US maintained its previous attitude.[40]

Just how the remaining topics on the list will fare is unclear, but even if all the discussions result in agreed and workable initiatives, collectively they will come nowhere near to effective verification of the BWC. They will increase transparency somewhat, improve national implementation and possibly establish some form of multilateral cooperative endeavour, but it will be a far cry from the CWC model. A change of heart by the US is the only way that the situation will alter dramatically. Alternatively, like-minded states will need to take initiatives outside the treaty framework.

[39] See *Time to Lay Down the Law: National Legislation to Enforce the BWC,* VERTIC, London, October 2003.
[40] See Jez Littlewood, 'Back to basics: verification and the Biological Weapons Convention', in *Verification Yearbook 2003,* VERTIC, London, 2003.

Confidence-building measures
The second BWC Review Conference in 1986 agreed that states should make annual declarations on various BW-related matters to increase transparency and act as confidence-building measures. These were revised and expanded at the third Review Conference in 1991. The current issues which states are invited to report on are:

A1: Data on research centres and laboratories
A2: Information on national biodefence research and development programmes
B1: Background information on outbreaks of reportable infectious diseases
B2: Information on outbreaks of infectious diseases and similar occurrences, that seem to deviate from the normal pattern
C: Encouragement of publication of results and promotion of use of knowledge
D: Active promotion of contacts
E: Declaration of legislation, regulations and other measures
F: Declaration of past activities in offensive and/or defensive biological research and development programmes
G: Declaration of vaccine production facilities

States parties are obliged to submit a CBM return by 1 April each year to the UNDDA, which collates and distributes the reports only to states parties. So far only two countries, Australia and the US, have made theirs public.

Participation in the CBMs has been poor, with only 53 states parties submitting a return in 1996, the peak year for submissions.[41] In 2003, only 33 states parties submitted declarations. Many states parties have never submitted one. Canada has prepared a guide to assist states to complete the CBM forms,[42] although the low level of participation is not solely attributable to a lack of understanding. As the data is not publicly reviewed and is unlikely to be substantially studied by states parties themselves there is little incentive for states to fully or accurately report. While the process does marginally increase transparency in regard to states which participate, it can in no sense be described as monitoring or verification.

The US/UK/Russian trilateral initiative
The accidental release of anthrax at Sverdlovsk in the Soviet Union in 1979, combined with the testimony of Soviet defector Vladimir Pasechnik in 1989, increased US suspicions that the Soviets had maintained an offensive BW programme in violation of BWC. After considerable diplomatic pressure from the US and UK, the Soviets reluctantly agreed to allow a joint US-UK team to visit four facilities in January 1991. Rather than allay concerns, the visits heightened suspicions of Soviet non-compliance. The team was denied access to parts of a research facility, identified inconsistencies about smallpox research and heard explanations about purported peaceful purposes of test chambers which lacked

[41] 'Transparency under the BWC: CBMs', *BioWeapons Report 2004* (forthcoming December 2004)
[42] The Biological and Toxin Weapons Convention Confidence Building Measures: A Guide to Their Completion, DFAIT, Canada, 2004; http://www.opbw.org/cbms/Guide_files/frame.htm

credibility. Following a reciprocal visit by a Soviet team to four US sites, the continuation of visits was formalised under a Joint Statement by the three governments in Moscow on 10 and 11 September 1992 (commonly referred to as the Trilateral Agreement)

Described as a CBM rather than verification (with its implication of non-compliance), the agreement provided for reciprocal visits to each others' military biological facilities. The US and UK were first invited to observe a Russian Commission of Inquiry to assess whether work at the Institute of Ultrapure Preparations violated the BWC. Unsurprisingly, the Commission declared that it did not. Agreements were then adopted on protecting proprietary information before another US-UK team visited Russian facilities in May and October 1993 and January 1994. Again, the Russians restricted access to certain facilities. They also failed to provide credible explanations of evidence of large-scale production and of facilities indicative of offensive application, such as excessive containment levels for current operations and aerosol test chambers. A Russian team then visited US commercial facilities and a Department of Agriculture site in February 1994. Further discussions were held in 1994 to 1996 on procedures for future visits ('Rules of the Road'), although these were never concluded as Russia continually failed to cooperate in the discussions. A lack of political will in Russia and the US to continue the process resulted in its demise.

The Trilateral Agreement is the only example of a voluntarily agreed multilateral inspection process to verify BWC compliance. While it was not a success in verification terms, the process was important in demonstrating that even inspections under conditions of limited access and minimal cooperation can identify indicators of an offensive BW programme. When pieced together, such evidence can provide a compelling picture of non-compliance.

The BWC compliance mechanism

Article 5 of the BWC provides for bilateral and/or multilateral consultations between states parties should a non-compliance allegation occur. The procedure was fleshed out by understandings agreed at the treaty's third Review Conference in 1991. The procedure was invoked in 1997, following a Cuban allegation that US aircraft had caused a crop disease outbreak involving *thrips palmi*. Information was sought and received from both Cuba and the US and a two-day meeting was held in Geneva by states parties to hear each side's case. However, no attempt was made to initiate a fact-finding mission, conduct on-site activities, identify and collate open source information or to solicit information from NTM. The chair of the meeting noted that 'the technical complexity of the issue and the lack of further detailed information made it impossible to draw any definitive conclusions'.[43] Although under Article 6, states parties may refer compliance matters to the UN Security Council, Cuba made no attempt to do so on this occasion.

[43] Letter from Ambassador Ian Soutar, United Kingdom Permanent Representative to the Conference on Disarmament, dated 15 December 1997 to All States Parties to the Biological and Toxin Weapons Convention.

No other alleged violation of the BWC has been brought to the Councils' attention. Even outside the BWC compliance framework, any state may bring such a BW matter to the attention of the UN Security Council as a threat to international peace and security, but none has yet done so.

Security Council-mandated verification regimes

The long crisis over Iraq's actual and presumed WMD capabilities generated not only agonizing dilemmas for the international community but also novel ways of attempting to deal with the problem. In particular it led to the establishment by the UN Security Council of two bodies, UNSCOM and UNMOVIC, charged with monitoring, verifying and assisting in Iraq's disarmament. Both were given powers of inspection and information-gathering vis-à-vis a sovereign member state that are unprecedented in the history of the UN. While both involved unique verification regimes that may not be replicated in future cases, the techniques and technologies they used, and which in some cases they developed to a high art, may be drawn on by the standing multilateral regimes and applied in more or less adversarial circumstances. In addition, as UNMOVIC still exists, consideration needs to be given as to the future of that body and the potential uses of its hard-won capabilities.

The UN Monitoring, Verification and Inspection Commission

UNMOVIC drew heavily on the experience of UNSCOM, as well as acquiring its assets, archives and some of its personnel.[44] However, it became a more formidable inspection and verification organization, partly because it used the three years between its establishment and the deployment of its inspectors to Iraq to prepare thoroughly. It also implemented many of the recommendations of the Amorim panel, named after Brazilian Ambassador Celso Amorim, which had been established by the Security Council to suggest ways of avoiding the pitfalls encountered by UNSCOM.[45]

The Commission comprises, besides the Executive Chairman and his support office, an Administrative Service and four main divisions—Technical Support and Training; Planning and Operations; Analysis and Assessment; and Information (see figure 1).[46] Although, unlike UNSCOM,[47] UNMOVIC actually had an organizational chart, the divisions are permeable, in recognition of the fact that expertise needs to flow where needed and is relevant in several different parts of the organization. For instance, planning and operations is critically dependent on analysis and assessment.

---

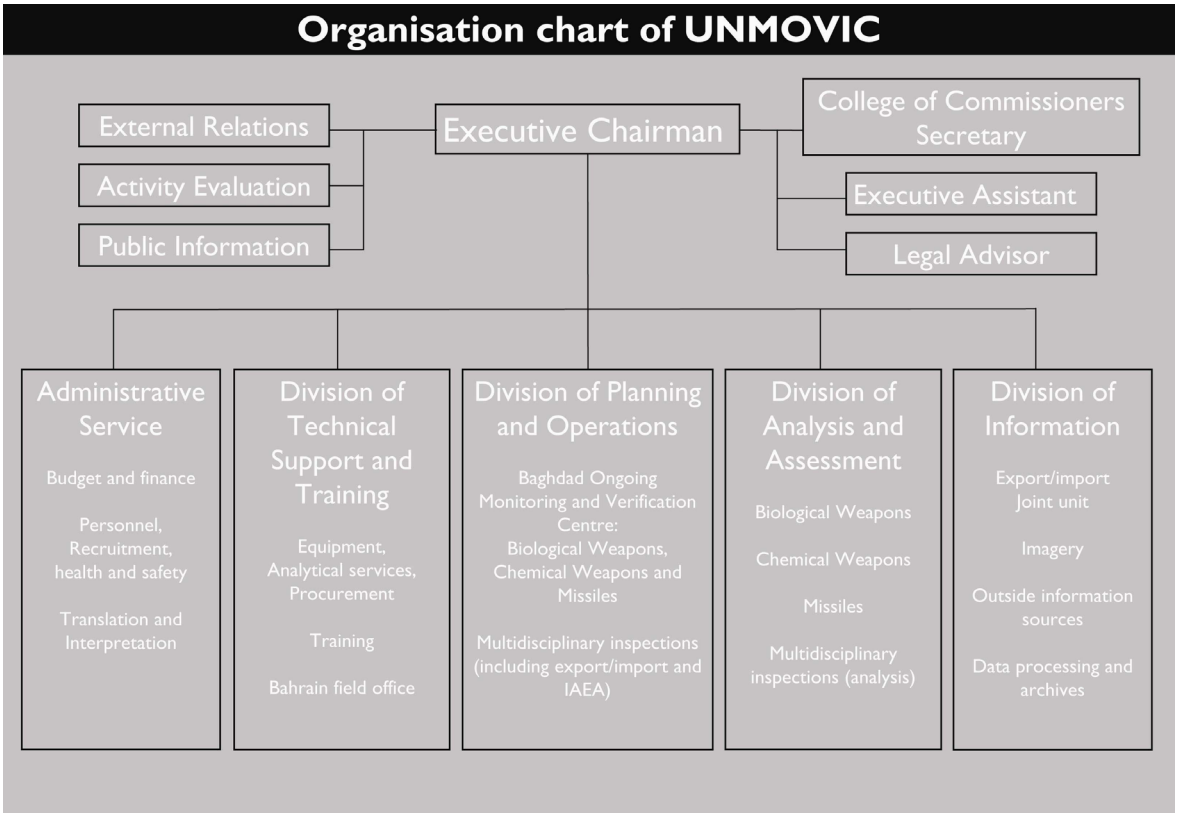
[44] There were some who argued that UNMOVIC should not employ any UNSCOM personnel. Hans Blix, though, felt strongly that the new body should draw on the wealth of experience and expertise that his predecessors had put so much effort into acquiring.

[45] 'Report of the First Panel Established Pursuant to the Note by the President of the Security Council on 30 January 1999 (S/1999/100), concerning disarmament and current and future ongoing monitoring and verification issues', UN document S/1999/356, 27 March 1999.

[46] 'Note by the Secretary General', UN document S/2000/292, 6 April 2000.

[47] UNSCOM Executive Chairman Rolf Ekéus reportedly deliberately avoided establishing an organizational chart, preferring to maximize his personal control of the body and to minimize interference from Commissioners.

The Division of Planning and Operations is responsible for planning and executing all monitoring, verification and inspection activities, including proposing sites for inspection, planning the objectives and timing of inspections and deciding the composition of inspection teams. The division has four principal units—BW, CW, ballistic missiles and multidisciplinary inspections and operations. The division also has responsibility for the verification and monitoring of any proscribed items imported by Iraq and investigating any dual-use items, as part of an Export/Import Joint Unit with the IAEA. The division also has responsibility for the Reinforced-Ongoing Monitoring and Verification (R-OMV) programme which was supposed to continue in Iraq indefinitely.



The Division of Information gathers, processes and archives information from several sources, including that garnered from both UNMOVIC and UNSCOM inspections, overhead imagery, open sources (notably from the Monterey Institute and a French research institute) and intelligence provided by UN member states. Because of the long period that elapsed between the end of UNSCOM inspections and the commencement of UNMOVIC inspections, and the resulting paucity of information about Iraq's weapons programmes between 1998 and 2002, information from open sources and intelligence was particularly important during the interregnum.

The Division of Analysis and Assessment is responsible for processing information in order to focus the work of the inspections, provide a basis for the R-OMV and assist the Export/Import Joint Unit. The Division has the same four units as the Division of Planning and Operations and each unit liaises directly with its counterpart to identify new sites for inspection and assess Iraq's compliance.

Finally, the Division of Technical Support and Training provided UNMOVIC with all the equipment and supplies needed for inspections, such as logistics, transport, communications and security. These activities were implemented in Iraq from the Baghdad Ongoing Monitoring, Verification and Inspection Centre (BOMVIC) for both UNMOVIC and the IAEA. It was also responsible for the Larnaca (Cyprus) and Bahrain field offices (the latter now closed) and for running the training programmes for staff and inspectors.

UNMOVIC innovations

Amorim's recommendations included employing all UNMOVIC staff, including inspectors, as UN civil servants, rather than accepting staff on secondment and in the pay of governments. All staff members would henceforth be obliged to act on behalf of and in the interests of the world organization. In part this was an attempt to avoid the possibility of national intelligence agents, still beholden to their national authorities, being planted in inspection teams. This aim was reinforced by Executive Charman Hans Blix's determination that the flow of intelligence information would be strictly 'one-way traffic'—from national intelligence services to UNMOVIC.[48] In addition the post of deputy executive chairman was abolished, since 'it had always been a direct channel to the authorities in Washington'.[49] Internally, intelligence information would be restricted to the executive chairman and a 'special officer', an intelligence conduit trusted by supplier governments. If intelligence information was needed for identifying the target or facilitating the conduct of an OSI, the head of operations and the team leader would also be included in the intelligence 'loop', as agreed with the intelligence provider.

Another UNMOVIC innovation was to establish multi-disciplinary analytical and inspection teams to avoid the 'stove-piping' of information into the three types of WMD that, in the past, had resulted in missed leads and lost opportunities. Training courses were devised to emphasize the need for cross-disciplinary thinking.

A key difference between UNMOVIC and its predecessor was that it was able to use the three-year waiting period to determine priority sites for inspection, carefully analyze the huge amounts of information on Iraq's WMD programmes and capabilities that UNSCOM had collected, consolidate and learn from the experiences of the Special Commission, create a well-trained force of inspectors and refine its monitoring and inspection methods. As instructed in resolution 1284,

[48] Hans Blix, *Disarming Iraq: the Search for Weapons of Mass Destruction,* Bloomsbury, London, 2004, p. 50.
[49] Blix, p. 49.

UNMOVIC focused on identifying 'unresolved disarmament issues' and 'key remaining disarmament tasks'. It assembled the unresolved issues into interrelated clusters to paint a better overall picture of Iraq's WMD programmes and to assess the significance of gaps in its knowledge and hence what still needed to be verified.[50]

Staff training—under UNSCOM largely the responsibility of member states—was now organized and conducted solely by UNMOVIC (with some support from governments).[51] As UNSCOM had been accused of cultural insensitivity, the programme included an Iraqi cultural training package that covered the history, economy and politics of Iraq, as well as regional, social and religious themes. With the completion of the first training courses and the recruitment of 42 professional core staff members in New York, UNMOVIC was in a good position by the end of 2002 to commence inspections at short notice. Courses were still running in February 2003, when UNMOVIC was withdrawn from Iraq, bringing the total number of experts on the UNMOVIC roster to 380 from 55 nations. The over-reliance of UNSCOM on American and other Western experts had been dealt with, removing at least one excuse for future Iraqi non-cooperation.

UNMOVIC also had better technological capabilities than UNSCOM. Surveys and the inspections were greatly assisted by significant improvements in technology after 1998. Detection devices were smaller, lighter, faster and more accurate. They included miniature radiation sensors, portable CBW detectors and ground-penetrating radar.[52] The IAEA used environmental sampling techniques developed for improved nuclear safeguards to monitor water, air and vegetation.[53] Information technology developments also helped UNMOVIC. The IAEA and UNMOVIC databases were connected and cross-disciplinary analysis not previously available was used to look for patterns and linkages.

UNMOVIC's capabilities were also to be enhanced by the establishment of two regional offices, the freedom to fly into Baghdad rather than an airport several hours' drive away, a fleet of British, Canadian and Russian helicopters, access to colour satellite images, including from commercial providers, and the use of Mirage and U-2 aircraft for reconnaissance (although the latter took some time to

[50] 'Unresolved disarmament issues—Iraq's proscribed weapons programmes', UNMOVIC working document, 6 March 2003, presented informally to the Security Council. Paradoxically, a draft work programme was submitted to the Council for its approval on the very day that UNMOVIC completed its last inspection before leaving Iraq ('Draft work programme', UNMOVIC document, 17 March 2003).

[51] UNMOVIC instigated a rolling programme of training on a wide range of topics: the work of UNSCOM; the origins, mandate and legal framework of the commission; the scope and nature of Iraq's weapons programmes; monitoring and inspection techniques; and health and safety.

[52] Multi-channel analysers (MCAs) were used to detect and assess gamma radiation from radioisotopes and neutron radiation from plutonium, while a gamma spectrometer was utilized to identify high-enriched uranium. Importantly, as nuclear activities often require exotic metals, X-ray fluorescence spectrometers were employed to distinguish between various metal alloys.

[53] The equipment employed to survey Iraq's watercourses was so sensitive that it could detect the permitted use by Iraq of radioisotopes for medical applications.

arrange). It was also planned to obtain data from unmanned aerial vehicles (UAVs), but these could not be deployed before UNMOVIC's premature withdrawal from Iraq.

Strategic lessons

The first strategic lesson to be drawn from the cases of UNSCOM and UNMOVIC, and the experiences of their partner in the nuclear field, the IAEA, is that international verification can work effectively even under the most disadvantageous of conditions. Despite Iraq's non-cooperation and deliberate attempts at sabotage all three bodies broadly succeeded in their verification mission. All demonstrated that international inspection regimes are able to prepare themselves well, deploy quickly, use technology skilfully, organize efficiently, maintain their impartiality and produce sober, balanced reports of a high technical standard. They were also able to follow intelligence leads successfully and reach quick and decisive, albeit suitably caveated, conclusions.

The findings of UNSCOM, the IAEA and UNMOVIC respectively have subsequently been found to be true for the most part. Iraq did destroy the bulk of its WMD assets, either unilaterally before inspections commenced or under international supervision. The IAEA's conclusion that Iraq no longer possessed significant nuclear capabilities and could not rejuvenate them swiftly has proved to be correct. Similarly UNMOVIC determined that Iraq's CW programme had, with a few innocuous exceptions, largely been eradicated. In the BW area, while substantive questions remained after UNSCOM's withdrawal, some of which even now have not been satisfactorily explained, the more outlandish claims made by US intelligence, such as the existence of mobile BW laboratories and pilotless drones for BW dissemination, were credibly rebuffed by UN inspections. In the missile realm, where question marks remained after UNSCOM's departure, UNMOVIC did detect violations and was in the process of removing them when it was extricated.

A second strategic lesson follows on from the first. The experience of all three bodies has demonstrated once more that the full support of the Security Council, or at least that of its permanent membership, is essential if a multilateral verification endeavour is to succeed in the face of opposition from the country being verified. In the UNSCOM case, a significant cause of its ultimate failure was French and Russian reluctance to press Iraq to comply and to extend full political support for intrusive inspections. Without a united Security Council, UNSCOM was unable to force the Iraqis to back down.

In the case of UNMOVIC, the re-admission of inspectors to Iraq and the substantive success of the process, even up to the point at which it was pulled out of the country, was undoubtedly due to the steeling of the Security Council's nerve by the UK and the US. The threat of the use of force in the event of continuing Iraqi non-compliance and a growing UK–US military presence on Iraq's doorstep undoubtedly were key factors in forcing Baghdad to yield. In turn, the premature

withdrawal of UNMOVIC was caused by the flaunting of the majority view of the Security Council, not by Iraq, but by the UK and the US. Purported growing US impatience with the inspection process, in reality masking a pre-determined preference for military means irrespective of UNMOVIC's performance, split the Security Council irredeemably.

A third strategic lesson is that an international monitoring and verification system backed up by military pressure, especially in combination with economic sanctions and control of militarily significant imports and exports, can result in effective containment of a renegade regime. Having, as it turned out, successfully disarmed Iraq of its WMD assets, it can now be seen that the planned Reinforced Ongoing Monitoring and Verification regime (never fully implemented) would likely have proved effective in detecting any future moves by Iraq to reacquire its lost capabilities. Notwithstanding revelations about Iraq's undermining of the Oil-for-Food Programme, there is little evidence that funds were able to be diverted to the resumption of WMD programmes.[54]

In addition to these strategic lessons there are numerous institutional, operational and technical lessons that have been learned as a consequence of the UNSCOM/UNMOVIC/IAEA experience in Iraq.

Institutional lessons

Institutionally, there was not only a direct lineage between UNSCOM and UNMOVIC, but also some evolution. Both were established by the Security Council and remained under its control and direction, rather than becoming part of the UN Secretariat. This had advantages for the political credibility of the organization, in that there was a direct line of authority to the Security Council. Both UNSCOM and UNMOVIC were headed by executive chairmen with strong powers and who were answerable to the Security Council (although appointed by the UN Secretary-General) and a College of Commissioners.

Finance is critical to organizational independence. UNSCOM had been funded for the first six months from the UN Working Capital Fund and subsequently by individual, mostly Western or pro-Western, UN member states.[55] By funding UNMOVIC through the Iraq Oil-for-Food programme escrow account (0.8 per cent), the independence of the body, as well as the ready availability of funding, was assured. Had UNMOVIC been set up under the UN Secretariat or by the UN General Assembly, it would have had its budget scrutinized by the Advisory Committee on Administrative and Budgetary Questions (ACABQ) and undoubtedly seen it whittled down by those states that objected politically to its existence. UNSCOM's reliance on seconded staff provided and paid by UN member states (in addition to seconded personnel from various UN agencies) had

[54] See Comprehensive Report of the Special Advisor to the Director of Central Intelligence on Iraq's WMD (the Duelfer report), Central Intelligence Agency, Washington DC, 30 September 2004.

[55] Notably Australia, France, Japan, Kuwait, Norway, Saudi Arabia, the UK and the US.

called into question its independence, as well as being unsatisfactory from a managerial perspective. Independent funding enabled UNMOVIC to hire the necessary staff quickly, an essential requirement when inspections have been urgently mandated by the Security Council.

While the vast majority of its personnel undoubtedly behaved professionally and in the best interests of the international community, UNSCOM was to a certain extent subject to undue influence by some UN member states. This occurred in two ways. First, the nature and pace of inspections may have been shaped without the agreement of UNSCOM's executive chairman. Former US National Security Advisor Richard Clarke claims that he 'set up' the confrontational nuclear inspections under UNSCOM, with British connivance; it is not clear whether these were approved by the executive chairman in advance.[56] A second misuse of UNSCOM was the reported planting of listening devices by the US on its monitoring equipment and the use of inspections for national intelligence-gathering purposes as a result of inspectors reporting back to capitals.

Compared to UNSCOM, UNMOVIC was more successful in avoiding being taken advantage of by any UN member state. In addition it managed not to offend Iraqi sensibilities unnecessarily and was able to parlay strong Security Council support into achieving Iraqi cooperation, if not proactive engagement and full compliance.

Intelligence information and verification

There are continuing lessons to be learned from both UNSCOM and UNMOVIC with regard to the relationship between intelligence information and multilateral verification. Intelligence information can, in theory, be of great assistance to multilateral verifiers. It may, for instance, be derived from highly sophisticated NTM beyond the reach and budget of international bodies.

But, as in the Iraqi case, national intelligence data can also consist of analysis of information from human intelligence (HUMINT) sources or electronic eavesdropping. As the various inquiries by legislatures in Australia, the UK and the US have revealed, such intelligence information may be based on unreliable, self-interested and/or malicious sources. National intelligence agencies, adopting worse-case scenarios or under political pressure, can dangerously inflate their assessments. By the time such analysis and 'information' is provided to multilateral verifiers it may have lost its qualifiers, its context and often, in an effort to protect the source and collection method, its provenance. International verification bodies thus need to be extremely wary of taking intelligence information provided by states at face value, even when it is supplied in good faith. Rolf Ekéus says that in any event the 'much-hyped intelligence provided [to]

[56] Richard Clarke, *Against All Enemies: Inside America's War on Terror*, Free Press, New York, 1004, pp. 67–69.

UNSCOM by member states was insignificant and highly marginal in the work to identify the WMD programmes and to establish the material balance'.[57]

It appears that UNMOVIC did learn from the difficulties that UNSCOM experienced in regard to what was later seen as too cosy a relationship with national intelligence agencies. There was, however, a price to pay. In seeking to formalize the relationship between UNMOVIC and national intelligence agencies by restricting it to the highest levels and a single designated 'conduit', UNMOVIC may have cut itself off from valuable contacts and information at the working level. This may be a necessary trade-off, though, to keep the intelligence/verification nexus as pristine as possible.[58] The relationship between any future inspection agency and national intelligence body needs to be subject to thorough review and careful thought. It is encouraging, however, that UNSCOM, the IAEA and UNMOVIC were never accused of leaking classified information and indeed were successful in establishing systems to safeguard it. This should help repudiate critics who claim that UN bodies inevitably 'leak like sieves'.

Verification and public relations

A key lesson for the future that has been identified by the IAEA, but which applies equally to UNMOVIC, is that multilateral verification bodies need to make better use of the media to convey their achievements to the public and decision-makers.[59] In part because of the multilateral nature of such bodies, but also because traditionally UN bodies have not been adept in defending their case, it was relatively easy for ill-informed and hostile observers to impugn the intentions and capabilities of the inspectors. Naturally there are constraints on how virulently UN bodies can engage in self-defence in these circumstances, especially when critics can be as senior as the US vice-president. Nonetheless, they should have public information and media capacities to enable their case to be injected clearly into the public domain.

Deception and denial

While initially UN inspections in Iraq may have begun in the naive hope that they would be concluded within weeks, if not months, UNSCOM soon found itself on a steep learning curve in terms of the degree of deception and denial that Iraq was willing and able to engage in. UNSCOM, the IAEA and UNMOVIC all ended up participating in a 'deception and denial' race, in which the Iraqis attempted to employ increasingly sophisticated means which the international bodies sought to counter with innovative schemes of their own. Both bodies set up their own special units to deal with the issue. Just one example relates to prior notification of inspections: after realizing that pre-notification allowed the Iraqis the opportunity

[57] Ekéus, 'Reassessment: the IISS strategic dossier on Iraq's weapons of mass destruction', *Survival*, vol. 46, no. 2, summer, p. 78.
[58] For further analysis of the verification/intelligence relationship, see Brian Jones, 'Intelligence, verification and Iraq's WMD', in *Verification Yearbook 2004*, VERTIC, London, 2004 (forthcoming).
[59] Jacques Baute, 'Timeline in Iraq: challenges and lessons learned in Iraq', *IAEA Bulletin,* June 2004, p. 67.

to clear intended sites of any traces of WMD, the inspectors opted to set off vaguely in one direction, while leaving their actual destination a mystery until the last possible moment. Learning and using such counter-deception techniques is unusual for a UN body, but clearly necessary in the circumstances.[60] The lessons of such campaigns need to be collated and analyzed so that they can be drawn on when future challenges to verification arise.

Technical lessons

The technical lessons that may be gleaned from the UNSCOM/IAEA/UNMOVIC experience are too numerous to be detailed here. Nonetheless, several broad categories of lessons are identifiable. One is the need for rapid deployment. All three verification bodies fared well in this respect, but such endeavours in future would be facilitated by pre-leased airlift, pre-positioned equipment and standing contracts with inspection personnel, rosters of experts and pre-certified analytical laboratories.

A second lesson is that UN verification bodies are clearly capable of rapidly absorbing and even advancing the latest verification techniques and technologies. Examples from the Iraq experience include U-2 overflights, ground-penetrating radar and environmental sampling. This should give pause to those who claim that UN bodies will always be behind the technology curve.

An innovation of UNSCOM and UNMOVIC, one acted on most stridently by David Kay as an IAEA inspection team leader, was the hunt for, and the use of, a paper trail—documents that would reveal WMD assets and intentions—rather than searching endlessly for the capabilities themselves.[61] A further innovation of UNMOVIC was what might be termed 'verification archaeology', the digging up of sites to detect buried weapons or weapons components or to determine destruction techniques and timelines. UNMOVIC did this fruitfully both in relation to missiles and CBW. Finally, the role of UNSCOM and UNMOVIC in seeking information from UN member states about Iraqi imports of weapons-related technology and materials and those of a dual-use character, and about the companies and organizations involved, was also unprecedented for a UN body. The IAEA has followed this precedent by attempting to trace the reach of the A.Q. Khan network in facilitating nuclear proliferation in the cases of Libya, Iran and North Korea. Such precedents are valuable for future counter-proliferation efforts.

Perhaps the greatest legacy of the Iraq verification experience, though, is the size of the verification cadre that it has produced. Literally hundreds of inspectors have been trained and have gained field experience in all areas of WMD verification. This has benefited standing verification bodies like the IAEA and the OPCW and

[60] For the details of UNSCOM's counter-deception and denial techniques, see Ekéus, p. 75.

[61] Blix notes that: 'I came to recognize in 1991 that both David Kay and UNSCOM had a better instinct than I: namely, on the importance of searching for relevant documents ... the rich caches of documents which Kay seized that year showed that such a search could be highly rewarding—providing you had good intelligence on where to look' (Blix, p. 26).

will also be useful for any future BW investigations under the mandate of the UN Secretary-General[62] or by a future BW organization. Such experience and capacity should be retained and nurtured, including by considering establishing a permanent, standing verification body to succeed UNMOVIC, which would be available to meet future Iraq-style non-compliance challenges.

Further lessons relate to health and safety and environmental issues, which may seem minor and parochial, but which can assume great significance. UNSCOM initially underestimated the time that it would take to ensure the safety and security of its personnel in a hostile political and physical environment. If such considerations are not taken into account verification can stop dead in its tracks, with severe political ramifications. Several UNSCOM inspectors suffered damaging exposure to toxic chemicals; UNMOVIC was much more careful in this respect, having learned the lessons. Similarly, the UN cannot be seen to be flaunting environmentally sound practices and international conventions in its rush to destroy WMD. In the early days of UNSCOM, for instance, CW shells were simply dynamited in open pits. Criticism of verification activities on environmental grounds can provide yet one more political excuse for opposing multilateral ventures of this sort.

Conclusion

The experiences of the three international bodies involved in verification in Iraq have been both salutary and path-breaking. They have added greatly to the store of verification lore and capacity that can be utilized by similar endeavours in future.[63] Lessons learned have already been fed into the standing multilateral verification bodies and were notable in the UNSCOM–UNMOVIC transition. The task for the international community is to ensure that such capacities as have been developed are preserved and strengthened. Providing the UN with the capacity to launch intrusive, highly capable verification operations when required may at the very least give pause to the small number of states that are tempted to violate international treaties and norms relating to WMD.

WMD verification techniques and tools

This section examines some of the generic techniques and tools currently available for multilateral WMD verification.

[62] See Angela Woodward, 'BW: revisiting the UN mechanism', *Trust & Verify,* no. 116, September–October 2004, pp. 3–4.
[63] For analysis of issues relating to the future role of UNMOVIC post-Iraq, see Trevor Findlay, 'Preserving UNMOVIC: the institutional possibilities', *Disarmament Diplomacy,* no. 76, March/April 2004.

Transparency

Transparency of information, whether raw, processed or analyzed, is essential for effective verification. For some purposes transparency is required only between the parties to an agreement, while in other cases transparency to the broader international community and indeed the general public is desirable. Verification systems aim to increase the transparency of those states with low levels of existing transparency, including through voluntary measures such as declaration of additional information. Verification systems may also take advantage of the vast amount of information now available about all states from open sources such as the internet, the mass media, academia and non-governmental organizations (NGOs).

There are certain circumstances, however, in which maintaining the non-transparency or confidentiality of certain information is vital for verification. For example, where industrial or commercial facilities are involved, maintaining the confidentiality of commercial proprietary information may be critical. Only if confidentiality is maintained will companies be willing to permit an international organization or its on-site inspectors to have access to their facilities and records. Similarly, governments do not want verification systems to acquire confidential and secret information not relevant to treaty compliance, especially information relevant to national security or defence.

A trade-off must therefore often be made between the confidentiality needs of governments and industry and the verification system's need for information to verify compliance. In some cases this problem is dealt with by strictly limiting the distribution of data gathered during the verification process to the relevant parties or to a designated international body. Within an international verification body itself there will be procedures for handling the confidentiality of certain types of information. Another option is to limit the capabilities of the monitoring equipment being used. Some treaties also establish procedures to prevent on-site inspectors having access to equipment or facilities that are irrelevant to treaty compliance. Such 'managed access' techniques may, for instance, permit equipment to be covered with shrouds or certain computers to be switched off during inspections. Inspectors could be permitted access only to designated areas of a site, perhaps on the basis of random selection.

Monitoring and verification techniques

Monitoring techniques can be categorized as either remote or on-site. 'Remote' refers to any monitoring that takes place at a distance from the object or activity being monitored, usually outside the territorial limits of the country being targeted. Remote monitoring may be done from space, in the air or on the ground at a distance. Methods include satellites, aircraft and remotely-located ground stations. 'On-site' refers to any activity that occurs on the ground near the object or activity

being monitored or verified. Such activities include on-site inspections and continuous on-site monitoring.

National technical means

National technical means of verification (NTM) are nationally owned and operated technologies and techniques used to monitor the treaty obligations of another state. NTM include satellites, high-altitude and other aircraft and land-based remote detection systems, electronic signals intelligence (SIGINT) and electronic intelligence (ELINT) collection systems, as well as systems that collect open source information. NTM, therefore, also may be assumed to include the facilities and personnel involved in collating, analyzing and interpreting information from such technologies.

While the 'T' in NTM was originally supposed to emphasize that such means were to be technical, NTM may also be used as a euphemism for all sources of information available to a state, including information obtained by intelligence organizations using all of the methods at their disposal. Treaties often attempt to avoid endorsing espionage by including a proviso that NTM that are permitted for verifying treaty compliance may only encompass methods that are in accordance with international law.

States may use NTM to verify compliance with a treaty in the absence of other measures, or to supplement the level of reassurance they receive from a co-operative verification system. In some instances, states are permitted to submit information obtained from NTM to a multilateral verification organization to support a request for clarification of the activities of another state, including through an OSI.

For most states the verification information they receive from multilateral means far exceeds that which they could obtain unilaterally. However, for the US, NTM remain its primary source of verification information, while for other technically advanced states, notably France, Russia and the UK, NTM still play an important role in their national assessment of arms control and disarmament compliance.

Increasingly there is a willingness for states to provide NTM-derived information for multilateral verification purposes. For example, the US provided satellite photographs and other information from NTM to the UN Security Council in relation to North Korea and to both UNSCOM and UNMOVIC. In addition it allowed UNSCOM and UNMOVIC the use of an NTM technology, a U-2 reconnaissance aircraft, to enable it to do their own information gathering.

The provision of information from NTM in these situations can create dilemmas for multilateral verification organizations as well as for the states involved. An international body will not want to become reliant on one or a small number of countries, as this may compromise its impartiality. For their part, states need to take great care in revealing information obtained through NTM to avoid revealing

confidential information about the scope and capabilities of their NTM. One way around this problem is for NTM-derived information to be used to focus multilateral verification which can then be used to build a non-compliance case that avoids relying directly on or revealing NTM sources or methods.

On-site verification

On-site activities are becoming increasingly sophisticated as the multilateral verification organizations accumulate experience and as non-compliance cases indicate improvements that are needed. On-site activities fulfil a variety of verification functions and occur in a variety of ways. The two main types are continuous on-site monitoring and on-site inspections.

Continuous on-site monitoring is used to monitor activities or facilities which, under the terms of a treaty, are subject to permanent observation. It may be carried out automatically by technical means or by personnel or by a combination of both. An example is the on-site verification of CW destruction carried out by the OPCW, which involves the permanent stationing of personnel and equipment at destruction facilities.

On-site inspections (OSI) involve the presence of personnel for limited periods. They have become almost a routine part of arms control and disarmament verification. Basic procedures and techniques, as well as administrative and logistical precedents have been established. A substantial body of experience has developed, in particular the experience of UNSCOM, UNMOVIC and the IAEA in Iraq, which may be drawn on in establishing new inspection regimes.

On-site inspections are, however, never the only verification tool provided for by a treaty. OSIs are normally triggered by other verification processes. In turn OSIs normally provide information that feeds into a larger verification process, supplementing or helping confirm data from other sources. For example, routine inspection may generate information which, in conjunction with data from an information exchange, may prompt a request for a challenge inspection.

A treaty will normally carefully detail the procedures to be followed for each type of inspection envisaged, including the way in which parties will be notified of an inspection, the rules and procedures for conducting the inspection, the length of time permitted for inspections, the rights and responsibilities of the inspected party and the rights and degree of access that must be given to inspectors. Such detail is often too great for the treaty text itself and is rendered in annexes or, in some cases, as with the CTBT, left for further negotiations.

After decades of arms control and disarmament verification regime-building, various generic types of on-site inspection are recognizable.

Routine inspections are conducted according to a schedule provided to the inspected party in advance. They are therefore predictable and the inspected party may make advance preparations for them.

Short-notice inspections have an element of surprise, intended to enhance the deterrent effect of the verification regime. Since the state party receiving the inspection may only be notified just before the inspection team arrives, it has less time to hide any serious non-compliance.

Random inspections may also be designed to have an element of surprise. Alternatively, they may be used to permit fewer inspections to be conducted for the same deterrent effect, thereby saving time, money and inspection resources.

Challenge inspections are the most contentious type of inspection as they imply that a violation has occurred. Their goal is to help provide evidence that will confirm or deny an allegation of non-compliance. In theory, the notification period for such inspections should be short, so that parties cannot remove or hide evidence. In practice, the speed with which an inspection can be mounted is limited by the need for the inspectors to travel to the site, gain entry and establish themselves and their equipment. The time that elapses between the announcement of a challenge inspection and the commencement of the inspection is likely to be considerable. Depending on the durability of the likely evidence or 'signals' to be detected this may or may not be critical to verification. It may, for instance, be harder for a violator to clean up evidence of a nuclear test than of BW use.

Multilateral treaties normally require a treaty body to approve, or at least to decide not to oppose, a request for a challenge inspection. Voting rules are established for such circumstances: a 'red light' system means that a challenge inspection will proceed unless a treaty body votes to stop it (hence the 'red light'), while a 'green light' procedure means that a challenge inspection will not proceed unless a treaty body gives its positive endorsement. Such decisions will not necessarily require consensus but varying forms of majority vote. Depending on the treaty provisions, a party asked to receive a challenge inspection may or may not have the right to refuse the request. Even without such a right, there will be many points at which a receiving state can delay an inspection unless the rules are clear. Refusal to receive a challenge inspection may be regarded as an admission of non-compliance.

In practice, challenge inspections have to date never been used in the multilateral WMD regimes indicating that they continue to be regarded as a verification tool of last resort. There is some debate within some regimes, notably the CWC's, as to whether the absence of a challenge inspection to date is good or bad for the credibility of the regime.

Cooperative or facilitation measures

These are measures designed to make verification easier or more effective. They may be voluntary or legally required by a treaty. An example is the CTBT's

voluntary provision that states notify the CTBTO of large conventional explosions to assist in discriminating them from nuclear tests. Not only do such measures contribute to verification, but if carried out as agreed they also help engender an overall sense of confidence in the commitment of the parties to the treaty.

Verification technologies

Technology plays a vital role in verification by permitting the rapid and systematic collection, collation, manipulation, analysis, storage, retrieval and dissemination of information. The extraordinary growth in computer power—a standard personal computer today is more powerful than the computers used for designing the first nuclear weapons—has had a significant effect on verification. In determining the role of technology, negotiators must balance its advantages and the disadvantages as well as considering questions of access and cost.

Technology does have advantages over human inspectors. It can operate continuously and at a constant level of observation. Its data is readily comparable. It can be limited to detecting treaty-relevant information, while ignoring other types of information. Inspectors need to be especially recruited, trained and deployed and can be expensive to maintain continuously in the field. Their attentiveness and dedication can vary considerably. They can also obtain information not related to the treaty that might be highly sensitive to the inspected party. On the other hand, the ability of inspectors to see the broader picture and discover information that they have not been briefed to expect can be an advantage to verification in keeping the inspected party uncertain as to what might be detected.

Some states parties may be concerned about equality of access to verification technology. This may be overcome by restricting the system to commercially available, 'off-the-shelf' technology or by making all the technology to be used available to all parties. This was a consideration in designing the 1992 Open Skies Treaty, for which the sensor suite to be mounted on aircraft was carefully defined (an additional motivation was to restrict intrusiveness). Cost must also be taken into account. High technology tends to be expensive to purchase and maintain, although costs tend to fall rapidly once a particular technology comes into general use. In addition, specialized training may be needed for particular types of technology. Tamper-proof mechanisms, redundancies and back-up systems need to be considered to prevent a party tampering with or deactivating monitoring technology. Technology-based monitoring can also generate unnecessary false alarms about non-compliance unless systems are in place to screen and analyze data carefully.

The main verification technologies being used or under consideration or development and the kinds of verification situations in which they may be useful are outlined below.

Space-based

Monitoring by satellite from outer space is one of the most useful remote monitoring tools. One of the major advantages of satellites is that their use does not need permission of the state that is being monitored. Since the first successful launch of the first reconnaissance satellite by the US in 1960, there has been a steady growth in the capabilities of space-based monitoring. In addition to optical (photographic) capabilities, satellites can now carry an array of sensors, including radar and multi-spectral sensors that can detect heat, soil disturbances, aerosols and gases.

Most satellites are owned and operated by states exclusively for their own purposes, including as part of their NTM. Such states may choose in particular instances to provide limited amounts of information from their satellites for multilateral verification purposes. Increasingly, however, any state wishing to acquire satellite capabilities can pay for design, construction and launch services either commercially or from other states. They will still, however, need to acquire the technical expertise to design and build the satellite sensors themselves (for security reasons), as well as the capability to receive, record and analyze the data received.

Commercial companies with their own satellites or with access to data from government-owned satellites, are increasingly selling images on the commercial market with resolutions as low as one metre for almost any part of the earth's surface. Prices for such images are decreasing as competition increases. However, receiving a continuous stream of images is still expensive and commercial data is currently restricted to photo images rather than the full spectrum available to the most highly sophisticated satellite operators. Recipients still need to determine which images are required and must have the specialized capability for analyzing and interpreting them. Even commercial operators may find themselves unable to supply the whole range of potential customers if particular states block purchase their entire output. One way around this that has long been proposed, is the multilateral ownership and operation of satellites for verification purposes. To date, however, concerns about intrusiveness, the complexities of multilateral ownership and cost have ruled this out.

Satellites are also not the definitive verification tool. They are not suitable for all verification purposes, such as detecting facilities hidden underground or small-scale activities in large building complexes. They are also subject to the vagaries of weather, they may not be available at precisely the time and place required and states may take steps to thwart their capabilities (as India and Pakistan did in hiding their nuclear test preparations from US satellites).

Aerial

Aerial surveillance, using aircraft or helicopters, can be a more powerful verification tool than satellites due to their closer proximity to the objects of verification. Like satellites they can employ cameras, a wide variety of sensors and

other monitoring equipment. A possible disadvantage, depending on the sensitivity of particular sites, is that information irrelevant to the verification purpose may be also gathered. Aerial surveillance is also limited by the fact that the permission of the state being overflown is required.

Significant mutual aerial surveillance opportunities are currently available under the 1992 Open Skies Treaty. While the original intention was that this regime only be used for conventional arms control purposes, there is no reason why it could not be used for WMD verification. One use would be the planning of inspections, especially challenge inspections, as in Iraq.

High altitude aircraft, which in theory also need overflight permission but in practice never seek it, can also be useful for verification but are currently owned and operated only by the US. The U-2, which has been operated by the US since the late 1950s, played a crucial role in the discovery of Soviet nuclear installations in Cuba in 1962. As noted, the US provided UNSCOM and UNMOVIC with a U-2 aircraft for monitoring Iraq.

Unmanned aerial vehicles (UAVs), also known as Remotely Piloted Vehicles (RPVs), have a number of characteristics that make them useful for monitoring arms control and disarmament agreements. Since they are pilotless there is no concern for the loss of military personnel over potentially hostile territory. UAVs can carry a wide variety of sensors, provide high-resolution coverage, cover large and remote areas and can fly continuously for long periods. In addition, their onboard sensors can provide all-weather day-and-night surveillance, and send real time information to ground stations. UAVs are particularly useful for atmospheric monitoring, border monitoring and on-site inspection support. They could be especially useful for collecting air samples to detect testing or use of radiological, nuclear, chemical or biological weapons. Their major drawback is that they are expensive and require considerable expertise to operate.

Ground-based

Ground-based technologies are also common in multilateral verification regimes, either for remote or on-site monitoring. The data from remote monitoring technologies can either be read periodically by humans on site or may, increasingly, be transmitted to central data processing and analysis centres by landline or satellite. The best example of the latter is the CTBTO's IMS.

A wide variety of sensor technologies is available for verification purposes on-site, providing continuous on-site monitoring without the need for human intervention except to periodically check that the equipment is functioning properly. Ground-based sensors can identify the movement of equipment, such as vehicles or personnel, by detecting weight on the ground, shifts in the magnetic or electrostatic fields or optical signatures. Such sensors can be used to monitor military or production facilities and entry and exit points.

Other technologies, such as x-ray machines to determine the contents of containers or canisters require the on-site presence of humans to operate and maintain. Portable or hand-held detection devices are also being increasingly developed—in addition to the traditional Geiger counter for detecting radioactivity. New devices that detect the presence of CBW are adding to the potential capabilities of on-site inspectors. Environmental sampling technology, used to determine what a facility or plant is producing by detecting environmental traces in its effluent or atmospheric discharges, is also reaching new levels of sophistication. Robots, including miniature robots, are being envisaged for dangerous verification tasks such as determining the use of CBW. Such new technologies may not always be usable for verification purposes because they are seen to be too intrusive or because they are not available 'off the shelf' to all treaty parties.

Ground-based monitoring can be facilitated by the use of increasingly sophisticated tags and seals. Tagging involves giving each treaty-limited item a unique tag that specifies that it is permitted under an arms control treaty. Critical to the success of tags is a high degree of certainty that they have not been duplicated or tampered with. Tagging is used for treaties where numerical limits on weapons, rather than outright bans, are to be verified. Any untagged item discovered is automatically a violation. This shifts the burden of verification: instead of on-site inspectors having to count every treaty-limited item to make sure that the limits are not exceeded, they simply need to ensure that each item they come across anywhere is tagged. Tags with in-built global positioning system (GPS) receivers have been developed, permitting the exact location of tagged items to be monitored. Improvements are also being made to ensure that tags are not able to be reproduced or tampered with.

Tamper-proof seals can help ensure that certain equipment has not been used or moved or that rooms or buildings have not been entered. Seals are used by the IAEA, for instance, to ensure the containment of safeguarded nuclear materials. A number of different types of seals are available, including those using a fiber-optic random pattern that changes if tampered with or special adhesives that disintegrate if disturbed. Like tags, seals can make continuous monitoring unnecessary—periodic inspection to ensure that the seals are intact is sufficient. Technological advances permit both types of systems to be monitored at a distance to ensure their integrity and viability.

Information technology

Verification requires parties to provide detailed information relating to their compliance by means of data declarations, exchanges and notifications. In addition modern monitoring technologies produce vast amounts of information. The continuing revolution in information technology (IT), permitting the rapid collection, transmission and analysis of such large quantities of data makes verification potentially much more manageable. Some multilateral verification systems, notably the CTBTO, have advanced to the point of having dedicated

communications systems for rapid bulk data transmission and data centres for continuous data collection and analysis.

Non-state stakeholders in verification

In addition to governments and international verification organizations, there are additional stakeholders in modern arms control and disarmament verification and monitoring whose actual and potential role must be taken into account.

Industry

Civilian industry may be involved in research, development and production of weapons, weapon systems and/or weapons components or it may be involved with dual-use technologies or materials. It may therefore have an important role in verification, in cooperation with governments and international verification organizations and will therefore be critically affected by the way in which verification is conducted. Industry will often have concerns about verification that need to be taken into account. Such concerns may include fears about the effects of adverse publicity as a result of inspections being conducted at their facilities, fears about loss of commercial proprietary information and concerns about both the real and opportunity costs of inspections (the time and expense involved in hosting on-site them, for instance). It is vital that industry be involved at an early stage of negotiations on verification in order that their concerns be addressed and, if possible, allayed.

A variety of steps can be taken to deal with industry concerns. Trial inspections can help allay fears about the potential intrusiveness, cost and disruption of OSIs. Managed access techniques may meet concerns about the loss of proprietary information. The chemical industry's experience of verification of the CWC has, for example, been good and initial industry fears have not been realized. In some instances industry can benefit from the inspection process by publicizing the fact that they have been successfully inspected and have cooperated fully in the process. For example, chemical facilities can advertise the fact that they have been given a clean bill of health through the CWC process, thereby contributing to their respectability.

Non-governmental organizations

Increasingly NGOs play a role in monitoring compliance with international treaties, a development made possible by technical and political changes. On the technical side, the information revolution, including the use of the internet, has radically altered the ability of NGOs to gather, analyze and distribute verification-relevant data. At the same time, the sensor revolution is democratizing access to previously classified technologies such as high-resolution satellite imagery. Politically, globalization has strengthened the importance of transnational

relations. The international arena now includes thousands of non-governmental and research organizations that are involved in all aspects of international life and that monitor state compliance with a wide variety of international obligations—whether states want them to or not. The most recent example of an NGO coalition becoming closely involved in encouraging and monitoring compliance with a WMD treaty is the Geneva-based Bio-Weapons Prevention Project (BWPP).

Compared to states or international verification organizations, NGOs are less constrained by questions of diplomacy or bureaucracy. They are able to publicize information immediately. On the other hand, since NGOs rely almost entirely on open sources their information may be inaccurate or incomplete. They can also be politically biased and crude in their analytical capabilities. A multiplicity of NGOs with different roles and sources of information is probably the best guarantee of ensuring that their contribution remains useful.

Conclusions

Multilateral WMD verification is currently better governed, organized, funded and supported by the requisite technical and technological means than ever before. Enormous advances have been made since 1972, when the NPT, the first major multilateral WMD treaty with a matching verification system, entered into force. Compliance mechanisms for multilateral WMD regimes, in contrast, are underdeveloped, untested and subject to doubt and confusion.

In addition to the scale of the international verification enterprise is the increasing extent of the commitments that such regimes, in combination, require of states, the growing degree of transparency they demand and the higher level of intrusiveness they seek. A state party to all of the relevant international instruments is obliged to provide information and accept safeguards on and inspections of their peaceful nuclear facilities and materials; make declarations on and submit their chemical industry to inspections; and become involved in the global nuclear test monitoring system, in all likelihood by hosting a CTBT monitoring station on its territory. Such a state is obliged to have a CWC national authority, a nuclear safeguards office, and sizeable numbers of staff to fulfil various membership requirements, including attending verification conferences, facilitating and accompanying on-site inspections, filling out declarations and complying with voluntary CBMs such as those sought from BWC states parties. At any time the state may be subject to special inspections under IAEA safeguards, complementary access under the Additional Protocol, challenge inspections under the CWC and in the future challenge inspections under the CTBT.

Under some of the relevant treaties and now under Security Council resolution 1540 the state will be required to enact national implementation measures, progress in which will be monitored by one of the verification agencies and/or a Security Council committee. Even the richest of developed countries like the UK and the US, struggle to fulfil all of these requirements. If you are an Iraq, an Iran, a Libya or even a South Korea, you will be subject to even more intense scrutiny requiring an even greater investment of time and resources. The availability of resources is a significant factor to be considered when additional verification burdens are being contemplated.

The regimes

Multilateral WMD verification today is a substantial international enterprise. In addition to UNMOVIC, here are three global verification regimes monitoring and verifying the nonproliferation of nuclear weapons, the ban on nuclear weapons testing and the ban on chemical weapons. Recurrent annual expenditure on multilateral verification currently totals more than $300 million. More than 3,000 people are employed by international verification bodies, not counting the hundreds more employed by national implementing authorities and regional

organizations. The number of full-time arms control/disarmament inspectors employed by multilateral agencies exceeds 700, while a further 380 are on UNMOVIC's roster (in addition to a notional number on the roster of the UN Secretary-General for CBW use investigations).

Budgets (in US$)

CTBTO (2005)	105 million
IAEA (2004)	102 million (verification only)
OPCW (2004)	76 million
UNMOVIC (2003)	80 million (includes permanent equipment purchase and aircraft hire)

Staff

CTBTO	274
IAEA	2200 (includes non-verification staff)
OPCW	556
UNMOVIC	51

Inspectors

CTBTO	0 (inspectors to be rostered only after entry into force)
IAEA	500
OPCW	200
UNMOVIC	380 (rostered).

The great lacuna here is BW: attempts to provide the BWC with a verification agency have failed utterly. Only UNMOVIC has anything approaching what would be needed for BW and it is mandated only to deal with Iraq, while the UN Secretary-General's mechanism is hyper-virtual. Without strong US support and advocacy there is currently no prospect of this situation changing dramatically despite the earnest discussion among BWC states parties.

Governance and organization

Much has been learned by now about the organizational structures required for effective verification, especially when a comprehensive system is envisaged. There is now a standard model of a conference of states parties, an executive body and a technical secretariat, including where necessary a standing inspectorate. International verification organizations still, however, rarely adopt best management practices, as used in business or in the more effective national governments. They still tend to use allegedly tried and true UN practices, often simply because they are readily available. They still often assume that running a verification organization is a unique organizational challenge that has no parallels elsewhere. There would appear to be no a priori reason why the highest managerial standards—including those relating to finance and human resources—should not be expected of our verification systems. International security is too important to be waylaid by distracting organizational problems that have ready solutions. As

seen in the IAEA's efforts to conceptualize and implement integrated safeguards, new approaches to making verification more effective and efficient, and in the long-run saving money, are possible in the most venerable of multilateral verification bodies.

Funding

The question of the funding of verification is perennially fraught. While no one expects verification systems to be given a blank cheque, verification cannot be expected to be done on the cheap lest it discredit the whole enterprise. All of the multilateral verification organizations are experiencing funding challenges as more effective and intrusive verification is demanded of them and technological possibilities grow. The OPCW has seemingly perennial funding challenges due to the unexpectedly large task of verifying CW destruction. While the IAEA was finally released from over a decade of punishing zero growth in 2003 additional funding would produce much enhanced verification and permit new activities like the Trilateral Initiative to proceed.

Particularly when compared to spending on defence, spending on verification is a security bargain. It should be considered in the same light as allegedly more hard-headed co-operative threat reduction and counter-proliferation programmes. Verification regimes themselves, where possible, should seek for new funding possibilities, including foundations and commercial spin-offs. For example, some of the data collected by the CTBTO's IMS has commercial value, for instance, for the airline industry.

Techniques and technologies

The extent to which the latest and most appropriate techniques and technologies can be used in multilateral verification systems is, perhaps surprisingly, often controversial. To begin with, there is always a trade-off between effectiveness and cost. States parties will naturally want to keep the costs of verification as low as possible, while still giving the verification system the requisite degree of credibility. Some states are fearful of technology that is too capable and will want to restrict it. In other cases the type of verification technology being applied needs to be restricted in order to prevent proliferation-relevant information being disseminated to the verifiers—hence the use of so-called blinded instrumentation that will detect only specific, limited types of information. Sometimes bureaucratic inertia in multilateral organizations prevents greater use being made of technologies, as in the case of the mysterious inability of the OPCW to replace expensive permanent human monitors at chemical weapon destruction facilities with equally effective remote on-site monitoring equipment.

Another difficulty is that verification technology can be so specialised that it must be researched and developed by verification bodies themselves: no commercial company will invest in research for such a limited market and potentially low

profit. This can be a heavy burden on verification organisations, although creative partnerships with universities and less commercially-driven organisations should be possible. There can also be a useful two-way exchange of technology and methodologies between international verification organizations and participating national research and monitoring agencies, to mutual benefit.

The good news where technology is concerned is that off-the-shelf equipment can be readily used for a variety of verification roles, and its price often drops rapidly once it begins to penetrate the commercial market. Both the hardware and the software of computers have demonstrated this trend dramatically.

National technical and technological incapacity for self-monitoring and for implementing treaty commitments is also a major issue in many regimes. Many developing countries, especially in Africa, and those that used to be part of the Soviet empire, struggle to report on their own compliance with international treaties and to adopt national implementation measures. They have even more difficulty in contributing technical personnel, including on-site inspectors, to international verification efforts. The obvious answer is to ensure that appropriate assistance and capacity-building are available to those states that need them.

As a multilateral verification technique, on-site inspections have come a long way since the voluntary CBM inspections pioneered by the Organization for Security and Co-operation in Europe (OSCE) in the 1970s and 1980s. There are now bodies of professional on-site inspectors, detailed protocols, procedures and technologies for on-site inspections, and a useful corpus of experience in making them effective. This includes 'managed access' techniques, the use of remote monitoring to supplement on-site inspections, environmental sampling, and procedures for handling commercially and militarily sensitive information. UNSCOM and UNMOVIC vastly increased our experience of the power and challenges of OSIs. The difficulties that the CTBTO is facing in reaching agreement on its OSI manual indicate, however, the sensitivities surrounding on-site inspections and the need for an educational process about them.

.

Use of information

One of the most pleasing verification developments in recent years has been the realization that multilateral verification organizations can and should use the vast array of open source material to their advantage. Commercial satellite imagery and the internet are just the most obvious of the new information tools available. The IAEA is leading the way in this respect and is to be highly commended. Clearly, however, open source information needs careful and discriminate handling lest the multilateral organizations be overwhelmed by a tidal wave of information, as some national intelligence agencies appear to be.

Similarly, the use of information provided by states from their national technical means (NTM) is a significant development. The experience of UNMOVIC is,

however, salutary. The intelligence information provided to UNMOVIC and the IAEA about Iraq was late and much of it was of dubious character. When almost all of the intelligence leads were verified by the international bodies as being without foundation, there was no public acknowledgement by the states that had provided the information that they had been wrong. Indeed, the impression was left that the UN's inspectors were not quite up to the verification job. While there are clearly enormous difficulties in states obtaining credible information from closed, autocratic regimes through NTM, and there is an undoubted need to protect sources, especially human sources of intelligence, those states that are able to provide NTM-derived information should be more honest and transparent in doing so. The UNMOVIC experience should be a warning for the standing verification bodies.

Compliance mechanisms

Compliance mechanisms are the least developed aspects of verification regimes. While a great deal of attention is paid to what information is to be sought and how it is to be collected, collated and analyzed, there is often a reluctance to be clear about how a determination of non-compliance is to be made and what subsequent steps are possible if such a finding is made. Even IAEA safeguards have not been free from this: confusion surrounding the possibility of 'special inspections' (essentially challenge inspections) has long dogged the NPT.

The most lively current case of alleged non-compliance with a multilateral arms control treaty, the Iran case, has wound its way through the IAEA compliance process as envisaged: following outside leads and its own investigations the IAEA has drawn the attention of its Executive Council to the possibility that Iran was not complying with its safeguards and NPT obligations. The Council has slowly increased the pressure on Iran to comply, issuing various requests, followed by demands, to the Iranian authorities, to which they have responded only partially satisfactorily. Technical means have been employed effectively by the Agency to strengthen its case, while at the same time keeping an open mind in investigating Iranian counter-claims. A like-minded group of members of the Board of Governors has attempted to engage Iran constructively, while another has issued veiled threats. This 'good cop, bad cop' routine is one way of seeking to deal with a non-compliance problem. If Iran fails to comply however, the question of how it can be induced to do so will soon confront the UN Security Council, since the IAEA itself will have exhausted the range of 'carrots and sticks' at its disposal. The cases of North Korea and Iraq followed different trajectories when their non-compliance was determined.

In the case of chemical weapons there have been only a few cases of alleged non-compliance in which investigations took place, but these related to the 1925 Geneva Protocol and they all ended unsatisfactorily. There has been no experience to date of deliberate non-compliance with the CWC, even though many consider a challenge inspection long overdue. Similarly there has been no alleged violation of

the CTBT in its current state of non-entry into force. In the BWC case allegations ended in one unsatisfactory official compliance process and one inconclusive trilateral undertaking. Clearly the BWC compliance process will always be at a disadvantage without an accompanying multilateral verification system with impartial monitoring and on-site inspection capabilities.

Overall there remains much work to be done to clarify how non-compliance cases should be dealt with and to broaden the range of incentives and disincentives that may be employed to bring a recalcitrant state back into compliance.

Building the international verification community

One of the critical lessons that can be drawn from the experience of multilateral verification and compliance regimes over recent years, including that of UNSCOM and UNMOVIC, has been the need to sustain political support and relevance. In this respect the multilateral organizations need to do better at promoting an appreciation of the contribution they make to international peace and security. Even governments themselves need to be reminded. Some governments, for example, when pressed to sign Additional Protocols to their nuclear safeguards agreements, have requested a quid pro quo in the form of technical and/or economic benefits—in essence a bribe from developed countries—when clearly the primary benefit derives from enhancement of their national security. These benefits need to be made clearer.

Political support can, naturally, wax and wane after a verification system has been put in place. While this might seem to be an unavoidable fact of international political life, there are steps that verification bodies can take to cushion themselves. They could start by cultivating stakeholders elsewhere, including in civil society and among NGOs, the general public, the media and the philanthropic foundation world, and even in business. Unless verification organisations can improve their record on this score they will forever be dependent on the kindness of governments and the limited attention span they often display, and their work will always be seen as arcane and marginal to what happens in the ‘real world’.

List of published studies and papers
All papers and studies are available as pdf-files at the Commission's website: www.wmdcommission.org

No 1 "Review of Recent Literature on WMD Arms Control, Disarmament and Non-Proliferation" by Stockholm International Peace Research Institute, May 2004

No 2 "Improvised Nuclear Devices and Nuclear Terrorism" by Charles D. Ferguson and William C. Potter, June 2004

No 3 "The Nuclear Landscape in 2004: Past Present and Future" by John Simpson, June 2004

No 4 "Reviving the Non-Proliferation Regime" by Jonathan Dean, June 2004

No 5 "Article IV of the NPT: Background, Problems, Some Prospects" by Lawrence Scheinman, June 2004

No 6 "Nuclear-Weapon-Free Zones: Still a Useful Disarmament and Non-Proliferation Tool?" by Scott Parrish and Jean du Preez, June 2004

No 7 "Making the Non-Proliferation Regime Universal" by Sverre Lodgaard, June 2004

No 8 "Practical Measures to Reduce the Risks Presented By Non-Strategic Nuclear Weapons" by William C. Potter and Nikolai Sokov, June 2004

No 9 "The Future of a Treaty Banning Fissile Material for Weapons Purposes: Is It Still Relevant?" by Jean du Preez, June 2004

No 10 "A Global Assessment of Nuclear Proliferation Threats" by Joseph Cirincione, June 2004

No 11 "Assessing Proposals on the International Nuclear Fuel Cycle" by Jon B. Wolfsthal, June 2004

No 12 "The New Proliferation Game" by William C Potter, June 2004

No 13 "Needed: a Comprehensive Framework for Eliminating WMD" by Michael Krepon, September 2004

No 14 "Managing the Biological Weapons Problem: From the Individual to the International" by Jez Littlewood, August 2004

No 15 "Coping with the Possibility of Terrorist Use of WMD" by Jonathan Dean, June 2004

No 16 "Comparison of States vs. Non-State Actors in the Development of a BTW Capability" by Åke Sellström and Anders Norqvist, October 2004

No 17 "Deconflating 'WMD'" by George Perkovich, October 2004

No 18 "Global Governance of 'Contentious'" Science: The Case of the World Health Organization's Oversight of Small Pox Virus Research" by Jonathan B. Tucker and Stacy M. Okutani, October 2004

No 19 "WMD Verification and Compliance: The State of Play" submitted by Foreign Affairs Canada and prepared by Vertic, October 2004

WMDC

THE WEAPONS OF
MASS DESTRUCTION
COMMISSION

www.wmdcommission.org