Verification Yearbook
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The Verification Research, Training and Information Centre is an independent, non-profit making, non-governmental organization. Its mission is to promote effective and efficient verification as a means of ensuring confidence in the implementation of international agreements and intra-national agreements with international involvement. VERTIC aims to achieve its mission through research, training, dissemination of information, and interaction with the relevant political, diplomatic, technical, scientific and non-governmental communities.

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OTHER ISSUES

Acronyms

ACABQ	Advisory Committee on Administrative and Budgetary Questions
ACFR	Advisory Committee on Fisheries Research
ASEAN	Association of Southeast Asian Nations
AU	African Union
AVLIS	Atomic vapour laser isotope separation
BW	Biological weapons
BWC	Biological Weapons Convention
CASA	United Nations Coordinating Action on Small Arms
CAT	Convention against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment
CBM	Confidence-building measure
CBW	Chemical and biological weapons
CEDAW	Convention on the Elimination of All Forms of Discrimination Against Women
CEMS	Continuous emission measurement systems
CEN	European Committee for Standardization
CERD	International Convention on the Elimination of all Forms of Racial Discrimination
CESCR	Committee on Economic, Social and Cultural Rights (UN)
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
COFI	Committee on Fisheries
CRC	Convention on the Rights of the Child
CSP	Conference of the States Parties
CTBT	Comprehensive Nuclear Test Ban Treaty
CTBTO	Comprehensive Nuclear Test Ban Treaty Organization
CW	Chemical weapons

CWC	Chemical Weapons Convention
CWPFs	Chemical weapons production facilities
DOC	Degradable organic compound
ECOSOC	Economic and Social Council (UN)
ELINT	Electronic intelligence
EMEP	European Monitoring and Evaluation Programme
EPER	European Pollutant Emission Register
ESA	European Space Agency
ETS	Emissions Trading Scheme (EU)
EU	European Union
FAO	Food and Agriculture Organization
FIGIS	Fisheries Global Information System
FIN	FISH INFOnetwork
FMCT	Fissile Material Cut-off Treaty
GEIA	Global Emissions Inventory Activity [Center]
GHG	Greenhouse gas
GWP	Global warming potential
HEU	High enriched uranium
HFC	Hydrofluorocarbon
HRC	Human Rights Committee (UN)
HSVAR	High Seas Vessels Authorization Record
HUMINT	Human intelligence
IAEA	International Atomic Energy Agency
IANSA	International Network on Small Arms and Light Weapons
ICCPR	International Covenant on Civil and Political Rights
ICESCR	International Covenant on Economic, Social and Cultural Rights
ICMW	International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families
ICRC	International Committee of the Red Cross
IEA	International Energy Agency
ILO	International Labour Organization
IMO	International Maritime Organization

IMS	International Monitoring System
INF	Intermediate-range Nuclear Forces
InSAR	Interferometric synthetic aperture radar
INVO	Iraq Nuclear Verification Office
IPCC	Intergovernmental Panel on Climate Change
IPOA-IUU	International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing
IPOAs	International Plans of Action
ISG	Iraq Survey Group
ISO	International Standards Organization
IUU	Illegal, unreported and unregulated (fishing)
LEU	Low enriched uranium
MANPADS	Man-portable air defence systems
MCS	Monitoring, control and surveillance
MLIS	Molecular laser isotope separation
MPAs	Marine protected areas
MW	Megawatt
N_2O	Nitrous oxide
NAS	National Academy of Sciences (US)
NBSR	National Board for Scientific Research (Libya)
NCRI	National Council of Resistance of Iran
NGO	Non-governmental organization
NMVOC	Non-methane volatile organic compound
NO_x	Nitrogen oxides
NPT	Nuclear Non-Proliferation Treaty
NTM	National Technical Means
NTS	Nevada Test Site
OCHCR	Office of the UN High Commissioner for Human Rights
OECD	Organisation for Economic Co-operation and Development
OECS	Organisation of Eastern Caribbean States
OPCW	Organisation for the Prohibition of Chemical Weapons
ORNL	Oak Ridge National Laboratory

OSIS	On-site inspections
PFC	Perfluorocarbon
POA	Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects
PSI	Proliferation Security Initiative
QA	Quality assurance
QC	Quality control
R-OMV	Reinforced Ongoing Monitoring and Verification
RFBS	Regional fishery bodies
RFMOS	Regional fisheries management organizations
SADC	Southern African Development Community
SALW	Small arms and light weapons
SAR	Synthetic aperture radar
SEAFO	South-East Atlantic Fisheries Organization
SF_6	Sulphur hexafluoride
START	Strategic Arms Reduction Treaty
SWUS	Separative work units
UAVS	Unmanned aerial vehicles
UCF	Uranium conversion facility
UK	United Kingdom
UN	United Nations
UNDDA	United Nations Department for Disarmament Affairs
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
UNIDIR	United Nations Institute for Disarmament Research
UNITAR	United Nations Institute for Training and Research
UNMOVIC	United Nations Monitoring, Verification and Inspection Commission
UNODC	United Nations Office on Drugs and Crime
UNSCOM	United Nations Special Commission
UOC	Uranium ore concentrate
US	United States
VMS	Vessel monitoring systems

WBCSD	World Business Council for Sustainable Development
WCO	World Customs Organization
WCPFC	Western Central Pacific Fisheries Commission
WMD	Weapons of mass destruction
WMO	World Meteorological Organization
WRI	World Resources Institute
WSSD-POI	Plan of Implementation of the World Summit on Sustainable Development

Preface

Rogelio Pfirter

Effective verification is crucial for the successful implementation of any functional international arms control and disarmament agreement. The verification regime of the 1993 Chemical Weapons Convention (CWC) provides for an effective and stringent mechanism designed to maintain confidence in treaty compliance by all of the countries that have either ratified or acceded to the accord. The effectiveness of this regime was recognized by the First Review Conference of the CWC in 2003.

In relation to the CWC, the core objective of verification is achieved through increased transparency, including on-site inspections (OSIS), and the ability to clarify and resolve any compliance concern. For states parties to be prepared to forego the option of arming themselves with chemical weapons (CW) they need to be able to rely on the protection and security offered to them by the CWC. It is vital, therefore, that the verification system has the capacity to detect any significant act of non-compliance in a timely manner in order to provide such protection and to contribute to the undiminished and progressively enhanced security of states parties, individually and collectively.

Effective verification ensures the stability of the disarmament regime established under the convention. It engages states parties in an active manner, providing them with opportunities to demonstrate their full compliance with the treaty and participate fully in the implementation process. Implementation of the CWC is thus a collective and co-operative undertaking that brings states parties together, underscores common and shared goals, and strengthens the legal regime established under the agreement as well as political support for its institutions. This is more than just a passive 'being inspected' approach; in the words of the CWC, demonstration of compliance is both an obligation and a right.

An efficient verification regime with an emphasis on providing undiminished security for all states parties is a powerful incentive for expanding the membership

of the Organisation for the Prohibition of Chemical Weapons (OPCW), especially with respect to countries in regions where the possession of CW may be perceived as an effective means of enhancing national security. Disarmament remains an urgent matter and an important option for improving security.

The OPCW—established by the treaty itself on its entry into force on 29 April 1997—has been working diligently towards establishing and implementing an effective, efficient, non-discriminatory and credible international verification system based on declarations, data monitoring and OSIS. This objective is recognized by the 164 member states of the OPCW and by the international community at large. In order for the verification system to be implemented (to fulfil the aims of the convention), three main requirements have to be met.

First, verification needs to be technically sound, and based on a good understanding of the science and technology underpinning the provisions of the agreement. A review must be held frequently to take account of new scientific developments that may affect the treaty regime and its verification. In the case of the CWC, such developments were evaluated during the First Review Conference and remain on the agenda of the Executive Council and the OPCW's Scientific Advisory Board. They include progress made in the life sciences, the emergence of new biologically active chemicals with relevance to the CWC, and the introduction of new production technologies and processes in the chemical industry. They also include, however, developments that can make verification more effective, for example in the field of chemical analysis.

Second, the verification system needs to be effective and efficient. The First Review Conference acknowledged the importance of optimizing the verification process, without compromising its stringency or effectiveness, in order to enhance the CWC verification system. Consequently, for some time, the Technical Secretariat of the OPCW and states parties have been actively engaged in a process of identifying and implementing measures to increase the efficiency of the verification system. The size of inspection teams has been reduced considerably, and inspection procedures have been streamlined, particularly at CW destruction facilities where, during active operations, CW destruction is being verified on a continual basis. It remains imperative that all such optimization measures are implemented without compromising the credibility and effectiveness of the verification system.

Third, verification measures need to be implemented in a non-discriminatory and even-handed manner in all states parties. On the one hand, this is a call to the Technical Secretariat to apply the convention's verification provisions in an equal and transparent fashion to all states parties. On the other hand, all states parties are required to implement the convention's provisions at the national level in full and in accordance with common, agreed standards. Only then will they be able to identify and declare to the OPCW all declarable activities and facilities—the starting point for the application of the routine elements of the CWC's verification system.

The close relationship between the quality of national implementation of the convention and the quality of verification was clearly recognized by the First Review Conference. In fact, the issue is even wider: for the ban on chemical weapons to be complete and comprehensive, the CWC needs to become a universal norm for all states. And to be completely effective, all states parties need to implement it in full. Then, and only then, can the verification system established under the CWC contribute fully to confidence-building and regime stability.

The importance of ensuring that these requirements are met is reflected in the main recommendations of the First Review Conference. Two Action Plans (on 'universality' and 'national implementation') were among the strategic decisions reached by participants, and, as touched on above, there was strong support for the optimization of the CWC verification system. This optimization approach finds practical expression in the way in which the OPCW assists new states parties in preparing to meet the requirements of the convention, such as the submission of initial declarations in respect to CW and related facilities and declarable facilities in their chemical industry. This initial assistance is followed up with an intensive programme of implementation support, for example the training of personnel of National Authorities or support in drafting of implementing legislation and regulations. And finally, the optimization approach can be seen in the Secretariat's intensive work with states parties, individually and within the framework of the Executive Council, aimed at further improving the efficient and reliable implementation of the verification measures.

Since 1997, six states parties (Albania, India, Libya, Russia, the United States and one other) have declared CW stockpiles comprising over 71,000 metric tonnes of

chemical agent, as well as over eight million chemical munitions, devices and containers. More than 12 percent of these toxic agents has been destroyed in an irreversible manner; over 25 percent of the munitions, devices and containers has been rendered unusable. All of these destruction activities have been verified by the OPCW in accordance with the CWC's requirements for stringent international verification. In the first eight months of 2004, four continuously operated and two non-continuously operated CW destruction facilities have been subject to on-site inspections. In the near future, there will be seven facilities that will operate 24 hours per day, seven days a week, and a further four facilities that will function on a non-continuous basis.

The entire production capacity that generated the enormous chemical arsenals declared by the possessor states parties has been deactivated and is currently being eliminated. All of the 64 chemical weapons production facilities (CWPFs), declared by 12 states parties (Bosnia and Herzegovina, China, France, India, Iran, Japan, Libya, Russia, Serbia and Montenegro, United Kingdom, United States and one other) have been subjected to international safeguards by the OPCW. Thirty-three have been certified by the OPCW as having been destroyed, based on the results of OSIs conducted during their destruction. A further 12 have been certified as having been converted to peaceful purposes and remain subject to verification by the OPCW. The remaining 19 CWPFs are awaiting destruction or conversion.

At the same time, more than 700 inspections have taken place to verify treaty compliance in the chemical industry and in other facilities engaged in activities permitted under the treaty and that have been declared to the OPCW, thus enhancing trust among states parties in the legitimate nature of these pursuits. Ninety-eight percent of the world's chemical industry is located in countries that have joined the CWC. The regime has gained the respect and support of the chemical industry and compliance with its stipulations regarding declarations, inspections and transfers is viewed as a responsible and therefore desirable course of action. This has become an intrinsic feature of the International Council of Chemistry Association's Responsible Care programme.

Furthermore, the OPCW has provided technical advice and support to states parties to help them identify all of their declarable facilities in the chemical industry. As a result, the submission of declarations of such facilities has increased by almost

40 percent over recent years, with many more states parties now filing declarations and opening up their facilities to international OSIs.

As of August 2004, OPCW inspectors as a whole have spent over 100,000 days in the field, conducting more than 1,850 inspections at over 750 different sites on the territory of 65 states parties. But these numbers only convey part of the reality of CWC verification. To achieve and maintain a high level of confidence in the CWC regime, verification requires professionalism and specialist experience, dedication and diligence by each state party's National Authority and by the OPCW Inspectorate. The combination of national capacity and independent, international expertise in chemical disarmament is a unique asset and an essential tool in multilateral disarmament.

Simultaneously, the OPCW has maintained and improved its readiness to conduct challenge inspections if so requested, and to investigate any allegations of use of chemical weapons that might be brought to its attention.

A challenge inspection remains the ultimate mechanism under the CWC for establishing the facts in order to resolve a non-compliance concern. It is, of course, noteworthy that no state party as yet has found it necessary to trigger this mechanism. That is not to say that there have been no such concerns. By and large, though, it seems that these have been resolved on a bilateral basis, an important clarification mechanism enshrined in the CWC. That said, the credibility of the CWC's challenge inspection mechanism, its deterrent effect and its reliability as a tool for re-establishing confidence in full treaty compliance, all depend on the conviction of states parties that the OPCW is professionally and procedurally capable of successfully implementing a challenge inspection should it be asked to do so. This is why it is so important to maintain and to demonstrate a high degree of readiness for a challenge inspection, no matter how likely or unlikely a request may appear.

The same can be said for investigations of alleged use. This and other CWC mechanisms have gained additional relevance in light of the association between terrorism and weapons of mass destruction (WMD), a risk that is increasingly recognized by the international community due to the enormous potential for mass casualties. The combined efforts to promote universal adherence to the CWC regime and to ensure that all participating states fully implement the terms of the treaty within their jurisdiction, along with the confidence that the verification system of the OPCW provides in treaty compliance are essential to maximizing the contribution

that the CWC can make to preventing and deterring acts of terrorism involving chemical weapons, and, in the event of an attack, mounting the necessary response.

The CWC's verification system was not designed to preclude CW acquisition by terrorist organizations. Its 'design criteria' were set with the concept of militarily significant quantities in mind, not the gram-to-kilogram quantities that need to be controlled when dealing with the threat of terrorism. Nonetheless, the CWC verification system can supplement national counter-terrorism efforts aimed at preventing access to toxic and precursor chemicals. It can pinpoint weaknesses in national preventive and control measures and identify areas where improvements need to be made and offer suggestions on how to do so. The contribution that the CWC can make in this regard is recognized in United Nations Security Council resolution 1540 of 28 April 2004, which mandates measures that complement the nonproliferation provisions of the CWC and thus reinforces international support for this key convention.

Ever since the CWC entered into force in 1997, the Verification Research, Training and Information Centre (VERTIC) has provided the OPCW with much-valued advice and encouragement, highlighted potential weaknesses in the regime and put forward useful strategies for its consideration. It has significantly expanded the body of academic research on verifiable chemical disarmament. Most notably, VERTIC's report on enhancing implementation of the CWC made an important contribution to the First Review Conference, and many of the practical proposals contained in that study were incorporated into the final documents of the Review Conference. I am delighted, therefore, to have the opportunity to contribute to the *Verification Yearbook 2004*.

VERTIC is an articulate and internationally respected advocate of the role of verification in building confidence in treaty compliance through enhanced transparency checked in an independent manner. Its continuing promotion of the objectives of the CWC, and its support for the effective implementation of its verification regime, add much to the international effort to ensure the complete and perpetual elimination of this category of WMD. The *Verification Yearbook* continues to make a valuable contribution to the further development of the concept of verification. It is highly relevant to our work at the OPCW.

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I

Introduction: the state of play of verification

Trevor Findlay

The re-election in November 2004 of George W. Bush as President of the United States has been interpreted by many pundits as ruling out any possibility that the richest and most powerful country on earth will re-embrace multilateralism in the next four years. The US will continue, it is assumed, to prefer unilateral action or coalitions of the willing in which it assumes the leading role. In the particular case of multilateral verification and compliance there are justified fears that a second Bush administration will continue to play the part of verification spoiler and compliance zealot.

Indeed there now seems no chance that, in the next four years, the US will become party to the three products of multilateral diplomacy that were opened for signature in 1997, all of which it helped to negotiate but then abandoned: the Kyoto Protocol to the 1992 United Nations Framework Convention on Climate Change (UNFCCC); the Ottawa Landmine Convention; and the Comprehensive Nuclear Test Ban Treaty (CTBT). Except for the CTBT, where it continues to contribute to the establishment of the International Monitoring System (IMS), the US will thus remain outside of the accompanying monitoring and verification regimes for these legal instruments. It will also continue to oppose a verification regime for the 1972 Biological Weapons Convention (BWC). Not only that, but the US has suddenly announced that, in its view, a new accord long envisaged as the next step on the long road to nuclear disarmament, a Fissile Material Cut-off Treaty (FMCT), should proceed without verification. On the compliance front, having invaded Iraq on the spurious grounds that only military means, not intensified inspections, could guarantee compliance with the United Nations (UN) Security Council's disarmament demands, the US may be tempted to choose abrasive methods to deal with Iran and North Korea.

Depressing as these prospects are for multilateralists, there are some positive aspects of US policy and behaviour in respect of verification and compliance that are likely to persist and may be advanced. The US has strongly backed the provision of increased resources for International Atomic Energy Agency (IAEA) nuclear safeguards and nuclear security. It has also increased its political and financial support (although still not sufficiently) for the repatriation of fissionable and other nuclear materials from reactors, research institutes and other locations where they are no longer needed in order to reduce the danger of such materials falling into the hands of terrorists or other 'non-state actors'. It needs to take this further by involving the IAEA in the verification of excess stocks of fissionable material from warhead dismantlement by realizing the as yet unimplemented Trilateral Agreement that it has finalized with Russia and the IAEA. The US has also been at the forefront of efforts to encourage and induce states to comply with their obligations to adopt national implementation measures to prevent the proliferation of weapons of mass destruction (WMD) to non-state actors, including by sponsoring a Security Council resolution to that effect.

With regard to compliance, the US has laudably been willing to hold countries to account for not fulfilling their treaty commitments, in the process sweeping away some of the shameful reluctance to 'name names'—even when all of the world is aware that treaties are being violated. It is to the credit of the United Kingdom and the US that they ultimately sought to hold Iraq to account for failing to meet the obligations that the Security Council had legitimately imposed on it, having in previous years let such pressure subside. The rush to war in March 2003, based on flawed intelligence, occurred before UN verifiers had been given a chance to accomplish their mission (the intelligence/verification nexus is discussed by Brian Jones in this volume). Unfortunately this 'compliance strategy' is now widely seen as a mistake of historic proportions. The final empty-handed report, released in October 2004, of the Iraq Survey Group, an Australia/UK/US effort that sought after the war to second-guess the judgement of UN inspectors about the existence of WMD in Iraq, has served only to enhance the credibility of the UN inspection enterprise.

The US also has a mixed record when it comes to subjecting its allies, including Pakistan, to the same degree of scrutiny that it subjects its foes, such as Syria.

On the plus side, the US has supported a full investigation into the lapses of its ally South Korea in complying with the 1968 Nuclear Non-Proliferation Treaty (NPT), even if they pale in comparison to violations by North Korea. The US has also played an invaluable role in verifying and assisting in Libya's nuclear disarmament—essential because the IAEA, as a multilateral verification body, cannot be granted access to sensitive nuclear weapons information. In doing so the US has demonstrated the utility of quiet, patient diplomacy in achieving verified arms control and disarmament, in stark contrast to its Iraq misadventure. But again, this positive role has been tarnished by its initial attempt to marginalize the involvement of the IAEA, as the chapter in this volume by Jack Boureston and Yana Feldman shows. It is encouraging, though, that the Bush administration, after reassessing its intelligence analysis procedures in the wake of failures pertaining to Iraq's non-existent WMD, has recanted the accusations it has long made against Cuba of having a biological weapons (BW) programme in contravention of the BWC.

It is also the case that, important though the US role is in multilateral monitoring, verification and compliance—politically, technologically and financially—there is much that the rest of the world can and should accomplish without it or with only its partial, grudging involvement. The imminent entry into force of the Kyoto Protocol, after Russian ratification was finally secured in November 2004, means that all of the parties must now work to implement its elaborate verification provisions without the US. Even here the United States cannot entirely disentangle itself from the regime, as it remains party to the framework agreement, the UNFCCC, to which the Kyoto Protocol has been appended. Similarly, the International Criminal Court has been established without US involvement or support and has begun hearing its first case, against Uganda's rebel leaders, setting international legal precedents in the process.

The multilateral verification organizations

In the arms control and disarmament field the major multilateral verification organizations are today in comparatively good shape. Indeed, apart from the BWC case, multilateral verification regimes are currently better governed, organized, funded and supported by requisite technical and technological means than ever

before. It is easy to overlook the enormous advances that have been made since 1972, when the NPT, the first major multilateral arms control treaty with a matching verification system, entered into force.

Contemporary multilateral WMD verification is a substantial international undertaking. In addition to the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC), which is restricted at the moment to dealing with Iraq (and is no longer permitted to deploy there), there are three global verification regimes monitoring and verifying the nonproliferation of nuclear weapons and the respective bans on nuclear weapons testing and chemical weapons. Recurrent annual expenditure on multilateral verification currently totals approximately $300 million. More than 3,000 people are employed by international verification bodies, not counting the hundreds more employed by national implementing authorities

Budgets (in US$)
Comprehensive Nuclear Test Ban Treaty Organization (CTBTO), Vienna, Austria 105 million (2005)
IAEA, Vienna 102 million (verification budget only) (2004)
Organisation for the Prohibition of Chemical Weapons (OPCW), The Hague, Netherlands 76 million (2004)
Climate Change Secretariat, Bonn, Germany 17.3 million (2005)
Staff
CTBTO 274
IAEA 2,200 (including non-verification staff)
OPCW 556
Climate Change Secretariat 100 (policy, technical and support staff)
Inspectors
CTBTO 0 (inspectors to be rostered only after entry into force)
IAEA 500
OPCW 200
Climate Change Secretariat No inspectors as such, but ad hoc Expert Review Teams make visits.

and regional organizations. Seven hundred full-time arms control/disarmament inspectors are employed by multilateral agencies, while a further 380 are on UNMOVIC's roster (over and above a notional number on the roster of the UN Secretary-General for investigations into the use of chemical and biological weapons (CBW)). By comparison, environmental treaties are relatively undeveloped: figures for the Climate Change Secretariat, which is responsible for administering both the UNFCCC and the Kyoto Protocol, are included in the table above to illustrate the point.

The great lacuna in the WMD area is BW: attempts to provide the BWC with a verification agency have failed utterly. Without strong US support and advocacy there is currently no prospect of this situation changing dramatically despite the earnest discussions taking place among BWC states parties in their current 'new process'. Only UNMOVIC has anything approaching what would be needed for BW and, as noted above, it remains mandated only to deal with Iraq. The UN Secretary-General's mechanism for investigating alleged use of CBW in violation of the 1925 Geneva Protocol is hyper-virtual, comprising only outdated lists of experts and analytical laboratories. Nonetheless, there are steps that could be usefully taken and that should be able to attract US support. One possibility is clearly to rejuvenate and upgrade the mechanism, especially since it has the endorsement of both the UN General Assembly and the UN Security Council. It could usefully draw on UNMOVIC's expertise, experienced inspector cadre, accredited laboratories and the wealth of lessons learned by the organization.

Another idea is to create a small BWC secretariat at least to give the treaty a minimal institutional home, to act as a clearing-house for treaty-relevant information and to handle more proactively the submission of the voluntary confidence-building measure (CBM) reports requested by successive BWC review conferences. Capacity-building with respect to national implementation of states parties' BWC obligations is another non-controversial area to be explored.

As to the broader question of the fate of UNMOVIC, it would clearly be tragic if its hard-won array of expertise and experience, especially that relating to BW and missiles, was lost to the international verification community. The Canadian government has sponsored a UN resolution, adopted by consensus in the First Committee of the UN General Assembly in October 2004, which calls for an expert study

of the issue of UN verification capacities. This is a useful first step, but it will not stop UNMOVIC atrophying through natural wastage of staff and the drying up of funding from the Iraq Oil for Food programme. Measures must be introduced in the meantime to keep UNMOVIC in place until a comprehensive assessment can be made of the potential use to which its personnel, resources and experience might be put.

The new focus on national implementation

One of the rising new items on the multilateral agenda is the role of national implementation measures in ensuring full compliance with states' treaty obligations. Such a focus has enjoyed the full support of, and indeed has been partly driven by, the US, as one of its responses to the terrorist attacks of 11 September 2001. Although many treaties have long called for national implementation measures to ensure that proscribed activities do not take place anywhere on the territory of states parties, new attention is being paid to this in order to prevent non-state actors acquiring and employing WMD. Lisa Tabassi and Scott Spence nicely illustrate this trend in respect of chemical weapons in their chapter in this *Yearbook*.

The UN Security Council has now latched on to this issue by unanimously adopting resolution 1540 in April 2004, requiring all UN member states to adopt such national measures. This is a watershed development in international law in that it has been adopted as a mandatory requirement by the Security Council acting under Chapter VII of the UN Charter and in that it applies to all states, whether they are party to the relevant WMD treaty or not. Hence the resistance of states like Pakistan—which happened to be on the Security Council at the time—which is not a party to the NPT and which accused the Security Council of breaking new ground by attempting to 'legislate' for the international community. This ignores the fact that the Security Council has been 'legislating' in all sorts of areas since its inception in 1945, in the sense of setting international legal precedents and establishing legal norms.

Compliance with resolution 1540 does need to be carefully monitored if it is to be effective. A good start has been made through the requirement that all states report to a Security Council committee by 28 October 2004 on their progress

in compliance. Exactly what the 1540 Committee does with the information it receives remains to be seen. An excellent model would be the compliance monitoring arrangements established for a related resolution on counter-terrorism (resolution 1373 of 28 September 2001). The Counter-Terrorism Committee (CTC) has acquired a substantial expert secretariat and actually conducts visits to states to determine the veracity of their reports. Thorough and professional monitoring of compliance with mandatory Security Council resolutions is an idea whose time has come.

The reporting, monitoring and verification burden

In addition to the scale of the international verification bodies themselves, a development that necessitates creative responses is the cumulative verification commitments that treaty regimes, in combination, require of states. These include a growing degree of transparency and a higher level of intrusion into sovereign national affairs. A state party to all of the major arms control and disarmament instruments is obliged: to provide information and accept safeguards on, and permit inspections of, its peaceful nuclear facilities and materials; to make declarations on and submit its chemical industry to inspections; and to become involved in the global nuclear test monitoring system, in all likelihood by hosting a CTBT monitoring station on its territory (as David Hafemeister explains in this volume). Such a state is obliged to have a national authority to ensure its compliance with the 1993 Chemical Weapons Convention (CWC), 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 future, challenge inspections under the CTBT.

If it is a developed country and party to the UNFCCC and the Kyoto Protocol it will have to have national systems to monitor and account for greenhouse gas emissions and to verify its reduction efforts, as described by Larry MacFaul in

this volume. As party to major human rights conventions the state will be obliged to report to the various monitoring committees, described in all their complexity by Patricia Watt in her chapter. Even voluntary or politically binding agreements, including those relating to small arms and light weapons, outlined by Helen Hughes, bring their own reporting obligations if states take them seriously, which they are under pressure from various sources, such as other governments and civil society, to do. International controls on fish stocks, again produce their own national implementation burdens, as illustrated by Judith Swan.

To add to this, under some of the relevant treaties the state will be required to enact national implementation measures, progress in which will be monitored by one of the verification agencies. Now, under Security Council resolution 1540 and other counter-terrorism-related resolutions, all UN member states are required to report in much greater detail and are subject to much greater scrutiny than before.

Even the richest of developed countries struggle to fulfil all of these requirements. If you are a country with a large nuclear, chemical or biotechnology sector, you will be subject to even more intense scrutiny, requiring an even greater investment of time and resources. The availability of resources to permit compliance is a significant factor to be considered when additional verification burdens are being contemplated: capacity-building for states unable to comply because of human, technical or financial barriers is vital if full treaty implementation is to be taken seriously. As has long been contemplated in the environmental and human rights areas, to date without much success, the rationalization of reporting requirements across various regimes should be considered, but only if it improves rather than detracts from verification.

Compliance mechanisms

Compliance mechanisms for multilateral WMD regimes, in contrast to monitoring and verification arrangements, are underdeveloped, untested and surrounded by doubt and confusion. 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 reached. Even nuclear safeguards have not been free from this: confusion surrounding the possibility of 'special inspections' (essentially challenge inspections) has long dogged the IAEA.

The most lively current case of alleged non-compliance with a multilateral arms control treaty, that of Iran—covered by Wyn Bowen in this *Yearbook*—has so far made its way through the complex and lengthy IAEA compliance process as envisaged by the systems designers: following outside leads and its own investigations the IAEA has drawn the attention of its Board of Governors to the possibility that Iran is not complying with its safeguards and NPT obligations. The board 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 board members 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. Notably, Iraq and North Korea 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 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. With regard to the BWC, allegations ended in one unsatisfactory official compliance process and one inconclusive trilateral exercise involving the Soviet Union/Russia, the UK and the US. 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.

In the environmental area, it now remains to be seen how the elaborate compliance mechanisms and activities arduously negotiated for the Kyoto Protocol will

work in practice. Undoubtedly, as we have reported in previous *Yearbooks,* and as Larry MacFaul does in this one, there will be continuing work-in-progress evident in the climate change regime as it is fully implemented and matures. Compliance monitoring will need to be of a high order if states are to be convinced to take on ever more gruelling commitments to reduce greenhouse gas emissions.

Across all international treaty regimes 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 might be employed. A useful concept here is 'compliance management', which implies a clear and well considered process for bringing recalcitrant states back into compliance without backing them into a corner or causing them to lose face unnecessarily. This too should be a rising issue on the international agenda.

As ever, this *Yearbook* is the result of intensive work over many months by VERTIC researchers and staff members and external consultants and contributors. As editor my work has been made inestimably easier due to the quality of chapter writers' manuscripts and the expertise of all who helped to prepare the final product. My thanks go to all involved, but in particular I am indebted to the masterly design, layout and sub-editorial skills of Richard Jones, the 'wordsmithing' of Eve Johansson, the organizational and technical abilities of VERTIC's Administrator, Ben Handley, and the promotional efforts of VERTIC's Information Officer and Networker, Jane Awford. Among the authors, who have laboured long and hard for little recompense, VERTIC is especially gratified in having the Director-General of the OPCW, Rogelio Pfirter, contribute the preface. He is the fourth head of an international verification body to do so—surely a vote of confidence in the role that non-governmental organizations like VERTIC can play in the multilateral verification enterprise.

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Arms control and disarmament

2

Effective CTBT verification: the evidence accumulates

David Hafemeister

The 1996 Comprehensive Nuclear Test Ban Treaty (CTBT) prohibits all nuclear tests of any yield in all places for all time.[1] It is an arms control measure that constrains nuclear weapon states from developing new nuclear weapons. It is also a non-proliferation measure that raises a barrier to the development of sophisticated nuclear weapons by non-nuclear weapon states.[2] The CTBT requires the fulfilment of a complete ban with respect to four parameters: number; yield; location; and time.[3]

The treaty has not yet entered into force, as it requires ratification by all 44 countries designated under Annex 2 as having an advanced civilian nuclear capability. As of 5 October 2004 173 states had signed the CTBT. Among the non-signatories are nations that are known to have nuclear weapons or to have aspirations in that regard, including India, Iraq, North Korea and Pakistan. Of the signatories, 119 have ratified the treaty, including three nuclear weapon states (France, Russia and the United Kingdom). Israel has signed the accord, but not ratified it, while China has said that it will only ratify the treaty when the United States does so. In October 1999 the US Senate rejected ratification by 51 votes to 48. (The current administration of President George W. Bush has underlined that it has no intention of ratifying the CTBT.)

Following the Senate's decision, then US President Bill Clinton asked General John Shalikashvili, Chair of the US Joint Chiefs of Staff, to head a high-level task force to analyze the issues that emerged in the debate. Shalikashvili, in turn, asked the US National Academy of Sciences (NAS) to convene a panel of experts to examine the technical questions that could affect the viability of a test ban.[4] The panel did not seek to evaluate the net benefit of the CTBT to the US, but rather the issues of verifiability, stockpile stewardship and national security vulnerabilities due to clandestine testing.[5] The Senate debate on the CTBT had been marred by

claims that cheating could take place without detection at weapon test yields of up to 70 kilotons (kt). The NAS report—entitled *Technical Issues Related to the Comprehensive Nuclear Test Ban Treaty,* and published in 2002—strongly contradicted this claim. Drawing on its conclusions and subsequent technical developments, this chapter considers whether the CTBT is effectively verifiable.

An effective verification standard and process

Verification is the process by which governments collectively determine whether a treaty party has or has not violated the terms of an accord. States may also individually make their own assessment of compliance by other states.[6] Since arms control and disarmament agreements invariably affect national security, there needs to be a standard against which to judge their verifiability, preferably one that is determined while the agreements are being negotiated and considered for adoption. An estimate of the verifiability of a treaty helps a potential party determine the risk to its national security that might be expected from possible violations of the convention.

For the US this benchmark was established during Senate ratifications of the 1987 Intermediate-range Nuclear Forces (INF) Treaty and the 1992 Strategic Arms Reduction Treaty (START I). During hearings on the INF treaty, former Ambassador Paul Nitze defined effective verification in the following way: 'if the other side moves beyond the limits of the treaty in any militarily significant way, we would be able to detect such violation in time to respond effectively and thereby deny the other side the benefit of the violation'.[7] Thus, any militarily significant cheating must be detected in a timely manner before it can threaten national security. During the 1992 ratification hearings on START I, Secretary of State James A. Baker III repeated this definition, but added a new criterion: 'Additionally, the verification regime should enable us to detect patterns of marginal violations that do not present immediate risk to US security'. This chapter uses the Nitze definition in determining whether the CTBT is effectively verifiable.

Seismological means of verification

Since the 1963 Partial (or Limited) Test Ban Treaty was concluded, all confirmed nuclear tests have been conducted underground. Seismographs provide the primary

tool for detecting underground tests, with other technologies supplementing this data. Earthquakes release compressional stress between two tectonic plates (or two regions within a plate), as one region slides past another over several seconds. Seismic traces from nuclear explosions differ from those of an earthquake in several ways. Seismic data from nuclear explosions have higher-frequency components than those from earthquakes because the duration of a nuclear explosion is much shorter than that of an earthquake. Furthermore, the ratio of the short-period, pressure body-wave magnitude (m_b) to the long-period, surface-wave magnitude (M_S), is significantly larger for nuclear tests than for earthquakes.

Over the past four decades the ability to detect underground nuclear explosions has improved considerably. Large seismic events are readily attributable to earthquakes, nuclear blasts or chemical explosions for mining. Since 1960, 72 events at various locations (out of some 700 Soviet nuclear tests) have appeared in the literature for which further study has been needed to determine their source. Lynn Sykes, Professor of Geophysics at Columbia University in New York, has examined these 72 events using accurate depth determinations, spectral ratios of seismic waves, first motions of P-waves, focal mechanisms and surface deformations.[8] Teleseismic stations measure distant sources (more than 1,500 kilometres away) by observing body waves that travel below the mantle. Sykes notes that advances in technology have lowered the threshold-detection region for problem events in seismic magnitude by two m_b units, from 4.3–5.6 30 years ago, to 2.0–3.5 today.[9] This improvement permits observation of wave amplitudes that are a factor of 300 smaller than before. This increased sensitivity lowers the yield threshold for problem events by a factor of 1,000.

These results are shown in Figure 1. The yield scale on the right is appropriate for well-coupled nuclear explosions at the former Soviet test site at Novaya Zemlya, where the explosion is surrounded by rock and not a cavity. No seismic waves were detected for events with downward pointing arrows, indicating that the signals could not have been larger than background noise levels on those dates.

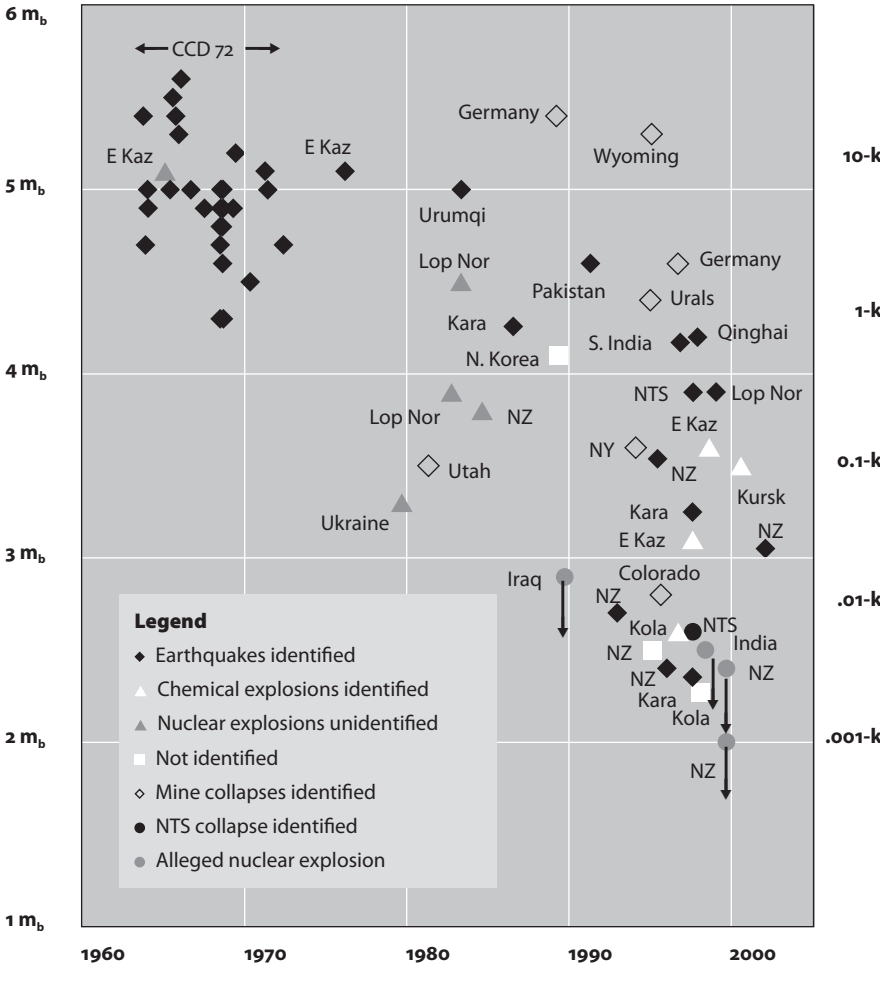
The International Monitoring System

The International Monitoring System (IMS), which is part of the verification regime for the CTBT, will, when complete, comprise 337 monitoring stations with seismic,

hydroacoustic, radionuclide or infrasound sensors.[10] As of April 2004 there were 81 fully-functioning stations (with another 80 under construction or subject to contract negotiations).[11] The seismic part of the IMS network will employ modern, high-quality sensors at its 50 primary and 120 auxiliary stations.[12]

The IMS will have the capability to detect explosions with high confidence to an m_b level of 3–3.5 with 90 per cent certainty using confirmation data from three

Figure 1 **Sizes of anomalous and problem seismic events, 1960–2002**



Abbreviations Eastern Kazakhstan (E Kaz), Kara Sea (Kara), Kola Peninsula (Kola), Nevada Test Site (NTS), western New York (NY) and Novaya Zemlya (NZ).

Source Lynn Sykes, 'Four decades of progress in seismic identification help verify the CTBT', EOS, Transactions of the American Geophysical Union, vol. 83, no. 44, 29 October 2002, pp. 497–500.

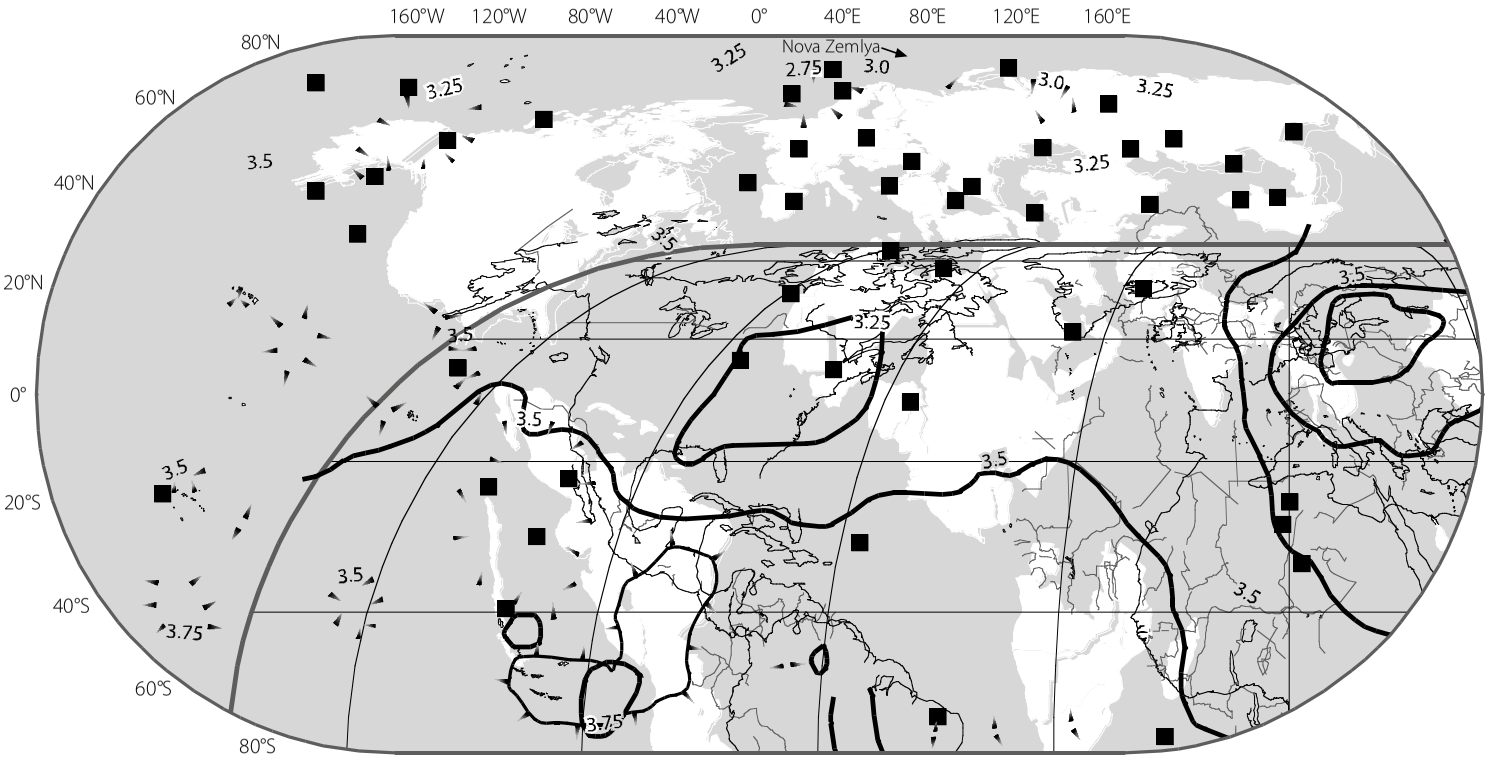


Figure 2 **IMS seismic monitoring magnitude limit (m_b)**

threshold-magnitude contours

stations of the IMS primary network

Source Center for Monitoring Research, Nuclear Testing Programs, Department of Defense, reprinted in National Academy of Sciences, *Technical Issues Related to the Comprehensive Nuclear Test Ban Treaty*, National Academy Press, Washington, DC, 2002, p. 52-b.

monitoring stations. Figure 2 shows seismic threshold detection magnitude contours (with signal-to-noise amplitude greater than 3.2) at three or more IMS primary seismic network stations (solid squares). This capability captures 90 per cent of the events at the contoured magnitude or larger. The contour interval is 0.25 magnitude units.

The detection threshold for Asia, Europe and North America is in the range of magnitude 3–3.5 or lower. For most of Eurasia and North Africa this corresponds to a 0.03–0.1-kt yield from a 'tamped explosion' (where the nuclear device is in direct contact with hard rock rather than being surrounded by a cavity). The result is shown in the threshold contour limits in Figure 2. These findings confirm the calculations of US national laboratories and universities. Explosions in soft rock couple less efficiently, raising these yield limits by a factor of up to ten. For Novaya Zemlya the m_b detection threshold is less than 2.5.

The threshold-magnitude contours of Figure 2 are translated into explosive-yield contours in tons in Figure 3, showing the projected detection threshold contours for the IMS network of 50 primary stations. The contours are given in tons of explosive yield for 90 per cent-probable detection, using signals from three seismic stations. The IMS detection threshold is below 0.1-kt for all of Eurasia and below 0.2-kt for all continents. In 1999, with 33 stations, the IMS detected 0.1-kt underground chemical explosions and a 0.025-kt explosion at the former Soviet test site in Semipalatinsk, Kazakhstan.

From this, it can be concluded that the IMS network can detect to a threshold of less than 0.1-kt for explosions tamped in hard rock for all of Eurasia, North Africa and North America. This is better by a factor of ten than the one kiloton limit originally projected for the IMS by treaty negotiators and system designers.

Regional seismic stations

The above threshold estimates are, however, too cautious in that they do not take into account the possibility of utilizing close-in regional seismic stations within 100 kilometres (or more) of the seismic event. For sub-kiloton explosions, signals at teleseismic stations—those located more than 1,500 kilometres from the source—can be too weak to be detected by single stations. For these smaller signals, monitoring must be done using regional signals. Some IMS stations, when they are situated relatively close to the source, are already acting as regional stations. More

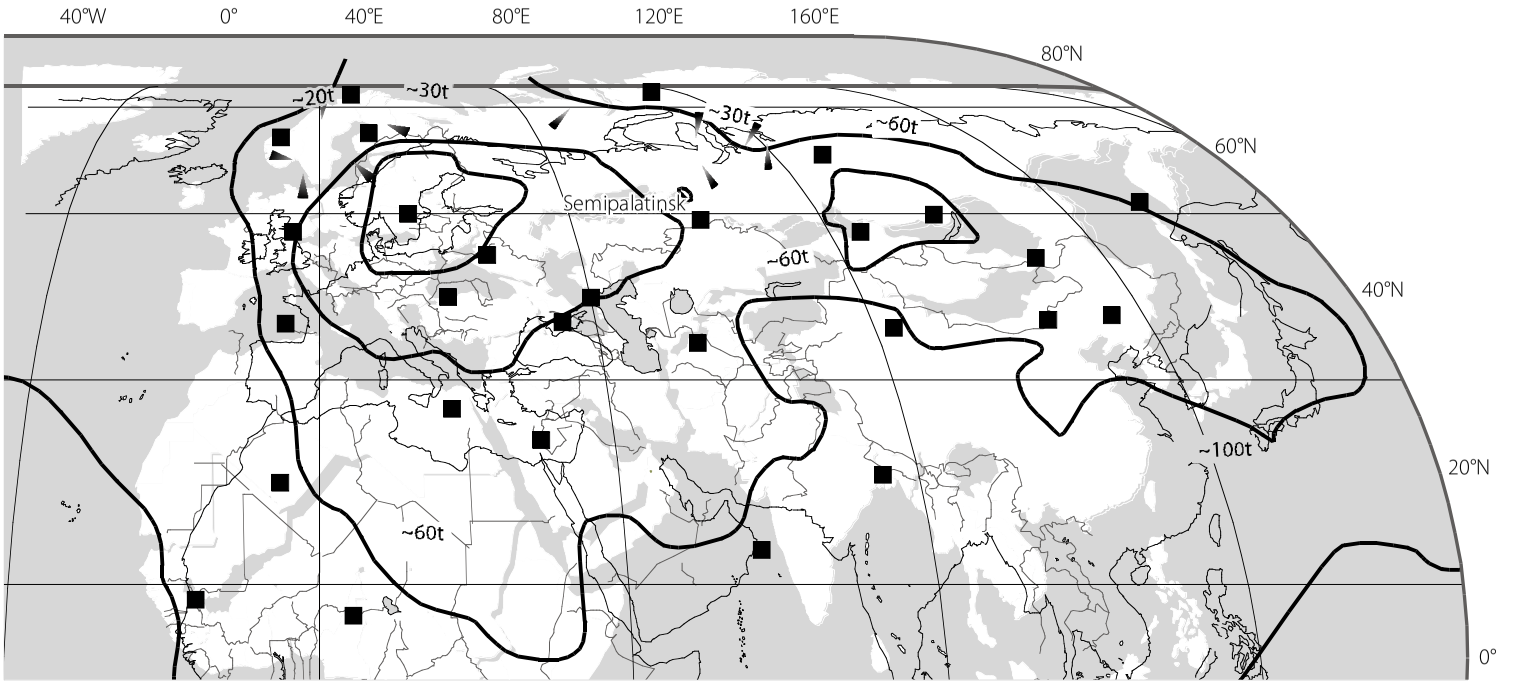


Figure 3 **IMS seismic monitoring limit (tons)**

explosive yield contours in tons

stations of the IMS primary network

Source Center for Monitoring Research, Nuclear Testing Programs, Department of Defense, reprinted in National Academy of Sciences, *Technical Issues Related to the Comprehensive Nuclear Test Ban Treaty*, National Academy Press, Washington, DC, 2002, p. 52-c.

regional stations could be located near areas of concern to improve further the IMS projections mentioned above. Regional waves propagate at depths of less than 100 kilometres and at higher frequencies, up to 20 Hz. Regional seismic magnitudes are referenced to teleseismic m_b magnitudes to simplify discussion. Cavity decoupling is much more detectable at frequencies above five to ten Hertz, thus regional seismographs can help to detect and identify clandestine testing. Because the local geological structure affects regional waves, making them more complex, research must be carried out to interpret them.

According to Russian sources, 340 underground nuclear tests took place from 1961–89 at Semipalatinsk.[13] At the end of the Cold War, only 271 of these tests were described in the open technical literature with well-determined origin times, coordinates and magnitudes. Good unclassified documentation was lacking for the other 69 tests until Vitaly Khalturin, Tatyana Rautian and Paul Richards obtained regional seismic data from seismographs located 500–1,500 kilometres from the Kazakhstan site.[14] As a result, they have been able to assign magnitudes to eight tests that had been previously located but whose magnitudes were unknown. For 31 tests they were able to estimate the origin times and magnitudes—and for 19 of these they were able to determine locations based on seismic signals. Of the remaining 30 poorly documented tests, 15 had announced yields that were less than one ton and 13 occurred at the same time as another test that had been detected. There were only two tests, with announced yields of over one ton, for which they were unable to recover seismic signals. This is an impressive achievement, arrived at with seismographs employing old technology. Regional seismic data from seismographs based on new technology will enhance the ability to identify and locate small nuclear tests with a yield of approximately one ton. Large chemical explosions are identifiable because they are usually ripple-fired in a line to enhance the fracturing of rock. In addition, the CTBT provides for voluntary notification of chemical explosions greater than 0.3-kt, which reduces suspicions about them.

Seismic detection of an explosion in a cavity

Very little data is available on nuclear devices exploded in cavities, which is known as decoupling. Coupling of waves to the earth is reduced since pressure is reduced when the wave hits the distant cavity wall.[15] If a nuclear weapon is placed in a cavity

of sufficient size, the blast pressure on the cavity wall will fall below the material's elastic limit, which avoids cracking and nonlinear effects. This can reduce the effective seismic yield by a theoretical factor of seven at 20 Hz and 70 at lower frequencies. The only fully decoupled test took place in 1966, when the 0.38-kt Sterling device was exploded in a Mississippi salt cavity with a 17 metre radius (created by the previous 5.3-kt Salmon nuclear explosion). The Soviets carried out a nine kiloton test in the Azgir cavity in western Kazakhstan in 1976, but it was only partially decoupled, as the weapon was too large for the cavity's 36 metre radius (created by a previous 64-kt test).[16]

If the blast pressure exceeds the elastic limit of the cavity wall, sufficient energy is absorbed to crack it, increasing coupling to the wall, and thereby increasing the seismic signal. Critical cavity size depends on the explosion depth, but it is usually assumed to be about one kilometre.[17] From this, a 70-kt explosion needs a cavity radius of 60–100 metres (equivalent to a 25-story building) to achieve full decoupling, an extraordinary engineering challenge when one considers the secrecy required to carry out such a test clandestinely. Even if such a test is conducted without radiation being leaked, it would have an amplitude that could easily be detected and identified by the IMS network.

Most cavities of such large sizes are close to the earth's surface. If a cavity is constructed less than one kilometre from the surface, the cavity size must be increased. For example, the critical radius for a one kiloton explosion is at least 30 metres at a depth of 600 metres. This is twice the size of the oft-quoted 15 metre radius at greater depth.[18] It is cheaper to construct non-spherical cavities than spherical ones. However, if a cavity is too asymmetric, the cavity area closest to the weapon is exposed to pressures over 150 atmospheres, raising the likelihood of radioactive releases. The portion of the cavity wall that is closest to the explosion will also experience considerably more radiation, increasing the likelihood that an ablation shockwave from the vaporized cavity wall will produce a detectable seismic signal.

Other monitoring technologies

In addition to seismic monitoring, the IMS will deploy 60 infrasound stations capable of detecting a nuclear test below 0.5-kt in the atmosphere. The IMS will

also deploy 11 hydroacoustic stations capable of detecting nuclear tests in the world's oceans, mostly to less than one-millionth of a kiloton yield (one kilogram). (In the worst case, the threshold would be 60 kilograms yield.) Explosions in the ocean are readily detectable, since water is almost incompressible, allowing acoustic energy to propagate with little attenuation.[19] The IMS will also deploy 80 radionuclide stations that can detect atmospheric nuclear tests above a threshold of 0.1 to one kilotons. Recent progress, such as the increased ability to detect radioactive xenon, should lower these thresholds.[20]

As well as these internationally owned and operated means of verification, several nations now have their own National Technical Means (NTM) to monitor the CTBT, including satellite reconnaissance of many types, electronic intelligence (ELINT), human intelligence (HUMINT) and other '-ints'. The CTBT allows states to submit such data from NTM to the Comprehensive Nuclear Test Ban Treaty Organization (CTBTO) in Vienna, Austria, if a non-compliance concern arises. Instruments on satellites produce images using optical, infrared and radar technologies. The US has optical bhangmeters on some of its satellites to detect characteristic, double-peak optical signals from atmospheric explosions. Other sensors on satellites monitor nuclear tests in the atmosphere and space by detecting gamma rays, x-rays, neutrons and electromagnetic pulses. Data from IMS and NTM technologies can be combined synergistically to enhance monitoring sensitivities. The fear of being spotted by IMS and NTM technologies should deter most states from cheating, and these measures will be buttressed by on-site inspections (OSIS) in case of suspicious events.

Interferometric synthetic aperture radar

Information on a new CTBT monitoring technology was published in December 2003 by Paul Vincent et al.[21] Signatures of three underground nuclear tests from 1992–93 were obtained using unclassified data from interferometric synthetic aperture radar (INSAR) operated by the European Space Agency (ESA). A synthetic aperture radar (SAR) has been used to obtain detailed pictures of Venus in spite of the planet's dense cloud cover. A SAR satellite transmits and receives reflected radar pulses as it moves along its flight path, effectively creating a large aperture antenna. A greater amount of time for collection leads to the procurement of more

data for computer analysis, which increases the effective size of the radar antenna. This results in SAR radar images with a higher resolution.

INSAR combines individual SAR images acquired from nearly identical viewing geometries by 'beating' the image pixels obtained before and after an underground nuclear test against each other (known as 'interfering') to obtain an interference pattern. The fringe pattern corresponds to topography (which can be removed) plus any change in topography (deformation) that may have occurred between image acquisitions. This allows for measurements of subsidence of the earth after such a test to within 0.5 centimetre accuracy. This approach is successful whether or not a visible crater is formed. INSAR data currently have a horizontal resolution of better than 30 metres, which is much smaller than a typical crater size, which have radii of more than 100 meters. A typical radar frame covers 100 kilometres by 100 kilometres (100,000 square kilometres), sufficient to search wide areas.

INSAR data can also determine the 'relaxation' rate, the rate of slow subsidence over longer periods. This approach can locate older tests carried out prior to the existence of INSAR data. This has allowed Vincent and his colleagues to locate and characterize 12 additional explosions, as well as a dozen or so others nearby, at locations where there was no INSAR data prior to the explosion. Initial measurements of the subsidence rates varied between 0.43 and 6.95 centimetres per year. These fluctuated widely because of the different geology, the different nuclear explosion situations and the different time histories. They also measured the reduction of subsidence rates over time, giving exponential decay time constants, in most cases, of 0.01 to 0.06 per year.

Long-term subsidence occurs as underground rock damage above the explosion cavity relaxes over time, as the pressure head naturally subsides. When underground tests were conducted near confined aquifers (for example in the Yucca Flat region of the Nevada Test Site (NTS), Vincent et al. found that the water pressure head, initially over-pressured by the underground nuclear tests, relaxed from 1,400 feet to 1,250 feet between 1992 and 1999.

INSAR will be a powerful tool for accurately directing OSI teams to the correct location (within 50–100 metres) to enable them to collect radioactive proof that a nuclear test has taken place. The CTBT requires that the proposed area for an OSI must be less than 1,000 square kilometres. INSAR more than fulfils this require-

ment. It will be interesting to discover the ultimate sensitivity of INSAR in detecting small nuclear tests. Overall, INSAR will be an important addition to CTBT monitoring.

Conclusion

The NAS panel concluded that tamped explosions in hard rock can be detected with high confidence in Eurasia, North Africa and North America at yields of over 0.1-kt. On evasive testing, the panel concluded that: 'the only evasion scenarios that need to be taken seriously at this time are cavity decoupling and mine masking'.[22] It considered many issues that affect the probability of successfully hiding a nuclear test in a cavity. For example, covert testing is complicated by the possibility of radioactive gases from the explosion venting, which can easily be detected. Thirty per cent of Soviet nuclear tests vented, while the US experienced severe venting problems during its first decade of underground testing. Venting from smaller tests is often harder to contain than venting from larger ones: the last four US tests that vented had yields of less than 20-kt. The tendency to vent at lower yields may be explained by the hypothesis that smaller explosions may not adequately enclose cavities with glassified rubble, and the cavities may not rebound sufficiently to seal fractures with a stress 'cage'.

The NAS panel noted seven situations that need to be mastered or avoided by nations that conduct covert nuclear tests:

- all radioactive gases and particles must be trapped;
- accurate estimates of the explosive yield must be made to avoid yield 'excursions';
- materials removed to create a test shaft and cavity must be hidden from satellites;
- crater and surface changes due to testing must be hidden from INSAR and other technologies;
- the cheater must avoid the detection of weaker seismic signals by closer regional seismographs;
- a series of nuclear tests must be conducted to develop significant nuclear weapons; and
- the cheater must prevent the detection of human and other intelligence that can provide unexpected information that reveals test preparations.

The probability of hiding a covert test is the product of the probabilities of success of each of the individual tasks involved. For example, if violators are 100 per cent successful in respect of four tasks, and only 90 per cent successful with regard to three tasks, they will be only 73 per cent successful at hiding the test.[23] For this reason, the NAS panel did not use a decoupling factor of 70 times the 0.1-kt limit to obtain a maximum cheating limit of seven kilotons. Rather, '[t]aking all these factors into account and assuming a fully functional IMS, we judge that an underground nuclear explosion cannot be confidently hidden if the yield is larger than 1 or 2 kt'. This limit could be further reduced by about 50 per cent (0.25 m_b units) if the 120 IMS auxiliary stations were to report continuously to the IMS network, instead of reporting only on request. The use of additional close-in regional seismic stations near areas of concern would lower the detection threshold further.

Despite the high probability that a clandestine nuclear test would be detected, the question still arises as to what practical benefit a state conducting such a test would obtain in terms of acquiring or enhancing its nuclear arsenal. According to the NAS report, nations with less nuclear testing experience than the five nuclear weapon states recognized by the 1968 Nuclear Non-Proliferation Treaty (NPT) could use small clandestine nuclear tests (one to two kilotons) to carry out equation of state studies to determine the compressive properties of plutonium. In addition, these states could: carry out high-explosive lens experiments; certify bulky inefficient unboosted fission weapons (gun-type weapons, without deuterium and tritium); conduct one-point safety tests; make limited improvements to unboosted fission weapons; and perform proof tests of compact weapons with yields of up to one to two kilotons (with difficulty and without an excursive yield).[24] Countries with considerable nuclear testing experience (the five nuclear weapon states) could also partially develop new primaries for thermonuclear weapons through small clandestine nuclear tests. They could also validate designs for unboosted fission weapons with yields of up to 0.1-kt. The CTBT thus prevents the development of low-yield boosted fission weapons and the full testing of primaries for fission weapons over one to two kilotons and thermonuclear weapons.

Arms control treaties must be shown to be effectively verifiable before the US Senate will ratify them. By using the definition of effective verification employed

by Nitze for the INF treaty and Baker for START I, the CTBT can be shown to be effectively verifiable. Seismic monitoring by the IMS can detect tamped, underground nuclear explosions to levels less than 0.1-kt. This is an improvement of a factor of ten over the one-kiloton level that was originally projected for the IMS system. When the NAS panel took all factors into account, it concluded that muffled explosions detonated in cavities can be detected to a level of one to two kilotons. Regional seismic stations, placed closer to national test sites, can further improve these results. The declassification of interferometric synthetic aperture radar results shows that surface subsidence from nuclear testing can be measured to within 0.5 centimetres. This new tool nicely complements CTBT monitoring technologies (seismic, infrasound, hydroacoustic and radionuclide) and NTM. In terms of the potential gains from successful clandestine tests, the NAS panel concluded that: 'Very little of the benefit of a scrupulously observed CTBT regime would be lost in the case of clandestine testing within the considerable constraints imposed by the available monitoring capabilities'.

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Endnotes

1 The author is grateful to Paul Richards, Lynn Sykes and Paul Vincent for comments on the draft manuscript.

2 The zero threshold was chosen because a finite limit, for example, of one kiloton (kt), has the effect of legalizing testing below that level. In addition, the determination of whether a particular test exceeds a threshold limit adds potential for error, which can become politicized, as it did in the case of the 1974 Threshold Test Ban Treaty (TTBT). Monitoring the 150 kiloton threshold yield of the TTBT was complicated by geological differences in the tectonic plates of the former Soviet Union and the United States at the test sites. The seismic magnitude of a body pressure wave is $m_b = a + b + c \log Y$, where m_b is the magnitude of a one-Hertz (Hz) body wave, a is the 4.1 magnitude of a one kiloton explosion, b is the bias correction for a test site, c is the slope of 0.74 and Y is the yield in kilotons. A 150-kt yield at the Nevada Test Site has an m_b of 4.1 + 0.74 log150, which equals 5.71 (4.1 + 1.61), while a 150-kt explosion at the Soviet Semipalatinsk site with a bias of 0.4 is 6.11. The US initially and incorrectly assumed that there was no bias between the two sites ($b = 0$), which gave a false impression that a Soviet explosion at 6.11 m_b was a violation with $Y = 10^{[(6.11 - 4.1 - 0)/0.74]} = 520$-kt. Later a value of $b = 0.2$ was used, but this was also too low. The incorrect US assessment of 'likely violation' of the TTBT by the former Soviet Union greatly hindered negotiations on the CTBT.

3 For further information on the CTBT, see the websites of the Comprehensive Nuclear Test Ban Treaty Organization (www.ctbto.org), the Independent Commission on the Verifiability of the CTBT (www.ctbtcommission.org), the Coalition on the CTBT (www.clw.org/pub/clw/coalition/ctbindex.htm), the US Department of Energy/National Nuclear Security Administration (www.nemre.nnsa.doe.gov/cgi-bin/prod/shared/index.cgi), Incorporated Research Institutions for Seismology (www.iris.edu) and the American Geophysical Union (www.agu.org/sci_soc/policy/test_ban.html).

4 National Academy of Sciences, *Technical Issues Related to the Comprehensive Nuclear Test Ban Treaty,* National Academy Press, Washington, DC, 2002. Further details can be found in David Hafemeister, *Physics of Societal Issues,* Springer Verlag and American Institute of Physics Press, New York (forthcoming 2005).

5 Classified meetings were held at the Department of State, the Department of Energy and the NAS in Washington, DC, and at the Lawrence Livermore National Laboratory in Livermore, California, with representatives of the US nuclear weapon laboratories, the intelligence community and the Department of Defense's Strategic Command, as well as with other government and non-government scientists.

6 Condition 7 of the Strategic Arms Reduction Treaty (START) Resolution of Ratification (October 1992) required President George H. Bush to file a report (a) listing all violations of nuclear arms control treaties, (b) listing reductions in nuclear arms under the arms control treaties, and (c) comparing the military significance of the actions listed in (a) and (b). The report clearly shows that the military significance of the cuts far outweighed the military significance of the violations.

7 US Senate Committee on Foreign Relations, *The START Treaty*, Executive Report 102-53, September 18, 1992, Washington, DC, pp. 27.

8 Lynn Sykes, 'Four decades of progress in seismic identification help verify the CTBT', *EOS, Transactions of the American Geophysical Union,* vol. 83, no. 44, 29 October 2002, pp. 497–500.

9 The seismic m_b magnitude units are for one Hz pressure waves that travel through the body of the earth.

10 Oliver Meier, 'Nuclear test ban verification: work in progress', *Verification Yearbook 2000,* Verification Research, Training and Information Centre (VERTIC), London, 2000, pp. 25–41; Trevor Findlay and Oliver Meier, 'Test ban verification: technical progress confronts political uncertainty', *Verification Yearbook 2001,* VERTIC, London, 2001, pp. 43–60; Oliver Meier, 'CTBT verification: technical progress versus political stasis', *Verification Yearbook 2002,* VERTIC, London, 2002, pp. 37–52; Hein Haak and Laslo Evers, 'Infrasound as a tool for CTBT verification', *Verification Yearbook 2002,* VERTIC, London, 2002,

pp. 207–221; Christine Comley and Owen Price, 'CTBT radionuclide verification and the British laboratory', *Verification Yearbook 2003,* VERTIC, London, 2003, pp. 141–150.

11 Ben Mines, 'The Comprehensive Nuclear Test Ban Treaty: virtually verifiable now', VERTIC Brief, 3 April 2004. Data obtained from the CTBT Provisional Technical Secretariat, Vienna, Austria (26 primary seismic, 11 auxiliary seismic, four hydroacoustic, 17 infrasound and 23 radionuclide).

12 All of the IMS seismic stations have modern, high-quality sensors. This means that they have 'broad-band' sensors that can detect the teleseismic surface and body waves, as well as the higher-frequency regional waves. They digitally record the motions in three directions (up/down, north/south and east/west). Many of the IMS stations have arrays of sensors that detect the vertical components. The arrays consist of five to 30 sensors with high-frequency response that are spread over several square kilometres.

13 National Academy of Sciences, p. 39.

14 Vitaly Khalturin, Tatyana Rautian and Paul Richards, 'A study of small magnitude seismic events during 1961–1989 on and near the Semipalatinsk Test Site, Kazakhstan', *Pure and Applied Geophysics*, vol. 158, pp. 143–171, 2001.

15 Lynn Sykes, 'Dealing with decoupled nuclear explosions under a CTBT', in Eystein Husebye and Anton Dainty (eds), *Monitoring a Comprehensive Test Ban Treaty,* Kluwer Academic Publishers, Dordrecht, Netherlands, 1996, pp. 247–293.

16 The cube root of yield ratio (64-kt/5.3-kt) is 2.3. The Salmon crater radius of 17 metres times the 2.3 yield factor is 39 metres, close to the Azgir radius of 36 metres.

17 One expects that the critical radius R_c is proportional to $Y^{1/3}$, since the work required to fill the volume of the cavity to a critical pressure is proportional to the yield, or $Y \propto P\Delta V \propto R_c^3$. A quick (adiabatic) expansion gives a critical *radius for decoupling* that increases with yield to the third power, according to R_c = (15–25 meters)$Y^{1/3}$, with Y in kilotons. The partial decoupling at Azgir (nine kilotons in a cavity with radius of 36 metres) implies that the 15 metre lower-bound estimate is too low.

18 Lynn Sykes, 'False and misleading claims about verification during the senate debate on the CTBT', *Public Interest Report,* vol. 53, no. 3, Federation of American Scientists, Washington, DC, www.fas.org/faspir/v53n3.htm.

19 National Academy of Sciences. See Figures 2-2 to 2-6 (pp. 52a–52f) for graphical representation of thresholds.

20 Theodore Bowyer, Keith Abel, Charles Hubbard, Mark Panisko, Paul Reeder, Robert Thompson and Ray Warner, 'Field testing of collection and measurement of radioxenon for the Comprehensive Test Ban Treaty', *Journal of Radioanalytical and Nuclear Chemistry,* vol. 240, 1999, pp. 109–122.

21 Paul Vincent, Shawn Larson, Devin Galloway, Randell Laczniak, William Walter, William Foxall and John Zucca, 'New signatures of underground nuclear tests revealed by satellite radar interferometry', *Geophysical Research Letters,* vol. 30, 2003, pp. 2141–2145.

22 National Academy of Sciences, pp. 57–59.

23 The probability of total success in hiding a covert test is the product of all of the success probabilities for each individual task. For I tasks, each with a success probability of P_I, the total success is $P_{success} = \prod_I P_I$.

24 National Academy of Sciences, pp. 61–68.

3

Improving CWC implementation: the OPCW Action Plan

Lisa Tabassi and Scott Spence

The global effort to prevent, pre-empt or prosecute terrorist activities has led to increased attention being placed on national implementation and enforcement of multilateral treaties aimed at the prohibition and/or nonproliferation of weapons of mass destruction (WMD).[1] The 1993 Chemical Weapons Convention (CWC)[2] is one such agreement and the initiatives of its implementing body, the Organisation for the Prohibition of Chemical Weapons (OPCW), are leading the way in the sphere of implementation support, serving to inspire similar initiatives in other treaty regimes.

In the seven years since the CWC entered into force, the OPCW's policymaking organs have moved from benign lack of interest in CWC national implementing legislation to being fully engaged with the issue. The Conference of the States Parties (CSP) and the Executive Council have adopted a series of decisions encouraging states parties to comply with their implementation obligations, motivating them to be more active in assisting each other with that task, assigning a more hands-on role to the OPCW Technical Secretariat and providing increased funding for this area of work.[3]

The First Review Conference of the CWC, held from 28 April–9 May 2003 in The Hague, Netherlands, recommended improvements in national implementation of the convention,[4] resulting in a 'Plan of Action Regarding the Implementation of Article VII Obligations'. This Action Plan was adopted by the OPCW's principal policymaking organ, the Conference of the States Parties, in October 2003.[5] In the short amount of time since its formulation, the Action Plan has led to greater dialogue, organizational change, more intensive reporting and some other concrete outcomes.

CWC requirements for, and significance of, national implementation measures

Article VII of the CWC is the basis for national implementing legislation, requiring states parties, in accordance with their respective constitutional processes, to adopt the 'necessary measures' to implement their treaty obligations. In particular, each state party is required to:

- prohibit natural and legal persons anywhere on its territory or in any other place under its jurisdiction as recognized by international law from undertaking any activity prohibited to a state party under the CWC, including enacting penal legislation with respect to such activity;
- not permit in any place under its control any activity prohibited to a state party under the CWC (implying positive enforcement action); and
- extend such penal legislation to any activity prohibited to a state party under the CWC undertaken anywhere by natural persons, possessing its nationality, in conformity with international law.

Article VII, paragraph 2 requires states parties to co-operate with and afford the appropriate form of legal assistance to one another to facilitate the implementation of these obligations. Article VI, paragraph 2 requires each state party to adopt the 'necessary measures' to ensure that toxic chemicals and their precursors are only developed, produced, otherwise acquired, retained, transferred or used within its territory or in any other place under its jurisdiction or control for purposes not prohibited under the CWC,[6] again implying positive enforcement action.

The extent of the regulations is not totally unfettered. Article XI, paragraph 2 requires states parties, subject to the provisions of the treaty and without prejudice to the principles and applicable rules of international law, to:

- not maintain among themselves any restrictions, including those in any international agreements, incompatible with the obligations undertaken under the CWC, which would restrict or impede trade and the development and promotion of scientific and technological knowledge in the field of chemistry for industrial, agricultural, research, medical, pharmaceutical or other peaceful purposes; and

- review their existing national regulations in the field of trade in chemicals in order to render them consistent with the object and purpose of the CWC.

The measures taken by states parties are subject to at least some level of review. Article VII, paragraph 5 requires states parties to inform the OPCW of legislative and administrative measures taken to implement the CWC. The First Review Conference interpreted this to mean that the full text of those measures must be submitted, including updates, or, in the case of states parties with a monist legal system,[7] information on the specific measures they have taken to implement the convention.[8]

Thus each state party must assess what steps are necessary to ensure that the treaty is implemented effectively and enforced in its jurisdiction. Although, initially, some monist states parties asserted that the CWC automatically constituted national law and no further positive measures were necessary after entry into force, it has become generally apparent that, regardless of the state party's legal system, national implementing legislation and/or regulations are required to compel the submission of the information needed for accurate national declarations to the OPCW and for the establishment of export/import controls to implement the trade measures under the CWC. Experience since 1997 has shown that comprehensive implementing legislation is the state party's key to: obtaining reliable, complete information from the private sector on activities declarable under the CWC; prosecuting violations of the norms of the CWC, including terrorist activity involving the use of toxic chemicals; promoting international co-operation and assistance in enforcing the norms of the CWC; and exerting the 'dual use' control required under Article VI, paragraph 2.

The question arises as to what extent the CWC is enforceable in the jurisdictions of states parties. Even without specific implementing legislation, all states parties would probably be able to invoke laws against manslaughter, attempted murder and/or murder to prosecute successfully those accused of using chemical weapons. It is the related offences of development, production, stockpiling and transferring directly or indirectly chemical weapons that might go unpunished if comprehensive penal legislation has not been enacted.[9] In addition, charges against co-conspirators might have to be dropped.

Offences are being reported much more frequently in the press. It is unclear whether this is because transgressions are on the rise, specific implementing legislation

has been enacted criminalizing a wider range of CW offences, enforcement authorities have become more vigilant due to heightened fears of terrorism, or because the subject is receiving greater media attention. In 2003 there were several media reports of CW offences being committed. The United Kingdom was reported to have charged six suspects under its Terrorism Act 2000 and Chemical Weapons Act 1996 in respect of ricin-related crimes.[10] In the United States it was reported that a man had been sentenced to 14 years in prison for producing ricin,[11] that another had been sentenced to 13 years in prison for violating the federal Chemical Weapons Statute of 1998 by possessing sodium cyanide and potassium cyanide,[12] and that a third had been arrested under the same statute and had later been found to have had sodium cyanide and nitric acid in his home.[13] There have been several reports so far in 2004 concerning alleged CW offences. For instance, six people were arrested in Lyon, France, in connection with an earlier arrest related to plans to produce ricin and botulinum toxin,[14] several individuals were arrested in connection with a plot in Jordan to use a chemical bomb and deadly gases,[15] and eight British nationals were arrested in the UK in connection with a plot to explode a bomb containing osmium tetroxide.[16]

Heightened fears of terrorist activity have made ever more urgent the issue of whether persons violating the norms of the CWC anywhere in the world might be detected, apprehended, prosecuted and punished. The Executive Council has identified the full implementation of the legislative measures required by Article VII as one of the main contributions that the OPCW can make to anti-terrorist efforts,[17] a focus reaffirmed by the First Review Conference.[18]

Status of compliance

As of 1 October 2004, 96 of 164 states parties (59 per cent) had met the requirement of Article VII, paragraph 5 of the CWC to inform the OPCW of legislative or administrative measures they have taken to implement the convention. However, only 52 (32 per cent) had legislation that covers all areas key to the enforcement of the CWC. Table 1 provides an overview of the submissions trend under Article VII, paragraph 5 of the CWC between 29 April 1997 (entry into force) and 1 October 2004, as well as of the scope of the legislation (as reported to the CSP at its annual sessions).

Table 1 **Submissions under Article VII(5), 29 April 1997–1 October 2004**

Status	Number of states parties	Article VII(5) submissions: number and percentage of states parties	Legislation that covers all areas key to the enforcement of the CWC[19]
C-I: May 1997	87	0 (0%)	Not available
C-II: December 1997	103	24 (23%)	Not available
C-III: November 1998	120	40 (33%)	Not available
C-IV: July 1999	125	43 (34%)	Not available
C-V: May 2000	133	48 (36%)	Not available
C-VI: May 2001	143	53 (37%)	Not available
C-7: October 2002	145	70 (48%)	39 (27%)
C-8: October 2003	154	94 (61%)	51 (33%)
1 October 2004	164	96 (59%)	52 (32%)

As reflected in the table, the increased attention given to this matter by the CSP and the Executive Council appears to have led, in recent years, to a rise in the number of submissions received by the OPCW. Nevertheless, in percentage terms, there has been a slight decline over the past year as a result of more states becoming members of the OPCW (from 154 in October 2003 to 164 in September 2004). Moreover, in terms of assessing global enforceability of the CWC's prohibitions, the most important factor is not the number of submissions, but the content of the national legislation and administrative measures enacted. The percentage of states parties with comprehensive implementing legislation remains comparatively low at 32 per cent.

Assessment of national legislation

As an initial step to assist drafters of national implementing legislation for the CWC and to draw attention to apparent disparities in the scope of national implementing legislation submitted to the OPCW, the Secretariat compiled and issued a Survey of National Implementing Legislation[20] a year after the treaty entered into

force. The survey consisted of a compilation of extracts of the legislation received, arranged topically to facilitate comparison. This document generally met with a lack of interest except for one initial instance of criticism from a member of the Executive Council. The question was raised whether the Secretariat had any mandate with respect to legislation beyond simply reporting to the policymaking organs on submissions received.

To avoid such sensitivities, the Secretariat created two tools: a Checklist of General Obligations under the CWC, and a Checklist for the Legislator—both in all six official OPCW languages.[21] This was followed, in 1999, by a joint project with the Secretariat of the Organisation of Eastern Caribbean States (OECS) to develop a model act employing an integrated approach to implementing legislation.[22] This was inspired by the initiatives of the United Nations Institute for Training and Research (UNITAR) to develop and strengthen national legislation and policies for the sound management of chemicals,[23] and was intended as an example of how the CWC regime could be implemented nationally with minimal impact on administrative and budgetary resources.

At its fifth session in May 2000, at the initiative of Switzerland, the CSP adopted a decision calling on states parties, the Executive Council and the Secretariat to assist states parties in fulfilling their obligations under Article VII, paragraphs 1 and 5.[24] The establishment of the Network of Legal Experts of Latin America and the Caribbean (the Grulac Network) and the First Legislation Questionnaire were two results.[25] The Grulac Network was formed at the behest of states parties in the region. It was intended that the network experts provide those states with assistance and advice, on request, during the process of elaborating national legislation, taking advantage of similarities in the states parties' legal systems and governmental structures.

The First Legislation Questionnaire was developed by the OPCW Secretariat to assess the legal and administrative mechanisms that states parties had established to regulate scheduled chemicals (that is, to identify not only what legislation and regulations were required, but also how they were being enforced), and to spot the problems that some states parties were facing in this respect and the means of addressing them. The questionnaire was in response to requests for assistance from several states parties that were drafting legislation and seeking the most

effective method of regulating scheduled chemicals and their precursors, in order to facilitate the reporting required under the CWC and to improve their control of transfers. Analysis of the 57 responses to the questionnaire[26] provoked some positive discussion in subsequent CSP and Executive Council sessions and was regularly referred to in informal consultations on the possible need for other measures regarding transfers of Schedule 3 chemicals to states not party to the CWC under Part VIII, paragraph 27 of the convention's Verification Annex.

In February 2001, at the request of the CSP, the Secretariat organized the International Symposium on Cooperation and Legal Assistance for the Effective Implementation of International Agreements, to examine the scope and implications of the obligation to co-operate and provide legal assistance to other states parties in the enforcement of the CWC.[27] The wording of the relevant paragraph, Article VII, paragraph 2, 'shall cooperate', leaves no room for discretion on the part of the requested state party. Yet there is no multilateral instrument that would enable all CWC states parties, in the absence of formal bilateral arrangements or an ad hoc agreement, to respond positively in the event that assistance is sought by one of them to enforce the CWC. The symposium was thus structured to reinforce the point that enforcement of the convention must encompass national and global efforts to prevent and prosecute criminal activities. It considered three broad topics: jurisdictional issues; modalities; and challenges. Speakers addressed each of the factors in the equation: national implementing legislation; the means of international co-operation and assistance (such as extradition and other forms of judicial or police co-operation); and the problems that can arise politically or constitutionally in trying to put the modalities into practice. Participants also looked at actual situations faced in the field in trying to prosecute offenders in an international context. The meeting closed with a roundtable involving the legal advisers of several international organizations to discuss multilateral initiatives to prevent or prosecute crime.

One outcome of the symposium was the issuance by the Secretariat of the Second Legislation Questionnaire on penal enforcement of the CWC,[28] which concentrated not on mechanisms and methodology, but on the bottom line: whether violations of each key area of the CWC could be prosecuted and penalized in each state party's jurisdiction. Going beyond the First Legislation Questionnaire,

it also focussed on whether states parties could prosecute offences involving the use of chemicals not listed in the schedules to the CWC. This depends primarily on how states parties have defined 'chemical weapon' in their penal legislation. In practice, some of the cases mentioned earlier have involved unscheduled chemicals with no history of use as chemical weapons, highlighting the importance of the treaty's 'general purpose criterion'. The responses to the second questionnaire were presented in a simple matrix format,[29] enabling a quick overview of the scope of each state party's legislation and identification of any existing gaps. While this could have been seen as a 'name and shame' exercise, it has not met with any criticism, in part because scrutiny of implementing legislation was becoming politically acceptable and in part because the reported information was based on each state party's assessment of its own legislation. The hard data contained in the matrix contributed to the political momentum, which had already been mounting, for states parties to address the issue of implementation. Indeed, by May 2003, the First Review Conference was able to recommend improvements in states parties' implementation efforts and by October 2003 the CSP was able to reach agreement on the Action Plan. The Executive Council received the First Progress Report on implementation of the Action Plan in March 2004,[30] containing an updated matrix to assist states parties and the Secretariat in prioritizing and focussing implementation support efforts, and has actively followed the matter since then, as discussed further below.

In a move that highlights the importance of national implementation of treaties prohibiting or regulating WMD, the United Nations (UN) Security Council, in resolution 1540 of 28 April 2004, called on all states to 'promote the universal adoption and full implementation, and, where necessary, strengthening of multilateral treaties to which they are parties, whose aim is to prevent the proliferation of … chemical weapons' and to 'renew and fulfil their commitment to multilateral cooperation, in particular within the framework of … the Organization for the Prohibition of Chemical Weapons … as [an] important means of pursuing and achieving their common objectives in the area of non-proliferation and of promoting international cooperation for peaceful purposes'. The resolution reinforces the call of the First Review Conference, as well as subsequent actions by the CSP and the Executive Council, for efforts to be stepped up in respect of

national implementing legislation. It also underlines the identification by the CSP and the Executive Council of implementation of legislative measures as one component of the OPCW's anti-terrorist efforts. Significantly, since the resolution was adopted under Chapter VII of the UN Charter, all UN member states, not just CWC states parties, are now obliged to put measures in place to prevent the proliferation of chemical weapons to non-state actors.

The Action Plan

The Action Plan on implementation of Article VII obligations, only four pages long, is divided into four parts (with respective tasks for states parties and the Secretariat): identification and analysis of problems and needs; resources for implementation support; the overall timeframe, intermediate steps and target dates for implementation; and oversight by the CSP and the Executive Council.

Identification and analysis of problems and needs

Under the first rubric, the Secretariat was requested to further identify, analyze and address the difficulties some states parties are having in adopting the required Article VII measures and to submit a progress report to the Executive Council at its thirty-sixth session in March 2004 on implementation of the Action Plan. In this report the Secretariat flagged a number of problems states parties were having, including: inadequate awareness of the CWC's requirements and thus a lack of support for its implementation; failure to accord the requirements priority; a shortage of resources; delays in establishing or designating National Authorities; and insufficient experience in respect of implementation.[31] The Secretariat also highlighted the following areas in which states parties were in need of help: preparing legislation and regulations and reviewing drafts; identifying declarable facilities and preparing and submitting declarations; strengthening administrative means; and building awareness of, and generating support for, the CWC, including through outreach to stakeholders in government and other interested communities.[32] States parties, meanwhile, were requested to inform the Secretariat of assistance they required if they had not already done so.[33] However, as the Secretariat noted in the progress report, very few states parties formally responded to this call.[34]

Resources for implementation support

Under the second rubric, the Secretariat is requested to offer, within its budgetary parameters (together with any voluntary contributions), technical support to states parties for the establishment and effective functioning of National Authorities,[35] the enactment of national implementing legislation and the adoption of administrative measures. States parties, for their part, are encouraged to provide assistance to other states parties, such as advice on drafting and adopting national measures. So far, 22 states parties have formally offered assistance.[36] The Secretariat is also tasked under the second rubric with developing and improving further its implementation support programme and identifying and engaging with regional, sub-regional and other relevant groups of state parties able to provide implementation support, and with forging partnerships with relevant regional organizations and agencies.

Overall timeframe, intermediate steps and target dates for implementation

Under the third rubric, and perhaps most importantly, the Action Plan requires states parties to take steps to enact necessary legislation, including penal legislation and any essential administrative measures, by the tenth session of the CSP (7–11 November 2005). States parties are also encouraged to set themselves 'target dates' and to maintain regular contact with the Secretariat regarding implementation of these steps and target dates. Specific steps that must be taken by states parties include designating or establishing a National Authority and notifying the Secretariat once this has been done, enacting legislation and administrative measures, and providing the full text of their implementing legislation to the Secretariat, or, in the case of monist states parties, supplying information about actual measures introduced. Finally, states parties are encouraged to review their existing chemical trade regulations to ensure their consistency with the object and purpose of the CWC, if they have not done so.

Oversight by the CSP and the Executive Council

Under the fourth rubric, the Secretariat is requested to report to the CSP at its ninth session (from 29 November–3 December 2004) and every other session of the Executive Council on progress in implementing the Action Plan, while the Executive Council is requested to give guidance to, and to coordinate with, the

Secretariat and monitor implementation of the Action Plan. States parties that provide advice to other states parties are requested to keep the OPCW informed. Finally, the Action Plan specifies that progress with regard to its implementation will be reviewed at the ninth session of the CSP, while the status of implementation of Article VII obligations generally is to be reviewed at the tenth session, when a decision will be taken on further action, if necessary.

Some elements of the Action Plan emerged because the CSP and the Executive Council recognized that the extent of implementation of Article VII obligations to date was unacceptable. It was clear, though, that the Secretariat, including the Implementation Support Branch and the Office of the Legal Adviser, could not cope by itself with the enormity of the task. This explains the assignment of primary responsibility for implementing the Action Plan to states parties, for example, by encouraging those that need assistance to request it and those that can offer assistance to provide it. In other words, the Secretariat is no longer the sole resource for implementation support, but rather a facilitator, coordinator, clearing house and source of background information for initiatives by states parties. At the same time, however, the CSP recognized that national implementation of the CWC is a daunting exercise requiring more resources, in some cases far more, than many states parties have. Accordingly, the Action Plan refrains from being confrontational and accusatory, but instead encourages states parties to identify 'steps' and 'target dates' for themselves with the ultimate goal of having their legislation and regulations in place by November 2005.

States parties, including those in need and those that can offer help, must become more involved than they have been if the Action Plan is to be a success.[37] It implicitly recognizes that lack of, or gaps in, national implementing legislation carry their own risks, particularly since non-state actors, terrorists and others, have proven themselves capable of producing and using chemical weapons, including ones not listed in the CWC's schedules in the Annex on Chemicals.

Implementation support under the Action Plan

So what have states parties and the Secretariat done so far in light of the Action Plan and where should efforts now be concentrated?

Technical assistance

As an initial matter, the Secretariat is tasked under Article VIII, paragraph 38(e) of the CWC with 'providing technical assistance and technical evaluation to states parties in the implementation of the provisions of [the] Convention'. Such technical assistance requires a budget and personnel. In October 2003 the CSP authorized the Director-General to draw on €250,000 of the OPCW's 2001 cash surplus to finance additional international co-operation and assistance activities in 2004.[38] Separately, the Secretariat has hired an additional legal officer, one of whose responsibilities will be to provide implementation support.

The Secretariat indicated in its first progress report to the Executive Council that, for 2004, it was considering or had planned: 13 regional seminars, thematic workshops and training courses; 11 National Authority training courses for individual states parties (with 16 other requests being considered); and nine bilateral implementation support missions. These events are coordinated by the Implementation Support Branch, in the International Cooperation and Assistance Division, and entail co-operation with the Verification Division and/or the Office of the Legal Adviser. The Verification Division helps states parties to identify declarable facilities and activities by working with the chemical industry and government representatives. The Office of the Legal Adviser, meanwhile, provides legislation support upon request, including: giving presentations on the elements of comprehensive national implementing legislation; participating in on-site drafting assistance; and commenting on successive drafts of legislation.

The Office of the Legal Adviser has commented on over 30 sets of draft legislation since 2003, either in communications from headquarters or during technical assistance visits and regional meetings. Although the Secretariat has received requests from states parties in all of the OPCW's regional groups, most have come from the African and Asian Groups. In some cases, states parties did not have legislation in place for the enforcement of any of the key areas of the CWC, thus the process had to start from scratch, while in other cases states parties had gaps in their existing legislation that could be remedied by amendments.[39]

With regard to offers of implementation support from states parties, so far, 22 have offered bilateral or regional assistance. One of the recommendations in the progress report is that states parties coordinate their efforts with the Secretariat

and share information on the activities they have engaged in, their results, lessons learned, follow-up action and future activities. Bilateral meetings with the Secretariat have commenced in this respect.

The OPCW Network of Legal Experts

Recognizing the value of the Grulac Network, which remains active, the Secretariat created a new, expanded network in 2003, encompassing the OPCW's four other regions (Africa, Asia, Eastern Europe, and Western European and Other States). The objective of the OPCW Network of Legal Experts is to increase the Secretariat's capacity to assist states parties with their implementing legislation by creating a framework for the provision of bilateral legal assistance as a cost-effective complement to the Secretariat's existing technical assistance projects. In order to establish the network, the Secretariat invited states parties to nominate individuals with in-depth knowledge of CWC implementing legislation or who were currently drafting such legislation.[40] The nominees were invited to the first meeting of the OPCW network, which took place at OPCW headquarters in The Hague in November 2003.[41] The Secretariat gave presentations on such topics as the CWC's legislative requirements, enforcement issues, the Action Plan, the updated and expanded legal module on the OPCW website, the National Legislation Implementation Kit[42] and privileges and immunities agreements. The legal experts were encouraged to give reports on the status of implementation in their home country, including problems encountered and assistance required. Perhaps the most useful segment of the meeting, however, was a two-day drafting workshop devoted to bilateral or broader consultations on drafting implementing legislation, during which participants met in smaller working groups organized according to language.[43]

Since the November meeting, the Secretariat has taken some steps to nurture the OPCW network and network members have begun joining the Secretariat in some technical assistance visits. However, much more remains to be done, and it is hoped that the additional legal officer will help in this respect. In the meantime, the roster of legal experts has been posted on the OPCW website and kept up to date to enable the legal experts and states parties needing assistance to contact each other directly.[44] Another step has been to encourage as many states parties as possible to nominate experts to the network. In April and May 2004, the

Secretariat took the opportunity to solicit nominations when sending some 75 formal requests to states parties for information on the status of their implementation efforts. In addition the Secretariat has asked the legal experts to prepare reviews of draft legislation or to take part in on-site implementation support missions and regional workshops and seminars. The Secretariat has also invited regional and other relevant organizations to designate experts; the Advisory Service on International Humanitarian Law of the International Committee of the Red Cross (ICRC) and the OECS have done so. The OPCW network now has 105 members, comprising 69 states parties and two international organizations.

The National Legislation Implementation Kit

The National Legislation Implementation Kit was devised following consultations within the Secretariat in 2003 on the need to provide states parties with a concise and clear guide for national implementation of the CWC. Previous model statutes had been prepared for the Preparatory Commission in 1993 and 1996, including a Model Act to Implement the Convention[45] and Australia's Illustrative Model Legislation for the Incorporation of the Chemical Weapons Convention into Domestic Law.[46] However, the former was not comprehensive and did not appear to be widely employed, while the latter was aimed at states following the common law tradition and in some respects was less useful for states with a civil law legal system. Accordingly, it was decided that an implementation kit should be put together, using the Checklist for the Legislator as the skeleton framework, from which states parties could choose appropriate provisions and synthesize their own implementing legislation.

The kit's structure is straightforward. It is arranged according to measures to be implemented under the CWC, with each measure accompanied by: the corresponding CWC reference(s); model statutory language; and commentary. For instance, a brief outline of the general prohibitions vis-à-vis chemical weapons (Measure 1.1) is followed by the corresponding CWC provisions that require this measure to be implemented through national legislation, model statutory language and an explanation of why this measure must be implemented.

The response to the kit has been positive and the Secretariat has been informed that it is being used by states parties. To ensure that it reaches the widest possible audience, it has been translated into all six official OPCW languages and distributed

and employed at workshops and regional seminars and in training courses. It was disseminated to delegates at the March 2004 session of the Executive Council and sent to some 75 states parties in April and May. The kit is available in hard copy and on the legal module of the OPCW's website, which itself was updated in late 2003 to include a legislation database, information and documents pertaining to national implementing legislation, legal technical assistance, co-operation and legal assistance, privileges and immunities agreements, facility agreements, administrative law aspects of the OPCW, and the 2000 Agreement Concerning the Relationship Between the UN and the OPCW. The links to OPCW-related legal publications has also been expanded.

Co-operation with other international organizations

The Action Plan encourages the Secretariat to identify and engage with regional, sub-regional and other relevant groups of states parties to advance implementation efforts. The Secretariat concluded in its progress report that it would be useful to approach the following organizations.

- With regard to implementing the CWC:
  - the Association of Southeast Asian Nations (ASEAN);
  - the African Union (AU);
  - the European Union (EU); and
  - the Pacific Islands Forum.
- With regard to helping states parties to develop and improve their systems for regulating and monitoring transfers of scheduled chemicals:
  - the World Customs Organization (WCO); and
  - the United Nations Office on Drugs and Crime (UNODC).
- UNITAR, in view of its programme to assist countries in developing and strengthening national action plans for the sound management of chemicals.

The Secretariat has already signed a Memorandum of Understanding with the Secretariat of the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The two bodies agreed to establish working-level co-operation on matters of common interest relating to national implementation of their respective conventions, including sharing expertise,

exploring synergies between international co-operation projects and capacity-building activities. And, as noted above, the ICRC and the OECS have nominated experts to the OPCW Network of Legal Experts to offer legislation assistance through their respective regional offices.

Coordination

The Executive Council has appointed a facilitator on the Action Plan (from the UK) and he is conducting informal consultations on a regular basis to discuss progress, review issues related to the implementation of the plan, including the coordination of assistance, and prepare proposals on action that the Executive Council may wish to consider. Additionally, a Task Force has been established within the Technical Secretariat to ensure internal coordination of its activities under the Action Plan, as well as to facilitate coordination with states parties (through the facilitator), international and regional organizations, and groups of states that are partners in implementing the Action Plan.

Conclusion

The lessons that have been learned thus far are many, yet there is still a long way to go to ensure that all states parties implement effectively the provisions of the CWC in their national legislation in accordance with the November 2005 timeframe. Perhaps most important, the Action Plan approved by the CSP in 2003 recognized that, while the level of implementation was unacceptable, engaging in a 'name and shame' exercise was not the appropriate solution. Rather, it was decided that a proactive and co-operative approach would lead to more effective outcomes for all stakeholders.

Second, the Secretariat does not have the human and financial resources to manage the task ahead alone in the set timeframe and in some cases lacks the means to motivate states politically to assign the necessary priority to the task at hand. States parties are ultimately responsible for implementing their obligations under the CWC. Therefore, the CSP called on those states parties that need help to ask for it and those that are able to provide it to come forward with offers. Collaboration between the assisting states parties and the Secretariat is helping

to ensure the effectiveness of implementation support activities. Furthermore, the Secretariat is stepping up its coordination efforts with regional and international organizations. This is a welcome move, as long as there are tangible results and no duplication of efforts.

Finally, concrete steps are necessary. Hard data is needed on progress being made by states parties and the problems they are facing need to be analyzed. Technical assistance must be targeted so that limited human and financial resources are expended prudently. The Grulac Network and the OPCW Network of Legal Experts are useful tools for bilateral consultation and the exchange of information and experiences. The Checklist for the Legislator, the Checklist of General Obligations and the National Legislation Implementation Kit are also proving helpful. And the Secretariat's reports to the Executive Council on progress in implementing the Action Plan are valuable in providing all stakeholders with a snapshot of where things stand and in illuminating what remains to be done.

Without effective national implementation, the CWC has little practical meaning at the national level vis-à-vis non-state actors. The Action Plan was designed to hasten improvements in implementation. The Secretariat and assisting states parties are receiving requests for implementation support and this alone could generate guarded optimism that at least significant progress will be seen by November 2005. However, actual adoption of legislation by national parliaments can be a complex process, which the Secretariat can do little to influence. Assisted or not, it is the political commitment of each state party to implement and enforce its legal obligations under the treaty that, ultimately, will be the determining factor in whether the goals of the Action Plan are met.

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Endnotes

1 The views expressed in this article are those of the authors and do not necessarily reflect those of their respective affiliated institutions. The authors would like to express their gratitude to Julian Perry Robinson and Ralf Trapp for their advice and comments on the final draft of this chapter.

2 The Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction was opened for signature on 13 January 1993 and entered into force on 29 April 1997.

3 An increasing number of states parties has generously provided voluntary funds for universality and implementation support programmes. Since 2003 the number of voluntary contributions by states parties has increased significantly, prompted by the Action Plans on 'universality' and 'national implementation' adopted that year.

4 Subparagraphs 7.74 to 7.83 of the 'Report of the First Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention (First Review Conference) 28 April–9 May 2003', OPCW document RC-I/5, 9 May 2003, www.opcw.org.

5 OPCW Conference of the States Parties decision C-8/DEC.16, 24 October 2003, www.opcw.org.

6 The concept established by the CWC definition of chemical weapons—that all toxic chemicals and their precursors are chemical weapons except where intended for purposes not prohibited under the convention as long as the types and quantities are consistent with such purposes—is referred to by some commentators as the 'general purpose criterion'.

7 Principally, the position of a state on the relationship between domestic and international law. The two main theories are monism (in the event of a conflict between international law and domestic legislation, the former will prevail) and dualism (international law is applied within a state only if it has been incorporated into domestic legislation).

8 'Report of the First Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention (First Review Conference) 28 April–9 May 2003', subparagraph 7.83(c).

9 For further information see Lisa Tabassi and Robert Silvers, 'Enforcing the CWC: Actual Investigations and Prosecutions of Offenders', *Chemical Disarmament,* vol. 2, issue 4, winter 2004 (forthcoming).

10 See *The CBW Conventions Bulletin,* no. 59, March 2003, p. 25.

11 See *The CBW Conventions Bulletin,* no. 62, December 2003, p. 54.

12 See *The CBW Conventions Bulletin,* no. 60, June 2003, p. 37.

13 See *The CBW Conventions Bulletin,* no. 62, p. 34.

14 See *The CBW Conventions Bulletin,* no. 63, March 2004, p. 40.

15 See *The CBW Conventions Bulletin,* no. 64, June 2004, p. 47.

16 See *The CBW Conventions Bulletin,* no. 64, p. 45.

17 Subparagraph 2(b) of OPCW Executive Council decision EC-XXVII/DEC.5, 7 December 2001.

18 'Report of the First Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention (first Review Conference) 28 April–9 May 2003', subparagraph 7.10.

19 The information included in this column is either drawn from the responses of states parties to the Second Legislation Questionnaire on Penal Enforcement of the CWC (document S/317/2002, www.opcw.org) or is derived from a reading of the text of national implementing legislation submitted by states parties under Article VII, paragraph 5 of the CWC.

20 OPCW document S/85/98, 17 November 1998. Updated version available at www.opcw.org (legal section).

21 Revised and updated versions available at www.opcw.org (legal section). The six official languages of the OPCW are Arabic, Chinese, English, French, Russian and Spanish.

22 'An Integrated Approach to National Implementing Legislation: Model Act Developed by the Secretariat of the Organisation of Eastern Caribbean States', OPCW document S/190/2000, 23 May 2000, www.opcw.org (legal section).

23 'Proceedings of the Thematic Workshop on Developing and Strengthening National Legislation and Policies for the Sound Management of Chemicals, 22–25 June 1999, Geneva', OPCW document S/127/99, 1 July 1999, www.opcw.org (legal section).

24 'Decision on National Implementation Measures', OPCW document C-V/DEC.20, 19 May 2000, www.opcw.org (legal section).

25 'Legislation Questionnaire: Survey of National Measures to Regulate Scheduled Chemicals under the Chemical Weapons Convention', OPCW document S/194/2000, 8 June 2000, www.opcw.org (legal section).

26 OPCW document S/269/2001, 16 August 2001, www.opcw.org (legal section).

27 The proceedings, updated to take into account reflections following the attacks of 11 September 2001, were published as Rodrigo Yepes-Enríquez and Lisa Tabassi, *Treaty Enforcement and International Cooperation in Criminal Matters, with Special Reference to the Chemical Weapons Convention,* TMC Asser Press, The Hague, 2002.

28 'Legislation Questionnaire: Penal Enforcement of the Chemical Weapons Convention', OPCW documents S/308/2002 and S/317/2002, dated 6 June 2002 and 18 September 2002 respectively, www.opcw.org (legal section).

29 Reports by the Director-General of the OPCW on national implementation measures (documents C-8/DG.5 and Addendum 1 (available at www.opcw.org), EC-32/DG.17, EC-30/DG.3 and EC-28/DG.4).

30 'Note by the Director-General: First Progress Report on the Plan of Action Regarding the Implementation of Article VII Obligations', OPCW document EC-36/DG.16, 4 March 2004 (distribution restricted to states parties). The Executive Council received additional information at its thirty-seventh session in June. 'Note by the Director-General: Information on the Implementation of the Plan of Action for the Implementation of Article VII Obligations', OPCW document S/433/2004, 25 June 2004, www.opcw.org (documents section).

31 See *The CBW Conventions Bulletin,* no. 64, p. 4.

32 See *The CBW Conventions Bulletin,* no. 64, p. 4.

33 See *The CBW Conventions Bulletin,* no. 64, p. 4.

34 See *The CBW Conventions Bulletin,* no. 64, p. 4.

35 Each state party is required under Article VII, paragraph 4 to establish a National Authority in its jurisdiction to serve as the national focal point for effective liaison with the OPCW and other states parties.

36 'Note by the Director-General: Information on the Implementation of the Plan of Action for the Implementation of Article VII Obligations', document S/433/2004, 25 June 2004, p. 3, footnote 1, www.opcw.org (documents section).

37 See 'Note by the Director-General: Information on the Implementation of the Plan of Action for the Implementation of Article VII Obligations'.

38 OPCW document C-8/DEC.19, 24 October 2003, www.opcw.org (documents section).

39 The key areas of enforcement of the CWC include Article 1 prohibitions, Article 1 penalties, extraterritorial application of the CWC's prohibitions, Article II(1) penalties ('general purpose criterion'), penalties in respect of violations of the Schedules 1, 2, and 3 chemicals prohibitions, the requirement of an end-user certificate for Schedule 3 chemicals, and penalties for failure to declare scheduled chemical facilities and activities.

40 See OPCW document S/363/2003, 28 May 2003, www.opcw.org (legal section).

41 See OPCW document S/381/2003, 14 October 2003, www.opcw.org (legal section).

42 Available at www.opcw.org (legal section).

43 See OPCW document S/398/2003, 28 January 2004, www.opcw.org (legal section).
44 See www.opcw.org (legal section).
45 OPCW document PC-XI/7/Rev.1, 31 May 1996, www.opcw.org (documents section).
46 OPCW document PC-IV/A/WP.10, 28 September 1993, www.opcw.org (legal section).

4

The lessons of UNSCOM and UNMOVIC

Trevor Findlay

The long crisis over Iraq's actual and presumed weapons of mass destruction (WMD) capabilities has generated not only agonizing dilemmas for the international community but also novel ways of attempting to deal with the problem.[1] In particular it has led to the establishment by the United Nations (UN) Security Council of two bodies 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. And both were withdrawn from the country in the face of Iraqi non-co-operation that was judged by two permanent members of the Security Council—the United Kingdom and the United States—but few other states, to warrant the use of military force.

This chapter considers the lessons for nonproliferation, arms control and disarmament that might be learned from the experience of the United Nations Special Commission (UNSCOM) and the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC). Since UNSCOM and UNMOVIC co-operated closely with the International Atomic Energy Agency (IAEA), the experiences of that agency will also be examined where relevant.

The United Nations Special Commission

UNSCOM was created in 1991 as an integral part of the arrangements for ending the fighting between Iraq and the coalition of states that, with Security Council authorization, had driven Iraqi forces out of Kuwait. Part C of Security Council resolution 687 of 3 April 1991 required Iraq to accept unconditionally the destruction,

removal or rendering harmless, under international supervision, of all of its weapons of mass destruction and of all materials and facilities that could be used for WMD, including means of delivery.[2] Iraq was required to submit detailed reports of its inventories in the nuclear, chemical and biological spheres, as well as missiles with a range exceeding 150 kilometres. It was also obliged to accept 'urgent on-site inspections' in order to verify the capabilities revealed in its declarations and at additional locations chosen by the Special Commission. While UNSCOM was given the chemical, biological and missile 'files', the IAEA was charged, in co-operation with UNSCOM, with handling the nuclear portfolio.

UNSCOM was the first such subsidiary body ever established by the Security Council. It was also extraordinary in having to be built from scratch, having been mandated to conduct urgent inspections even before it had any capacity to do so. In May 1991, just one month after the creation of the disarmament regime, UNSCOM conducted its first inspection. Within a few months its hastily assembled staff had developed the plans and procedures and garnered the resources needed to fulfil its mandate. In addition to inspections UNSCOM began assessing Iraq's declarations in detail, as well as planning, and in some cases executing, the destruction of declared weapons and capabilities. When it became apparent that Iraq's declarations were incomplete and that Baghdad's co-operation would not be unconditional, UNSCOM turned its attention to identifying the gaps and unearthing hidden or undeclared facilities and items.

Organizationally, UNSCOM comprised a 19-member College of Commissioners which provided policy and other advice to its Executive Chairman, Rolf Ekéus, a Swedish diplomat, and his deputy, initially US Department of State official Bob Galluci. He had a small headquarters staff, located in the UN Secretariat in New York. Later, a field office was established in Bahrain to support the commission's activities in Iraq, in addition to a substantial presence in Baghdad itself. The majority of inspection team members were seconded, on request, from supportive governments, mostly Western ones.

UNSCOM also rapidly acquired techniques and technology, including some that was not normally available to UN bodies. In August 1991 the US provided the services of a U-2 high-altitude reconnaissance aircraft to support on-site inspection (OSI) planning, to facilitate industrial infrastructure monitoring and to search

for undeclared facilities. In 1991 and 1992 UNSCOM obtained low-altitude aerial capabilities in the form of helicopters, and, ultimately, an Aerial Inspection Team that provided overhead security at inspection sites and conducted aerial photography. Finally, and controversially, as it turned out, UNSCOM began to seek and receive information, including intelligence data, from governments. This began with supplier information to permit UNSCOM to track Iraqi imports, but later expanded to include sensitive data obtained from so-called National Technical Means (NTM), such as satellites, and human intelligence (HUMINT) sources.

It became clear as early as the end of 1991 that what many thought would be a quick accounting and verification exercise would in fact be a tug of war with the 'host' government. In October 1991 UNSCOM reported to the Security Council that: 'The elements of misinformation, concealment, lack of co-operation and violation of the privileges and immunities of the Special Commission and IAEA have not created any trust in Iraq's intentions'.[3] In June 1991, acting on information supplied by the US, a nuclear inspection team tried to examine two sites suspected of containing undeclared components of the Iraqi nuclear programme. Iraq barred the inspectors from both and fired on inspectors at one of them. In response, the Security Council passed resolution 707, condemning Iraq's actions as a 'material breach' of the ceasefire, language that would resonate more than a decade later in the Security Council debate over whether or not to invade the country.[4] Three months later another fabled incident occurred in which inspectors, again acting on external information, raided several facilities in Baghdad in search of documents relating to Iraq's nuclear programme. When inspectors seized documents the Iraqis took some of the papers back and then besieged the inspectors in a carpark to force them to surrender the remaining ones. The incident only came to an end after the inspectors managed to transmit the incriminating data electronically to Washington.[5]

While UNSCOM was able to piece together the details of, and eventually almost completely destroy, Iraq's nuclear and chemical weapon and longer-range missile capabilities, Iraq was particularly unforthcoming about its biological weapons (BW) activities. UNSCOM was convinced that there had been such a programme, but it experienced continuing difficulties in assessing its extent, especially due to the large amount of biological growth media that Iraq had imported and was unable

to account for convincingly. Iraq admitted that it had a BW programme only after it was confirmed by the defection in August 1995 of President Saddam Hussein's son-in-law, General Hussein Kamel Hassan, but by then UNSCOM had already determined that Iraq did have a large-scale BW programme.[6]

In an effort to clear up the remaining mysteries about Iraq's capabilities, UNSCOM embarked, from 1995 through 1998, on an intensified series of investigations, as well as on developing more intrusive investigative techniques.[7] These included: digging up sites where Iraq claimed to have destroyed and buried weapons and other materials unilaterally; conducting interviews with Iraqi personnel; and exploring and trying to counter Iraq's attempts at concealment, deception and denial.

Inevitably, Iraq reacted to this increased scrutiny and strived to end the activities of the Special Commission once and for all. In November 1997 it ejected all US nationals participating in the operation. It also rejected UNSCOM's right to inspect Saddam's palaces. UN Secretary-General Kofi Annan was dispatched to Baghdad in February 1998, returning with a much derided agreement for special procedures for such sites, but one that ultimately made little difference either way.[8] In November 1998, Iraq, sensing a lack of resolve in the Security Council, refused all co-operation with UNSCOM, alleging that it had been used as a cover for Western espionage, a charge that regrettably had some truth to it—whether wittingly or unwittingly remains unclear. In addition, UNSCOM's second executive chairman, Australian diplomat Richard Butler, was seen, not just by the Iraqis, as undiplomatic and heavy-handed and, less plausibly, as having become too close to the US.[9]

In December 1998 the UK and the US carried out a series of bombing campaigns in an attempt to force Iraq to comply with its obligations. When Baghdad refused, the Security Council was unable to agree on how to proceed and commissioned some studies to look at the options. The UK and the US became preoccupied with other issues and failed to pursue their harder line. UNSCOM remained in a hiatus for a year, able only to observe Iraq from afar, while the Security Council decided what to do. UNSCOM was never permitted to return to Iraq. Unfortunately it ended its life in controversy, accused by Iraq of having become a Trojan Horse for Western intelligence and military operations.

The achievements of UNSCOM and the IAEA's Iraq Action Team—responsible for nuclear inspections in Iraq—were nonetheless considerable. Among them were

the discovery and verified destruction of clandestine nuclear, chemical and biological weapons programmes and a long-range missile capability. But Iraq, in clear violation of its mandatory obligations to the Security Council, never did produce a credible complete and final account of its capabilities and what had become of them, particularly in respect of BW and, to some extent, missiles. UNSCOM and IAEA inspectors were faced with persistent Iraqi non-co-operation, harassment and dissembling. They had therefore not been able to verify Iraqi disarmament completely, nor to put in place the planned long-term Ongoing Monitoring and Verification (OMV) system designed to prevent Iraq from reacquiring WMD capabilities.

The United Nations Monitoring, Verification and Inspection Commission

UNSCOM was abandoned in December 1999 after a year of debate in the Security Council, to be replaced by UNMOVIC. Created by UN Security Council resolution 1284 of 17 December 1999, the new body inherited its predecessor's responsibilities, as well as being mandated to strengthen the OMV, now to be known as the Reinforced Ongoing Monitoring and Verification (R-OMV) system. The IAEA retained its separate role with regard to nuclear matters. Swedish diplomat Dr Hans Blix, former Director General of the IAEA, was selected as executive chairman of UNMOVIC.[10] A 16-member College of Commissioners was also appointed that would meet at least every three months to provide the chairman with advice and guidance. The proposed role and membership of the College of Commissioners elicited allegations that UNMOVIC would have less political independence than UNSCOM, but such fears never materialized and Blix came to regard it as a useful 'sounding board'.[11]

Organization and capabilities

UNMOVIC drew heavily on the experience of UNSCOM, as well as acquiring its assets, archives and some of its personnel.[12] However, it became a much more formidable inspection 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.[13]

These 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 Blix's determination that the flow of intelligence information would be strictly 'one-way traffic'—from national intelligence services to UNMOVIC.[14] In addition the post of deputy executive chairman was abolished, since, as Blix puts it, 'it had always been a direct channel to the authorities in Washington'.[15] 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 UNMOVIC 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, UNMOVIC focussed on identifying 'unresolved disarmament issues' and 'key remaining disarmament tasks'. To do this 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.[16]

Staff training—under UNSCOM largely the responsibility of member states—was now organized and conducted solely by UNMOVIC (with some support from governments).[17] 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-co-operation.

UNMOVIC also had better technological capabilities than UNSCOM. Surveys and 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 chemical and biological weapon detectors and ground-penetrating radar.[18] The IAEA used environmental sampling techniques developed for improved nuclear safeguards to monitor water, air and vegetation. 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. Information technology developments also helped UNMOVIC. For instance, 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 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.

The build-up to UNMOVIC's entry into Iraq

The first signs of movement in the Iraqi position on allowing inspectors to return appeared in the early part of 2002, prompted by UK and US intimations that the use of force could not be ruled out if the country continued to defy the Security Council.[19] Pressure was increased by the US release in September of intelligence

information on Iraq's alleged import of aluminium tubes for use in uranium enrichment centrifuges. The now infamous UK dossier on Iraq's alleged weapons of mass destruction was published on 24 September.[20]

On 8 November 2002 the Security Council unanimously adopted resolution 1441, declaring that Iraq had been and continued to be in 'material breach' of its obligations and calling on it to co-operate 'immediately, unconditionally and actively' with UNMOVIC. It ordered Baghdad to provide UNMOVIC and the IAEA with 'immediate, unimpeded, unconditional, and unrestricted access to any and all, including underground, areas, facilities, buildings, equipment, records, and means of transport which they wish to inspect'. The two bodies could impose no-drive and no-fly zones around suspect sites and could destroy, impound or remove any armaments, materials or records. They were also entitled to receive comprehensive lists of and 'immediate, unimpeded, unrestricted, and private access to all officials and other persons' whom they wished to interview in a mode or location of their choosing, without the presence of Iraqi observers. Gone were the special procedures for the inspection of presidential sites, as were the confidential 'understandings' that Ekéus had previously reached with Iraq.[21] Inspectors' premises were to be protected by UN guards, and UNMOVIC and IAEA personnel were to enjoy unimpeded entry to, and exit from, Iraq, and the right to import and export any equipment and material they required.

Not only was UNMOVIC's mandate now tougher and more intrusive than that of UNSCOM, but also it was politically more compelling. Unlike the resolution establishing UNSCOM, UNMOVIC was now specifically authorized under Chapter VII of the UN Charter, leaving no doubt that compliance with the resolution was mandatory. It was also, unlike the initial UNSCOM resolution, adopted unanimously (even Syria voted in favour).[22] In addition resolution 1441 explicitly stated that failure to comply at any point 'shall constitute a further material breach of Iraq's obligations', which would be reported to the Security Council for immediate assessment, with the possibility of 'serious consequences'. This was the first time that such a direct threat of force had been made in a resolution concerning the UN inspection regime. Previously, it had been linked indirectly as part of Iraq's ceasefire obligations.[23]

Several deadlines were imposed by resolution 1441: seven days for Iraq to notify the Security Council that it would comply; and 30 days for it to provide a 'currently

accurate, full and complete declaration of all aspects of its programmes to develop chemical, biological and nuclear weapons, ballistic missiles, and other delivery systems'. UNMOVIC was to begin inspections within 45 days and report to the Security Council 60 days thereafter, but earlier if Iraq was failing to comply.

On 13 November Iraq informed the Security Council of its decision to comply with the resolution 'without conditions'. A 30-strong advance team lost no time in travelling to Baghdad with Blix and IAEA Director General Dr Mohamed ElBaradei on 18 November for talks with Iraqi officials on the practical arrangements for the return of inspectors and to prepare premises and organize logistics to permit the resumption of operations. On 7 December a crucial deadline was met when Iraq provided, more than 24 hours before it was obliged to do so, what purported to be the required 'accurate, full, and complete declaration'. Comprising over 11,807 pages, with 352 pages of annexes and 529 megabytes of data, the declaration was detailed and technical (part of it was in Arabic).

UNMOVIC in Iraq

The first inspectors arrived in Iraq on 25 November—there were only 11 experts but they covered all areas of UNMOVIC's caseload. This paved the way for inspections to begin early, and on 27 November, three sites previously inspected by UNSCOM were visited. Several more inspections were conducted, unimpeded by the Iraqis, on successive days. These early inspections were low-key affairs designed to test Iraqi co-operation. On 3 December the first presidential site was inspected, again without serious incident, although access was delayed.

The inspections by UNMOVIC and the IAEA's Iraq Nuclear Verification Office (INVO), formerly known as the Iraq Action Team, had two distinct phases. From November 2002 until the beginning of 2003, the focus was on re-establishing a baseline for declared sites by assessing any changes made with regard to activity, personnel or equipment after inspectors had left the country in 1998. Newly declared sites were also visited and all sites assessed against Iraq's declaration of 7 December. From mid-December inspections began in earnest, averaging eight per day, with discipline-specific teams focussing on their own particular area of interest. The strength of the teams varied between two and 40 inspectors, eight being the average. From mid-January UNMOVIC and the INVO began a second, investigative phase, designed

to identify and pursue leads obtained from inspections, Iraqi documents or information from other sources, including intelligence.

In its 111 days in Iraq UNMOVIC conducted 731 inspections at 411 sites—of which 88 had not been previously inspected[24]—while the INVO carried out 237 nuclear inspections at 148 sites, including 27 new ones, with over 1,600 buildings.[25] Most were located around Baghdad or the northern city of Mosul—inspections at the latter were facilitated by the opening of a regional field office there.[26] In sharp contrast to their handling of UNSCOM, the Iraqis did not prevent entry to any site that UNMOVIC sought to visit and delays in gaining access were minimal, even when inspections were no-notice or undeclared. Two key areas where Iraq engaged in delaying tactics were in granting permission for overflights by helicopters and U-2 and *Mirage* aircraft, despite the fact that such flights had occurred under UNSCOM, and in granting UNMOVIC access to Iraqi scientists and other experts to permit interviews to be conducted without the presence of Iraqi minders. In reporting to the Security Council, Blix distinguished between Iraq's co-operation in 'process', which was good, and co-operation in 'substance', where Iraq continued to be evasive and misleading. In his briefing to the Security Council on 7 March 2003 he identified at least 100 unanswered questions, many relating to the amount of anthrax and VX nerve agents that Iraq had declared but not adequately accounted for.[27] The waters were muddied by continuing unproven allegations made by the UK and US, based on their own intelligence sources, about various aspects of supposed Iraqi non-compliance, virtually all of which were discounted by UNMOVIC and/or the IAEA after investigation or as a result of subsequent public revelations.

By 17 March 2003, differences in the Security Council over continuing Iraqi non-compliance reached a head. China, France, Germany and Russia on the one hand and the UK and US on the other clashed heatedly over whether a second resolution was needed to authorize the use of force if Iraq were found to be in non-compliance with resolution 1441. The impasse led to the US declaring its intention of acting unilaterally. On 18 March, two days after Washington advised the UN that the inspectors should leave for their own safety, UNMOVIC and the IAEA withdrew from Iraq. So ended the second round of international inspections. Bombing by American and British aircraft began on 20 March and the coalition ground invasion was launched soon after.

UNMOVIC's achievements

Many observers and a majority of Security Council member states—China, France, Russia and all ten non-permanent members—felt that UNMOVIC had not been given enough time to fulfil its mandate. While Iraq had not been proactive in assisting the inspectors and continued to prevaricate about its past programmes, it had nonetheless co-operated sufficiently to permit UNMOVIC and the IAEA to carry out their tasks unhindered and had consistently backed down on specific issues when pressure was applied by the Security Council.

UNMOVIC had barely been in the country three months. It had not yet completed its second phase, had only just begun receiving overhead imagery and had not installed monitoring equipment. It had still to establish an office in Basra, which would have opened up southern Iraq to more thorough inspection and increased the element of surprise. In the end only seven sites were inspected in the southern third of the country. UNMOVIC had also interviewed only a fraction of the scientists and officials that it wanted to.

UNMOVIC appeared at all times to act professionally and efficiently, despite adverse conditions. Among these were the failure by the UK and the US to provide adequate, reliable intelligence early enough to allow inspections to progress more quickly. It turns out, in retrospect, that there was no such intelligence information available, which is why they were so coy about providing it. Also difficult for UNMOVIC were the insinuations and criticisms about its alleged shortcomings made by some within or associated with the US administration. Blix, as the head of an international body that was supposed to balance the interests of all UN member states, including Iraq, could clearly not engage in an open, all-out debate with his critics without further harming UNMOVIC's reputation. On the contrary, his official reports to the Security Council and public comments were a model of tact, balance and diplomacy.

If there was one failure by UNMOVIC to fulfil its mandate, highlighted extensively by US officials, it was Blix's understandable reluctance to attempt to remove Iraqi scientists (accompanied presumably by their families) from Iraq for interview. Plans were, however, being developed, before UNMOVIC's withdrawal, for this process to occur in another Arab state or possibly Cyprus. Some commentators suggest that this would not have helped much, as scientists might have still felt

too intimidated by the Iraqi regime to have divulged much information of use. Even after the invasion of Iraq the US has had little success in inducing Iraqis to talk, or if they have agreed to do so they have revealed little or have actually denied the existence of WMD programmes or plans.

The post-war failure of US and coalition forces and the Australian/UK/US Iraq Survey Group (ISG) to uncover anything more than UNMOVIC has gilded the reputation of both UNSCOM and UNMOVIC. Calls for the ISG to be given more time and vastly greater resources when it was unable to discover rapidly any WMD have only reinforced the notion that UNMOVIC itself should have been afforded these. The difficulty for both UNSCOM and UNMOVIC, even if they had been given more time and resources, was the perennial challenge that all verifiers, including the ISG, face—that of verifying a negative, in this case the absence of Iraqi WMD capabilities. The professional duty of verifiers to give honest assessments of the probabilities involved in obtaining verifiable certainty provides openings for those with political motives to invoke worst-case scenarios that are ultimately unverifiable.

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-co-operation and deliberate attempts at sabotage all three bodies broadly succeeded in their verification mission. All demonstrated that an international inspection regime can perform creditably: they were 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. In the nuclear sphere, the closure by the IAEA of its file on the grounds that Iraq no longer possessed significant capabilities or could rejuvenate them

swiftly has proved to be the correct decision. Similarly UNMOVIC determined that the chemical weapons programme had, with a few innocuous exceptions, largely been eradicated. In the biological weapons 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 the US intelligence services, 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 destroying the missiles concerned when it was extricated.

A second strategic lesson follows 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, Executive Chairman Butler 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,[28] 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 and thereby deterring any future moves by Iraq to reacquire its lost capabilities.

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.

Iraq could have been under no illusion that it was dealing with another toothless part of the sprawling UN bureaucracy under a Secretary-General obliged to observe diplomatic niceties. Indeed Butler resisted attempts, as he saw it, by Annan to manage him, criticizing the latter for his alleged over-solicitousness towards the Iraqis.[29] The US too was critical when it appeared that Annan had reduced UNSCOM's inspection powers in respect of the so-called presidential sites. All of this reinforces the necessity for the head of such verification operations in future to be as independent of the UN Secretary-General and the UN Secretariat as possible.

Finance is also 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.[30] 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 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.[31] A second misuse of UNSCOM was the reported planting of listening devices by the US on UN 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 co-operation, 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. Clearly intelligence information can, in theory, be of great assistance to multilateral verifiers. It may, for instance, be derived from highly sophisticated NTM that are beyond the reach of international bodies. High-resolution satellite photography is one such example, although one that is declining in importance with the advent of cheap commercial satellite images with resolutions below one metre.

But, as in the Iraqi case, national intelligence data can also consist of analysis of information from 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. In fact Rolf Ekéus says that the 'much-hyped intelligence provided [to] UNSCOM by member states was insignificant and highly marginal in the work to identify the WMD programmes and to establish the material balance'.[32]

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.[33] The relationship between any future inspection agency and national intelligence bodies needs to be subject to thorough review and careful thought.[34] 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.[35] 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 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.[36] 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 in this chapter. Nonetheless several broad categories of lessons are readily 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.[37] 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 chemical weapons. 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 Organisation for the Prohibition of Chemical Weapons (OPCW), and will also be useful for any future BW investigations that are launched under the mandate of the UN Secretary-General[38] 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 correct 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, chemical weapons were simply dynamited in open pits. Criticism of verification activities on environmental grounds can provide yet one more political excuse for opposing such multilateral action.

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.[39] 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 ability 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.

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Endnotes

1 An earlier version of this chapter was prepared for a research project on 'The Iraq Crisis and World Order' organized by the International Peace Academy in New York and the United Nations University in Tokyo, Japan. The author is grateful for the research assistance of VERTIC Intern Benjamin Armbruster in preparing this chapter.

2 UN Security Council resolution 687, S/RES/687 (1991), 3 April 1991.

3 'Note by the Secretary-General', UN document S/23122, 8 October 1991 (report of the sixth IAEA inspection team).

4 UN Security Council resolution 707, S/RES/707 (1991), 15 August 1991.

5 A team of inspectors apparently read out the documents to a secretary in the US Department of State who typed them up for UN Secretary-General Kofi Annan and US President Bill Clinton. See Richard. A. Clarke, *Against All Enemies: Inside America's War on Terror,* Free Press, New York, 2004, pp. 67–69.

6 Contrary to popular opinion Kamal's defection was not decisive for the success of UNSCOM's BW investigations. See Rolf Ekéus, 'Reassessment: the IISS strategic dossier on Iraq's weapons of mass destruction', *Survival,* vol. 46, no. 2, summer 2004, p. 74.

7 For details see Stephen Black, 'Verification under duress: the case of UNSCOM', in Trevor Findlay (ed), *Verification Yearbook 2000,* Verification Research, Training and Information Centre (VERTIC), London 2000, pp. 122–125.

8 'Memorandum of Understanding between the United Nations and the Republic of Iraq', 23 February 1998.

9 There are varying assessments of Butler's performance: clearly a tough executive chairman was needed to deal with the Iraqis, who were engaged in an increasingly aggressive concealment, deception and denial campaign. Throughout his career as an Australian diplomat Butler had been notably critical of US policy and could hardly be considered a US lackey. Nonetheless it clearly suited the Iraqis and their supporters to portray him that way. His relations with the French and the Russians, whom he suspected of attempting to undermine UNSCOM's effectiveness, at least partly for economic reasons, were poor. See Cameron Stewart, 'What the Butler saw', *The Australian Magazine,* 10–11 June 2000, pp. 33–37.

10 The Security Council had been unable to agree on the Secretary-General's first choice, Rolf Ekéus.

11 Richard Butler, *Saddam Defiant: The Threat of Weapons of Mass Destruction, and the Crisis of Global Security,* Phoenix, London, 2000, p. 239.

12 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.

13 '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.

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

15 Blix, p. 49.

16 'Unresolved disarmament issues—Iraq's proscribed weapons programmes', UNMOVIC working document, 6 March 2003, which was presented informally to the Council. Paradoxically, a draft work programme was submitted to the Security 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).

17 UNMOVIC instigated a rolling programme of training on a wide range of topics: the past 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.

18 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.

19 Iraqi Foreign Minister Tariq Aziz held talks with Kofi Annan on 7 March and again on 1 and 3 May. Technical talks were also held with an Iraqi delegation, headed by General Amer Al-Sa'adi, the main point of contact for UNSCOM on chemical and biological weapons.

20 'Iraq's Weapons of Mass Destruction—the assessment of the British government', The Stationary Office, London, 24 September 2002.

21 In June 1996 the Security Council requested him to go to Baghdad to obtain 'immediate, unconditional and unrestricted access' to all sites that UNSCOM wanted to inspect. In a statement of 22 June, signed by Deputy Prime Minister Tariq Aziz and Ekéus, Iraq agreed to the Security Council's demand in return for UNSCOM's assurances that it would 'operate with full respect for the legitimate security concerns of Iraq'. Ekéus produced 'modalities for sensitive sites' to alleviate Iraqi concerns. See Ekéus, pp. 76–77, for details.

22 Cuba voted against the initial UNSCOM resolution, while Ecuador and Yemen abstained.

23 Resolution 1154 of 2 March 1998 had, however, come close to threatening military action, in asserting that 'any violation would have severest consequences for Iraq'.

24 '13th quarterly report of the Executive Chairman of UNMOVIC to the Security Council', UN document S/2003/580, 30 May 2003. For a detailed log of the inspections see VERTIC's online database at www.vertic.org/onlinedatabase/unmovic.

25 'Fifteenth Consolidated Report of the Director General of the International Atomic Energy Agency under paragraph 16 of the UNSC Resolution 1051 (1996)', 11 April 2003.

26 Of the inspections conducted by UNMOVIC, 219 (30 per cent) were carried out by missile teams, 205 (28 per cent) by biological teams, 161 (22 per cent) by chemical teams and 146 (20 per cent) by multidisciplinary teams. In addition to inspections, the INVO also conducted 125 surveys, including 42 at locations not previously visited by the IAEA. The surveys included land- and vehicle-based sampling, with inspectors travelling over 8,000 kilometres to visit state-run industrial and military locations, as well as urban areas. They also conducted a radiometric survey of Iraq's main water-courses from 9–19 December, 2002.

27 Hans Blix, 'Briefing of the Security Council, 7 March 2003: Oral introduction of the 12th quarterly report of UNMOVIC', 7 March 2003, and '12th quarterly report of the Executive Chairman of UNMOVIC to the Security Council', UN document S/2003/232, 28 February 2003.

28 Richard Clarke records that, in the days after the 11 September 2001 attacks on the US, when he expected to be talking about strategy to deal with al-Qaeda, he instead 'realized with almost a sharp physical pain' that Secretary of Defense Donald Rumsfeld and Deputy Secretary of Defense Paul Wolfowitz were 'going to take advantage of this national tragedy to promote their agenda about Iraq' (Clarke, p. 30). Quizzed in an ABC television interview about the 'hard fact that there were weapons of mass destruction, as opposed to the possibility that [Saddam] might move to acquire those weapons', President Bush replied revealingly: 'What's the difference?' (Clarke, p. 266). Clarke also notes that Charles Duelfer, former Deputy Executive Chairman of UNSCOM and the last head of the now disbanded Iraq Survey Group, who was one of the leading US experts on Iraqi WMD, had thought in 2002 that no large and threatening stockpiles remained in Iraq. He was ignored by the US administration until he was appointed to lead the ISG (Clarke, p. 267).

29 'Deeply alarming' says Butler, 'was the behaviour of … Kofi Annan, who repeatedly tried to deal with the problems raised by an outlaw regime by papering them over with diplomacy'. See Richard Butler, 'Why Saddam is winning the war', *talk*, vol. 1, no. 1, September 1999, pp. 196–201.

30 Notably Australia, France, Japan, Kuwait, Norway, Saudi Arabia, the UK and the US.
31 Clarke, pp. 67–69.
32 Ekéus, p. 78.
33 For further analysis of the verification/intelligence relationship, see Brian Jones, 'Intelligence, verification and Iraq's WMD', in this volume.
34 Jessica Tuchman Mathews, 'What happened in Iraq? The success story of the United Nations inspections', keynote address delivered at the 'International Peace Academy Conference on Weapons of Mass Destructions and the United Nations: Diverse Threats and Collective Responses', New York, 5 March 2004, Carnegie Endowment for International Peace, www.ceip.org.
35 Jacques Baute, 'Timeline in Iraq: challenges and lessons learned in Iraq', *IAEA Bulletin,* June 2004, p. 67.
36 For the details of UNSCOM's counter-deception and denial techniques, see Ekéus, p. 75.
37 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.
38 See Angela Woodward, 'BW: revisiting the UN mechanism', *Trust & Verify,* no. 116, September–October 2004, pp. 3–4.
39 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.

5

Verifying Libya's nuclear disarmament

Jack Boureston and Yana Feldman

On 19 December 2003 Libya made the surprise declaration that it would abandon its weapons of mass destruction (WMD) programmes. The breakthrough apparently came in early October 2003 when, under the auspices of the US-led Proliferation Security Initiative (PSI), American, British, German and Italian forces collaborated to intercept the German-flagged *BBC China,* which was carrying five containers filled with over 1,000 assembled gas centrifuges and components. The vessel had picked up its cargo in Dubai and was bound for Libya, before being diverted to the Italian port of Taranto for inspection. The incident may have been the straw that broke the camel's back, finally convincing Libya's leaders that it was time to put an end to the country's WMD programmes.

Prior to the December announcement, the Libyan government had secretly approached the United Kingdom and the United States on a number of occasions. The most recent move was in March 2003, at the start of the war in Iraq—perhaps at a time when it thought it could obtain the maximum benefits in terms of international recognition and financial assistance. Following negotiations with, and visits by, UK and US experts in 2003, Libya agreed to 'disclose and dismantle' all of its WMD programmes and 'immediately and unconditionally' to allow international inspectors to visit the country. On 29 December 2003, while International Atomic Energy Agency (IAEA) Director General Mohamed ElBaradei was in Libya, national authorities confirmed that, pending entry into force, Libya would act as if its Additional Protocol had already come into effect.

Subsequently, over 4,000 centrifuges and some 50,000 tons of other material, including several canisters of uranium hexafluoride (UF_6) gas, were removed and shipped to the Oak Ridge National Laboratory (ORNL) in the US.[1] The IAEA has

access to all of this material for testing and analysis, and is in the process of consulting with Libyan technicians to understand fully the extent of Libya's past nuclear activities. This chapter examines the present status of Libya's nuclear facilities and the true intent of its past nuclear-related actions in light of recent inspections by the IAEA and the UK–US team, as well as Libya's own declarations.

Past ambitions and known or suspected activities

Western intelligence analysts long believed that, despite its expressed commitment to nuclear nonproliferation—ratifying the Nuclear Non-Proliferation Treaty (NPT) in 1975, concluding a safeguards agreement (INFCIRC/282) with the IAEA in July 1980 and signing various regional nonproliferation treaties—Libya was continuing to pursue a nuclear weapons option. They suspected that Libya was carrying out its programme with assistance from a number of countries, including Argentina, Belgium, Brazil, Egypt, France, Germany, India, Pakistan, the former Soviet Union and Sweden. Of particular concern was co-operation between Libya and Pakistan. Libya is known to have provided large sums of money to Pakistan for its nuclear weapons programme; in return, Pakistan may have promised to supply the technology needed to develop nuclear weapons, or to transfer an assembled nuclear weapon to Libya. Until recently, however, no evidence of such a transfer has ever surfaced. Before December 2003, it was thought that the major limitations on Libya's aspirations to develop nuclear weapons were its lack of indigenous natural resources, the rudimentary state of its nuclear infrastructure and a shortage of trained personnel.

The dearth of qualified technicians in Libya appeared to be a major impediment to the development of its nuclear programme. During the 1976 International Conference on World Nuclear Energy in Washington, DC, Libyan officials spoke of the need to amass the required number of qualified technicians and researchers, and mentioned that Libya had implemented a programme to send a 'large number of pre and post graduate students to training centers abroad for education and training associated with nuclear power'.[2] Reports on Libya issued by the IAEA in 2004 confirmed this when they referred to training provided by 'foreign experts at locations in Africa, Asia, Europe, the Middle East, and Southeast Asia'.[3] In

fact, on a number of occasions, the IAEA itself provided training to Libyan scientists as part of specific projects, including a small one on fluoride chemistry in 1985.[4]

Libya's known facilities before the December 2003 announcement included the Tajura Nuclear Research Center (TNRC), which was constructed with the assistance of the former Soviet Union, beginning in the late 1970s. The TNRC is thought to be at the heart of Libya's nuclear activities and has been the focus of foreign technical assistance in the past. In 1984, international journalists were allowed to visit the TNRC and reported having seen various types of 'state-of-the-art' nuclear-related equipment and instrumentation from Hungary, Poland, the former Soviet Union, Switzerland and the US.[5]

The TNRC consists of numerous laboratories and facilities. One such facility is the 10-megawatt (MW), pool-type Tajura Research Reactor (IRT-1),[6] which was constructed in 1980 and went critical in 1981, but probably did not become operational until 1983. The reactor's core is filled with high enriched uranium (HEU) that was originally transferred from the Soviet Union. The TNRC also houses a critical facility that operates a 100-watt critical assembly and a TM4-A Tokamak fusion reactor. In addition the TNRC houses a nuclear metallurgy laboratory and a radiochemical laboratory with a number of hot cells that have been used to produce various isotopes, such as I-131 for medical and agricultural purposes.

One can assume that Libya's reactor is of an analogous size and capacity to that of North Korea, since it too came from the Soviet Union and was used for similar purposes. North Korea's IRT reactor and isotope production laboratory, which operated seven hot cells, allowed the country to experiment with spent fuel reprocessing and eventually to separate approximately two to four kilograms of plutonium from the spent fuel.

The TNRC also houses a physics research centre with various facilities for conducting research on nuclear physics, solid-state physics, neutron physics, material science and engineering, radiation biophysics and mass spectrometry. Some of these facilities contain hot cells and glove boxes that, theoretically, could be used to carry out spent fuel analysis, isotope production and other isotope-related research activities.

As a party to the NPT, Libya had pledged not to manufacture or acquire nuclear weapons, nor to receive assistance in this respect from elsewhere. Under the framework of the safeguards agreement that it concluded with the IAEA in July

1980, Libya declared its nuclear facilities, materials and related activities to the agency. The IAEA verified Libya's declaration to ensure that no nuclear material had been diverted for weapons purposes. The IAEA periodically conducted comprehensive inspections of Libya's facilities and gave Libya a 'clean bill of health' on numerous occasions. Intelligence community suspicions aside, it was not until Libyan President Moammar Gaddafi's announcement of December 2003 that the international community learned of the illicit nature of Libya's nuclear-related activities.

Libya comes forward

On 20 December 2003, at a meeting with IAEA representatives, the Libyan government pledged to eliminate 'materials, equipment and programmes' that can be used in nuclear weapons development.[7] Libya's declaration was reportedly the outcome of nine months of secret diplomacy with the UK and the US.[8] Prior to December 2003, American and British specialists travelled to Libya to visit projects and installations at more than 10 sites, including a uranium enrichment facility.[9] It appears that the IAEA had no knowledge of negotiations between Libya and the UK–US team before US President George W. Bush and UK Prime Minister Tony Blair issued a statement on 19 December 2003. According to a diplomat based in Vienna, Austria, the IAEA suffered 'hurt feelings' as a result of the surprise announcement.[10] The media later reported that 'turf battles' had erupted between the IAEA and the UK–US team over who would take the lead in disarming Libya, and there was uncertainty regarding to what extent the agency would be involved in the verification process.

Initially, the UK and the US planned to remove sensitive nuclear material and equipment, including weapons designs, from Libya, and to transfer them to the United States for in-depth inspection, verification and storage.[11] The details of who would be responsible for overseeing the dismantlement of Libya's WMD programmes were discussed at the meetings between Libya, the UK and the US. According to senior Western diplomats, during those meetings Libya pressed for an international organization, namely the IAEA, to take the lead, contrary to the wishes of London and Washington.[12] At subsequent meetings with IAEA officials, in January 2004,

Libya notified them of the discussions. The IAEA, not unexpectedly, protested, arguing that 'these items constituted a part of the Agency's evidence and were to remain under Agency seal and legal custody until the Agency has been able to verify the correctness and completeness of Libya's declarations'.[13] On 19 January 2004, American and British officials met with ElBaradei to establish a bilateral arrangement that would serve as the basis for verification and disarmament activities in Libya. The parties agreed to the following division of labour: the IAEA would 'verify that Libya's programme is properly dismantled, while the Americans and Britons would physically destroy the capabilities'.[14]

Nine days after the renouncement of its WMD programmes, Libya agreed to sign an Additional Protocol to its existing safeguards agreement with the IAEA, allowing for more thorough inspections of its nuclear facilities.[15] By the end of December 2003, ElBaradei had travelled to Libya to begin the process of verification of its nuclear capabilities and their dismantlement and destruction. According to its declarations to the IAEA and the UK–US team, from 1978 until 2003 Libya pursued uranium conversion, enrichment and reprocessing programmes, and had obtained nuclear weapons designs.

Verification of Libya's programme[16]

The IAEA relied on interviews with government officials and scientists, visual inspections of facilities and equipment, analyses of technical documents and shipment records, environmental samples and discussions with nations that were involved in assisting Libya's programme, to verify its declarations of past activities. When Libya admitted that it was receiving nuclear technology from foreign sources, it also revealed the existence of a vast procurement network that spans a number of countries, including China, France, Germany, Japan, Malaysia, South Africa, Switzerland and the United Arab Emirates. Established by Dr A.Q. Khan, the 'father' of Pakistan's nuclear bomb, the network has helped various nations, specifically Iran, Libya and North Korea, and possibly Iraq, to develop nuclear weapons programmes.

The IAEA's verification work revolved around five issues: Libya's imports of yellowcake and other uranium compounds; uranium conversion experiments and

procurement plans for a uranium conversion facility (UCF); a gas centrifuge enrichment programme; uranium target irradiation and reprocessing; and weapons designs. An essential part of its verification work involved investigating and understanding the exact role played by the Khan nuclear network in Libya's weaponization activities.

Nuclear material imports

In its deliberations with the IAEA, Libya declared that, between 1978 and 1981, it imported 2,263 tons of uranium ore concentrate (UOC)—yellowcake—from two producers in an unnamed country, presumed to be Niger.[17] A total of 587 tons was imported before Libya's safeguards agreement entered into force in July 1980, and thus was not previously reported to the IAEA.

During its January 2004 inspection, the IAEA verified Libya's declared total of imported UOC by inspecting the documents provided by the supplier country. On 25 January 2004 IAEA inspectors travelled to the UOC storage facility at Sabha, where they carried out an inspection and took samples of UOC for analysis. They found the facility disorganized and lacking documentation on stored material; some UOC drums were inaccessible. The IAEA planned to return to Sabha to verify the condition of this material after Libyan technicians have had a chance to put the plant in order.[18]

In January 1985, in return for the possible procurement of a uranium conversion facility from a nuclear weapon state (widely presumed to be China), Libya exported approximately 100 kilograms of UOC to that country.[19] One month later, the nuclear weapon state shipped back some 39 kilograms of natural UF_6, six kilograms of uranyl uranate (U_3O_8), six kilograms of uranium dioxide (UO_2) and five kilograms of uranium tetrafluoride (UF_4). Before December 2003, Libya had reported neither this export of yellowcake nor successive receipts of converted nuclear material.[20] On learning of these transactions, the IAEA reviewed shipping documents, provided by Libya, and analyzed the imported nuclear material. It confirmed Libya's declaration, and placed the material under IAEA seal before it was transferred to the US. The IAEA has also verified the declared containers of U_3O_8, UO_2 and UF_4, which remain in Libya.

In its new declarations to the agency, Libya stated that in September 2000 it imported two small 5A-type cylinders, each containing approximately 25 kilograms of UF_6, and that in February 2001 it imported a large 30B-type cylinder, containing

approximately 1,600 kilograms of UF_6. These imports were previously undeclared to the IAEA. Libya reported that it received the cylinders from an unnamed country through a foreign clandestine network.[21] IAEA inspectors used the non-destructive assay measurement process to establish the content of the cylinders. The 30B-type cylinder contained low enriched uranium (LEU) (approximately one per cent uranium-235 (^{235}U)), while the 5A-type cylinders contained natural and depleted uranium (0.3 per cent ^{235}U). The content of the three cylinders was placed under IAEA seal and shipped out of Libya. Other states have since provided information on these activities, and the IAEA is continuing to investigate the matter, particularly with regard to the procurement network utilized by Libya.

According to Libya's statements, the same network sold it another 16 kilograms of uranium compounds for use as 'laboratory standards' in chemical laboratories in 2002. The compounds, mostly uranium acetate and uranium nitrate, were reportedly never used. Visual inspections and statements by Libyan officials have allowed the IAEA to learn that the compounds were acquired through foreign intermediaries. However no billing or shipping documents were available to identify the source. The IAEA took samples of compounds for laboratory analysis, the results of which were not available as of September 2004.

Lastly, Libya requested that Russia take back 16 kilograms of HEU originally supplied for the operation of the IRT-1.[22] In March 2004, the fuel, consisting of 13 kilograms of uranium-235 isotopes and three kilograms of natural uranium, was sealed by IAEA inspectors and moved to the Dimitrovgrad Nuclear Reactor Scientific Research Institute in Russia.[23]

Uranium conversion

Conversion experiments

Libya stated that it used about 35–38 kilograms of yellowcake from drums stored at Sabha for laboratory-scale and bench-scale uranium conversion experiments at the TNRC in the mid-to-late 1980s and on a limited scale after 1994. IAEA inspectors verified present holdings of feedstock and product resulting from these experiments and found them to be consistent with Libya's statements. Although only limited data were available on the extent of uranium conversion experiments at the TNRC, the IAEA appears to be satisfied with the information received.

Uranium conversion facility

In 1981, Libya negotiated with a West European company for the construction of a 100 ton per year yellowcake conversion plant at Sabha and a related set of laboratories at the TNRC.[24] Although these plans were cancelled, as part of its proposal the firm provided Libya with a number of detailed diagrams of buildings and illustrations of chemical processes. The company has subsequently made information available to the IAEA regarding these negotiations. Libya did not volunteer this information to IAEA inspectors during their initial visits in December 2003 and January 2004, but it has since confirmed that negotiations took place as described by the company, and provided related documents during IAEA visits in April and May 2004.

In 1983 Libya negotiated with a 'nuclear weapon state' for the construction of a conversion plant with the capacity to produce 120 tons of natural UF_6 per year, but the negotiations ended without agreement.[25] Libya has provided the IAEA with limited documentation on these negotiations, including a copy of a preliminary contract. However, no technical plans or information from the nuclear weapon state were available. The agency will continue to pursue other means of verifying Libya's declaration on this matter.

In 1984 Libya ordered and received a pilot scale, portable, modular, 'uranium conversion facility', from a 'Far Eastern Country'.[26] The plant has an estimated feed capacity of 30 tons of uranium and is capable of producing UF_4, UO_2 and uranium metal, but not UF_6—although the Libyans had requested this capability from the supplier. The plant modules began to arrive in Libya in 1986 and were stored at various locations until 1998, when most of them were taken to, and assembled at, Al Khalla. The facility was subsequently moved to Salah Eddin, which was first inspected by the IAEA in December 2003.

In its reports to the agency, Libya stated that, while some cold tests were conducted in early 2002, no uranium was actually processed at the UCF. The IAEA took environmental samples from the surfaces of the UCF equipment, and was able to confirm Libya's statements. In January 2004, as part of the agreement between Libya, the UK and the US, all of the facility modules were shipped to the US. The IAEA is continuing to investigate Libya's plans for UF_6 production, particularly with respect to academic research into uranium conversion conducted by Libya's scientists.

Gas centrifuge enrichment

Libyan officials told the IAEA that they began developing the country's uranium enrichment programme in the 1980s. At least two facilities were built to conduct centrifuge research and development: the original testing facility at Al Hashan; and the newer research facility at Al Khalla. Later the machine shop 'Project 1001' was constructed to assemble centrifuges.[27] During the 1980s, Libya's scientists worked with a 'European expert with relevant experience' to design a gas centrifuge.[28] The expert brought a centrifuge design with him to Libya, and worked with the Libyans to develop two types of centrifuges. Although they were not successful in building a working centrifuge system, Libya did gain experience in designing and operating centrifuge equipment and related technologies. According to IAEA reports, Libya was interested in both what the agency has termed 'L-1 and L-2 type' centrifuges (presumably the same as Pakistani P-1 and P-2 centrifuges).[29] The IAEA inspected centrifuge components remaining from that period. Subsequently it took environmental samples of those components and found the analysis results to be consistent with Libya's declarations that no UF_6 was used. It also discovered on inspection several unfinished, maraging steel cylinders in Libya's inventory of centrifuge components from the early 1980s. The cylinders have the same parameters as the advanced L-2 centrifuges of Pakistani design obtained by Libya in September 2000. The IAEA will continue to investigate the origin of these cylinders.

According to a Malaysian police report of 20 February 2004,[30] in the late 1990s, Libyan officials contacted Khan for assistance in procuring uranium enrichment technologies. In 1997, Khan and his deputy, Buhary Sayed Abu Tahir, met with Libyan representatives Mohamed Matuq and an individual known as Karim on several occasions.[31] According to a senior European diplomat with access to intelligence information, the Libyan programme had 'certain common elements' with Iran's enrichment programme, which are suspected to have come from Pakistan. Iran's centrifuges use an aluminium rotor with a diameter of around 100 millimetres. This is similar to centrifuges that Pakistan acquired clandestinely in the mid-1970s. According to Western officials, Iranian centrifuges have a production capacity of approximately two separative work units (SWUs) per year.

In 1997 Libya began importing L-1 centrifuges through 'foreign intermediaries'. The first delivery included 20 pre-assembled centrifuges and components for an

additional 200 centrifuges. In 2000 Libya began 'progressively' installing 9-machine, 19-machine and 64-machine L-1 centrifuge cascades. By 2002 the cascades were at different stages of completion, with the 9-machine cascade closest to being operational. According to the Libyans, no nuclear material was used during any of the tests conducted on these centrifuges. The IAEA confirmed Libya's declaration through information received from other sources, possibly from the governments of countries where foreign intermediaries operated. Libya has stated that no nuclear material was used in two successful high-speed tests conducted at the Al Hashan testing area between May and December 2002. However, analyses of environmental samples taken from the L-1 centrifuge test area at Al Hashan indicated the presence of LEU and HEU on the floor of the site, as well as on centrifuge and related equipment. The contamination might have occurred prior to the equipment being imported into Libya.[32] The IAEA will continue to investigate the source of the contamination. It will have to rely on analyses of environmental samples taken from the supplier state to match the contamination found at Al Hashan and on additional information received from countries where the components may have been manufactured.

In September 2000, according to its declaration, Libya imported two L-2-type test centrifuges and some small UF_6 cylinders from an unnamed supplier state through a network of foreign intermediaries.[33] This led to an initial order of 5,000 L-2 centrifuges, which was later expanded to 10,000. The IAEA's discussions with the supplier state have confirmed the details of this transfer. The 10,000 L-2 centrifuges began to arrive in December 2002, again through a foreign procurement network. By the time Libya decided to dismantle its WMD programmes in December 2003, a large quantity of L-2 centrifuge components and supporting equipment was already in its possession.[34] Similarly Libya imported equipment for a large precision machine shop that it planned to use for domestic centrifuge production. During its inspections in January 2004, the IAEA examined centrifuge components and supporting equipment, as well as the machine shop that was to be used for assembling centrifuges. It found all components boxed and unopened, confirming Libya's statements that no assembly or testing had taken place.

As with the L-1 centrifuges, the agency discovered HEU contamination on the first two complete L-2 centrifuges and on some of the L-2 components.[35] All

centrifuges and related components and equipment were removed from Libya and shipped to the US between January and March 2004. The IAEA is continuing to analyze centrifuge design drawings and documents, as well as centrifuge-related computer data, such as assembly and test instruction manuals that Libya reportedly received from the A.Q. Khan network. The IAEA is also investigating Libya's participation in various centrifuge-related training programmes provided by experts at locations in Africa, Asia, Europe, the Middle East and Southeast Asia.

Uranium irradiation and reprocessing

According to Libya's declarations, between 1984 and 1990, it manufactured several dozen small UO_2 and uranium metal targets, each containing one gram of uranium, and irradiated them in the IRT-1 reactor. Staff at the radiochemistry laboratory, located at the TNRC, then used both the ion exchange and solvent extraction methods to dissolve the targets and to extract radioisotopes, including 'small quantities' of plutonium, in several of the laboratory's hot cells.

The agency has taken environmental samples of the hot cells—the analysis results were not available as of September 2004. It should also investigate any possible foreign assistance in the irradiation and reprocessing training provided to Libya's scientists. Libya has agreed to include the radiochemical laboratory in the revised design of the IRT facility, which will ensure future monitoring of the plant.

Weaponization

The National Board for Scientific Research (NBSR) was the entity in charge of Libya's nuclear weapons programme. Libya declared that, in late 2001 or early 2002, it had obtained two copies of documents related to nuclear weapons design and fabrication, including a series of engineering drawings related to nuclear weapon components, and handwritten notes related to the fabrication of nuclear weapon components.[36] The latter suggest the involvement of other parties outside of Libya. The Libyans stated that they had not taken steps to assess the credibility of the documents because their personnel were not competent in this area. They said that they had planned to ask the supplier for assistance once they were at the stage of developing, designing and constructing their own nuclear weapon.

Before the IAEA's arrival in December 2003, the UK–US inspection team had access to copies of the documents. In January 2004, IAEA officials—nationals of nuclear weapon states—were present when American and British weapons experts examined the designs. Although few details of the IAEA's meeting of 19 January 2004 with the UK and the US are known, a decision may have been made to restrict access to nuclear weapons-related information to those IAEA inspectors who are nationals of nuclear weapon states, so as to avoid any 'proliferation' or allegation of 'proliferation' of weapons information to non-nuclear weapon countries. The IAEA then placed the documents under seal, at which point they were transferred to the US. Pursuant to the 19 January agreement between the IAEA and the UK and the US, agency representatives were also present when the seals were broken in Washington.

Dismantling Libya's nuclear infrastructure: a chronology

March 2003	Libya approaches UK and US, seeking to dismantle its WMD programmes in exchange for normalizing relations with the West
4 October 2003	*BBC China* is seized on its way to Tripoli. Five containers packed with centrifuges and related components are found on-board
19 December 2003	Libya announces elimination of its WMD programmes
27–29 December 2003	ElBaradei visits Libya
29 December 2003	Libyan authorities confirm they will sign Additional Protocol
27 January 2003	US airlifts shipment of components seized from Libyan facilities
20–29 January 2004	IAEA inspectors, including centrifuge specialists, visit Libya
16–19 February 2004	IAEA inspectors continue verification process in Libya
23–24 February 2004	ElBaradei and senior agency officials visit Libya to discuss safeguards implementation and nuclear proliferation matters
25 February 2004	Libya, Russia and IAEA sign tripartite contract to ship fresh HEU from Libya to Russia
8 March 2004	Russia airlifts from Libya 13 kilograms of research reactor fuel assemblies containing 80 per cent HEU, and sends three kilograms of uranium back to Russia for down blending
10 March 2004	Libya signs Additional Protocol
25 May 2004	Libya submits its initial declarations required under Additional Protocol, as well as nuclear accountancy reports for TNRC.

According to the IAEA, 18 locations were of potential utility for a nuclear weapons programme, specializing in the handling of high explosives, ammunition production, missile propellant fabrication and testing, missile warhead design and manufacturing, metal casting, welding and machining, and research and production of materials. Between 1994 and 1998, several institutes of concern were constructed, including the Advanced Center of Technology, and the Higher Technical Center for Training and Production. According to the Libyans these were not associated with the nuclear programme. However, one of them housed a large precision machine shop that could be used for domestic centrifuge production. The IAEA plans to conduct further analyses, perhaps involving forensic tests, to verify Libya's declaration and to investigate the possible involvement of other parties in its weaponization programmes. Although no specific facility was determined to be involved in the design, manufacture or testing of nuclear weapons, IAEA inspectors requested and were granted access to sites that they deemed capable of providing support for nuclear weapons research. The lack of information available for verification of this matter presents perhaps the biggest challenge to the agency in building a complete and accurate picture of Libya's nuclear weapon-related activities.

Next steps

Following Libya's December 2003 decision to abandon and dismantle its WMD-related programmes, the IAEA, in co-operation with the UK, the US and other countries, such as Russia, has conducted a tremendous amount of work to verify the completeness and correctness of its declarations and to ensure that nuclear-related programmes and equipment will not be used for illicit purposes in future. Much more work remains to be done, however. In its March and May reports to the IAEA Board of Governors, the agency outlined specific issues that require further investigation. For instance, there are plans to visit Libya's facilities again, including the one at Sabha, to verify its holdings of UOC.

Meanwhile, the IAEA will continue with its efforts to confirm the origin of the UF_6 received in 2000 and 2001, and will consider Libya's overall intentions to produce and acquire nuclear material. It also plans to continue to investigate the source of the LEU and HEU contamination of gas centrifuge parts found in Libya,

as well as to assess the country's gas centrifuge enrichment activities. Finally, the IAEA plans to discuss Libyan interactions with third parties and to conduct forensic analyses of nuclear weapon-related documents to understand fully the history of Libyan nuclear weapon-related activities.

Several other issues related to verification and the dismantlement of Libya's nuclear programme, while not on the list of specific tasks set out by the IAEA, are nonetheless important. The first involves ensuring that all orders previously placed by Libya for material and equipment for its nuclear programme have either been received or cancelled, and are not on their way to the country from foreign locations. A case in point is the container on the *BBC China* that arrived in the Libyan capital of Tripoli in January 2004, carrying components for L-2 centrifuges. The *BBC China* arrived three months after the American-led teams intercepted and seized five containers full of centrifuge parts at Taranto in October 2003.[37] The arrival of the container raises questions regarding the effectiveness of US counter-proliferation initiatives, and suggests that the PSI cannot be counted on as the sole tool for tracking down illicit shipments of WMD-related materials.

Second, the IAEA will need to continue to investigate past training programmes for Libya's scientists and monitor future research activities, particularly in the area of uranium enrichment, conversion and reprocessing. Libya's new agreements with the international community will facilitate admissions to Western universities to study disciplines previously restricted to them. Also promised to Libya in return for dismantling its WMD programmes is greater economic aid. With the lifting of decade-long sanctions on nuclear exports in September 2003, and with Libya opening up to the international community, foreign technical assistance, including IAEA technical co-operation, will be much more readily available to the country in future than it has been at any point in its post-monarchical history. Although sanctioned by the NPT to aid countries in the employment of nuclear technologies for civilian purposes, some of these activities may also be used to further nuclear weapons programmes. The IAEA and the international community must continue to be diligent in their investigation and monitoring of past and future developments in Libya, and proceed with cautious optimism.

In its May 2004 report, the IAEA asserted that, 'the existence of [a] procurement "network" was of decisive importance in Libya's clandestine nuclear weapon

programme'. Libya's indigenous scientific and technical capability is arguably the least developed in the Middle East. Libya was able to take advantage of the 'indifference displayed by a lot of Western suppliers',[38] as well as the willingness of a few, motivated and well connected individuals to circumvent weak export regulations, to make significant progress towards developing a nuclear capability. Understanding the full extent of the foreign network will not only help the IAEA complete its inquiry into Libya's past nuclear activities, but it will also help to ensure that nuclear equipment and technology will not flow from supplier states to would-be proliferators in future.

Conclusion

As attempts are being made to convince Iran and North Korea to curtail their nuclear ambitions, some experts and government officials are pointing to the Libyan case as a workable model to persuade countries to roll back their weapons programmes. However, those in the know are expressing their disdain for this concept. They believe that Libya is not an appropriate paradigm, and that the West should not be fooled into believing that other nations are going to go the way of Libya and give up their WMD assets so easily. Although the dialogue with Libya came directly at the start of the war with Iraq, it would be short-sighted to argue that Libya's disarmament was a consequence of that conflict, and that such results might be emulated elsewhere and should be expected. In the final analysis, the reasons most commonly cited for Libya's actions are the dire state of its economy, caused in part by the economic sanctions imposed after Libya was implicated in the 1998 bombing of a Pan Am airliner over Lockerbie, Scotland, and Gaddafi's desire to bring his country out of international isolation.[39] Libya's admission came voluntarily and with a high degree of co-operation, which is in stark contrast to the current behaviour of Iran and North Korea.

In the aftermath of these events, the IAEA's ability to detect and stop countries that might be developing nuclear weapons has again been called into question. Observers highlight uncomfortable similarities between the agency's failure to detect the nuclear programmes of Iraq and North Korea, and the present case of Libya. As some analysts note, though, with budgets approximately 10 times

larger than the IAEA's, the American and Israeli intelligence agencies also failed to produce credible evidence of Libya's nuclear weapons programme prior to it coming forward.[40] While its detection capabilities have drastically improved since the early 1990s, particularly through the strengthened safeguards system, including the Additional Protocol system, the IAEA remains limited in terms of its finances and legal authority. The way in which Libya was persuaded to disarm may yet prove to be a useful model for further examination. Perhaps individual states, especially nuclear weapon states, should engage in greater co-operation with the IAEA in carrying out more intrusive forms of detection, interdiction and verification. The IAEA could take advantage of individual states' superior detection capabilities and bilateral negotiating strategies, and couple them with its own experience and impartiality to monitor, verify, detect and possibly prevent potential violations of countries' nonproliferation obligations.

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2 H. El Hares, H. Kreshman and M. El Eswed, 'Nuclear technology education and training in Libya', Proceedings of International Conference on World Nuclear Energy—A Status Report, 10–14 April 1977.

3 'Implementation of the NPT Safeguards Agreement of the Socialist People's Libyan Arab Jamahiriya', International Atomic Energy Agency Board of Governors, Report by the Director General, GOV/2004/33, 28 May 2004, www.fas.org/nuke/guide/libya/iaea0504.pdf.

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5 Ann MacLachlan, 'Libyans are seeking broad international cooperation in nuclear area', *Nucleonics Week,* vol. 25, no. 39, 27 September 1984 (via Lexis-Nexis).

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7 'The IAEA Director-General to visit Libya', IAEA Press Release 2003/14, 22 December 2003, www.iaea.org/NewsCenter/PressReleases/2003/prn200314.html.

8 David E. Sanger and Judith Miller, 'Libya to give up arms programs, Bush announces', *New York Times,* 20 December 2003 (via Lexis-Nexis).

9 Rosemary Bennett and Tim Reid, 'Libya to scrap nuclear and chemical arms', *The Times,* 20 December 2003 (via Lexis-Nexis).

10 'US and UK agree to let IAEA lead disarmament in Libya', *Daily Times* (Pakistan), 1 January 2004, www.dailytimes.com.pk/default.asp?page=story_20-1-2004_pg4_1.

11 Paula A. DeSutter, 'US government's assistance to Libya in the elimination of its weapons of mass destruction (WMD)', testimony before the Senate Foreign Relations Committee, 26 February 2004, US Department of State, www.state.gov.

12 'Qadhafi plans international campaign against nuclear weapons', Global Security Newswire, 8 January 2004, www.nti.org/d_newswire/issues/2004_1_8.html.

13 'Implementation of the NPT Safeguards Agreement of the Socialist People's Libyan Arab Jamahiriya', International Atomic Energy Agency Board of Governors, Report by the Director General, GOV/2004/12, 20 February 2004, www.iaea.org/Publications/Documents/Board/2004/gov2004-12.pdf.

14 DeSutter; 'Experts begin disarming Libya', 20 January 2004, http://edition.cnn.com/2004/WORLD/africa/01/20/libya.nuclear.reut.

15 The Additional Protocol is a voluntary arrangement between a state and the IAEA, 'designed to strengthen and expand existing IAEA safeguards for verifying that non-nuclear-weapon states-parties to the nuclear Nonproliferation Treaty only use nuclear materials and facilities for peaceful purposes'. See 'The 1997 IAEA Additional Protocol at a glance', Arms Control Association, January 2004, www.armscontrol.org/factsheets/IAEAProtocol.asp and Kenneth Boutin, '93+10: strengthened nuclear safeguards a decade on', VERTIC Brief, no. 2, April 2004. Libya only signed an Additional Protocol after revealing its nuclear weapons programme.

16 The majority of Libya's declarations about its past nuclear activities has been extensively covered in two IAEA reports outlining agency inspection and verification activities in Libya: 'Implementation of the NPT Safeguards Agreement of the Socialist People's Libyan Arab Jamahiriya', GOV/2004/12; and 'Implementation of the NPT Safeguards Agreement of the Socialist People's Libyan Arab Jamahiriya', GOV/2004/33. The information in this section is drawn from these two reports, unless otherwise stated.

17 'Libya: the search for nuclear technologies', *Library of Congress Country Studies,* 1987, http://lcweb2.loc.gov/frd/cs/lytoc.html.

18 It is unclear whether the UOC inventory comes under the aegis of Libya's agreement with the UK and the US, and hence will be moved from Libya to the US.

19 The IAEA reports do not identify the nuclear weapon state involved. Given China's past involvement in the possible sale of conversion technology to Iran, though, it is probable that it is the country in question.

20 Since the importing country was a nuclear weapon state, Libya was not required to report the export of UOC to the IAEA under the export-reporting requirement of Article 34(a) of its safeguards agreement.

21 The IAEA believes that the same clandestine network was utilized by Libya to procure centrifuges and related equipment. The centrifuge design and subsequent statements made by Libya have led observers to believe that the supplier country is Pakistan, and that the intermediary is the A.Q. Khan nuclear smuggling network. See DeSutter.

22 The Tajura Research Reactor will soon be modified to operate on LEU.

23 'Removal of high-enriched uranium in Libyan Arab Jamahiriya', International Atomic Energy Agency Staff Report, 8 March 2004, www.iaea.org/NewsCenter/News/2004/libya_uranium0803.html.

24 Although the identity of the company was not disclosed in the IAEA reports, it has been speculated elsewhere that it is the Belgian firm, Belgonucleaire. See 'Libya: nuclear overview', *Nuclear Threat Initiative,* May 2004, www.nti.org/e_research/profiles/Libya/3939_3940.html.

25 The IAEA report did not disclose the identity of the nuclear weapon state involved, but some analysts have theorized that it could be either China or the former Soviet Union. See Joe Fiorill, 'Nuclear weapon state processed uranium for Libya, IAEA says', Global Security Newswire, 23 February 2004, www.nti.org/d_newswire/issues/2004_2_23.html. At the time the former Soviet Union had been helping Libya to complete the 10 MW Tajura Research Reactor. China, meanwhile, was assisting Iran with similar uranium conversion technology.

26 Coming on the heels of unsuccessful negotiations with a 'nuclear weapon state' for a UF_6 conversion plant, it is possible that the 'nuclear weapon state' and the 'Far Eastern Country' are one and the same, China, and that the 1984 sale was the conclusion of the negotiations that began in 1983.

27 'Implementation of the NPT Safeguards Agreement of the Socialist People's Libyan Arab Jamahiriya: Annex 2', International Atomic Energy Agency Board of Governors, Report by the Director General, GOV/2004/33, 28 May 2004, www.fas.org/nuke/guide/libya/iaea0504.pdf.

28 Although unnamed in the IAEA report, open sources reported that the European expert was apparently a former employee of a German company. See Peter Slevin, 'Libya made plutonium, nuclear watchdog says', *Washington Post,* 21 February 2004 (via Lexis-Nexis). The expert could possibly be one of the European experts connected to the A.Q. Khan network, like, for example, the late German engineer Heinz Mebus, who in 1984–85 was allegedly involved in negotiations to supply Iran with centrifuge designs, or Gotthard Lerch, who is suspected of having tried to procure supplies of pipes for Project 1001. See 'Press release by Inspector General of Police in relation to investigation on the alleged production of components for Libya's uranium enrichment programme', *Polis Diraja Malaysia* (Police Report Malaysia), 20 February 2004, www.rmp.gov.my/rmp03/040220scomi_eng.htm.

29 L-1 (or P-1 or G-1) refers to an old design of European origin; L-2 is a more advanced design.

30 'Press release by Inspector General of Police in relation to investigation on the alleged production of components for Libya's uranium enrichment programme'.

31 'Press release by Inspector General of Police in relation to investigation on the alleged production of components for Libya's uranium enrichment programme'.

32 This is similar to contamination found on centrifuge components in Iran in summer 2003. Iran, which imported the parts through foreign intermediaries, stated that the contamination occurred prior to importation. In August 2004 experts involved in the IAEA investigation into the contamination confirmed that the traces of uranium were from centrifuge equipment obtained from middlemen, some of whom had connections with the A.Q. Khan nuclear smuggling network. According to the same experts, inspectors discovered two levels of contamination on Iran's equipment: particles with 54

per cent enrichment, which they believe came from Pakistan's nuclear weapons programme; and particles with 36 per cent enrichment, which most likely came from Russian equipment imported by Pakistan. Investigations into the origin of Libya's contamination will probably confirm that Pakistan was also the source of its centrifuge equipment. Dafna Linzer, 'Findings could hurt US effort on Iran', *Washington Post,* 11 August 2004 (via Lexis-Nexis).

33 Given Libya's other statements, the supplier country is thought to be Pakistan, while the foreign intermediary is believed to be the A.Q. Khan nuclear smuggling network. See DeSutter.

34 One container of P-2 centrifuge components reportedly arrived in Libya in January 2004. Libya informed the IAEA of its arrival, and it was subsequently removed from the country. See William J. Broad and David E. Sanger, 'After ending arms program, Libya receives a surprise', *New York Times,* 29 May 2004 (via Lexis-Nexis). This raises serious questions about the ability of the PSI to halt the proliferation of nuclear material.

35 It is unclear whether this contamination has been explained by the supplier state or if the matter remains unresolved and thus is an issue for further investigation by the IAEA.

36 Some notes were reportedly in English and Chinese. Analysts believe that the documents are Chinese nuclear weapons designs, which China later shared with Pakistan. Joby Warrick and Peter Slevin, 'Libyan arms designs traced back to China', *Washington Post,* 15 February 2004 (via Lexis-Nexis).

37 Broad and Sanger.

38 Dany Shoham, 'Libya: the first real case of deproliferation in the Middle East?' *Disarmament Diplomacy,* no. 77, May/June 2004, www.acronym.org.uk/dd/dd77/77libya2.htm.

39 Ronald Bruce St. John, '"Libya is not Iraq": preemptive strikes, WMD and diplomacy', *Middle East Journal,* vol. 58, no. 3, pp. 386–402.

40 'Coming clean', interview by Gwen Ifill with Joseph Cirincione and Paul Leventhal, Online News-Hour, 30 December 2003, www.pbs.org/newshour/bb/africa/july-dec03/libya_12-30.html.

6

Iran and nuclear safeguards: establishing the facts and seeking compliance

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International concern regarding Iran's nuclear ambitions has increased markedly over the past two years due to significant revelations about previously undeclared activities, including extensive work on uranium enrichment and plutonium separation—the two routes to producing nuclear weapons-grade material.[1] The revelations have demonstrated that, for a number of years, Iran has systematically contravened both the letter and the spirit of its safeguards agreement with the International Atomic Energy Agency (IAEA). As a direct consequence, Iran's future status as a non-nuclear weapon state under the 1968 Nuclear Non-Proliferation Treaty (NPT) has been cast into doubt. Tehran's strategy of obfuscation and the contradictory claims that it has made in response to investigations carried out by the IAEA in 2003–04 have exacerbated concerns about its nuclear intentions. Indeed, a resolution adopted by the IAEA Board of Governors on 18 June 2004 deplored the fact that 'Iran's cooperation has not been as full, timely and proactive as it should have been'.[2]

This chapter examines the disturbing revelations that have emerged about Iran's previously concealed nuclear activities since mid-2002. It considers the outcomes of the IAEA investigations that have occurred over the past couple of years, the various disclosures made by the Iranian government in light of these investigations and the issues that have yet to be resolved. Attention is also paid to the actions taken by the IAEA Board of Governors during this period to secure Iran's compliance with its safeguards obligations. In the process, the chapter assesses the diverging approaches of the United States and the European Union (EU)-3 (France, Germany and the United Kingdom) and the various responses of Tehran. To begin with, though, it is necessary to review Iran's official position on nuclear energy and nonproliferation.

Iran, nuclear energy and nonproliferation

Iran's official aim in the nuclear field is to produce 7,000 megawatts (MW) of nuclear energy by 2020 in order to meet future energy demands. This will require at least seven nuclear power plants, including the 1,000 MW Bushehr plant, which is being built with Russian assistance and is close to completion.[3] According to Iranian officials, their programme requires the presence of all elements of the nuclear fuel cycle. In this respect, the IAEA has noted that Iran possesses 'a practically complete front end', including uranium mining and milling, conversion, enrichment, fuel fabrication, heavy water production and associated research and development facilities, as well as a light water reactor and a heavy water research reactor.[4]

Despite having the second largest proven natural gas reserves in the world and around seven per cent of the planet's oil reserves,[5] Iran has provided several official reasons for not relying on its fossil fuels to meet future energy demands. First, it argues that it will eventually become a net importer of crude oil and some of its by-products if it continues to consume energy in the present form and at the same rate. Second, there is concern that local use of fossil fuels will 'drastically affect Iran's foreign exchange earnings' derived from the export of crude oil and natural gas. Third, the assertion is advanced that greater added value is generated by utilizing fossil fuels in Iran's petrochemical and other processing industries. The fourth reason is that increased reliance on fossil fuels will have a negative impact on the environment.[6]

The existence of significant Iranian deposits of fossil fuels has reinforced long-held suspicions, particularly on the part of the US, that Iran's nuclear ambitions are not benign and encompass the development of nuclear weapons. Indeed, the administration of US President George W. Bush has accused Iran of using its civil nuclear activities as a cover for a nuclear weapons programme. In response to unfolding revelations about Iran's nuclear programme in late 2003, US Under Secretary of State for Arms Control John Bolton said that it was 'simply impossible to believe' that Iran was not developing nuclear weapons.[7] In June 2004 Bolton testified to the US House of Representatives that: 'The costly infrastructure to perform all of these activities goes well beyond any conceivable peaceful nuclear programme. No comparable oil-rich nation has ever engaged, or would be engaged, in this set of activities—or would pursue them for nearly two decades behind a continuing

cloud of secrecy and lies to IAEA inspectors and the international community—unless it was dead set on building nuclear weapons'.[8] Such suspicions have been dismissed by Iranian officials from across the political spectrum, including hard line conservatives and moderate reformists. The Secretary of Iran's Supreme National Security Council, Hassan Rowhani, has claimed that nuclear weapons and other WMD 'are not important' to the country's 'defence doctrine'.[9] Indeed, the official Iranian position is that the possession of WMD would make the country more vulnerable. Moreover, it is contended that Iran is committed to the goal of a WMD-free region and the government emphasizes that it is a party to the NPT, the 1993 Chemical Weapons Convention and the 1972 Biological Weapons Convention, and is a signatory of the 1996 Comprehensive Nuclear Test Ban Treaty.[10]

An important aspect of Iran's commitment to employ nuclear technology purely for peaceful purposes is its full-scope safeguards agreement with the IAEA, which entered into force in 1974. The accord commits Iran to accepting safeguards on: 'all source or special fissionable material in all peaceful nuclear activities within its territory, under its jurisdiction or carried out under its control anywhere'.[11] The IAEA is responsible for ensuring that states fulfil the terms of their safeguards agreements, which cover nuclear materials and activities. Safeguards are designed to serve as 'a confidence-building measure, an early warning mechanism, and the trigger that sets in motion other responses by the international community if and when the need arises'.[12]

Establishing the elusive facts

IAEA investigations conducted in 2003–04 have revealed that Iran has actively sought to conceal significant and sensitive nuclear activities over the past two decades, including uranium enrichment and plutonium separation. In addition, when asked by the agency to provide a complete assessment of its nuclear programme, Iran has made contradictory claims and has provided information incrementally only when confronted with evidence related to specific materials, activities and facilities. Not surprisingly, Iran's concealment efforts have added to international concern that more activities could well remain hidden from the IAEA. They have also fuelled suspicions in Europe, the US and beyond that Iran is pursuing a clandestine nuclear weapons programme.

Below is a summary of the key findings of the IAEA investigations carried out in 2003–04, as well as associated Iranian revelations. The objective is to offer a snapshot of Iran's concealment efforts, including its contradictory responses to questions posed by the IAEA designed to clarify the true nature and extent of its nuclear programme.

Enrichment

In mid-2002 an Iranian opposition group, the National Council of Resistance of Iran (NCRI), revealed the presence of a large gas centrifuge enrichment facility at Natanz, including both pilot and commercial-scale plants. Subsequent IAEA investigations resulted in Iran admitting for the first time that it had been pursuing a uranium enrichment programme for 18 years,[13] encompassing extensive work on the gas centrifuge process and laser isotope separation.

Although Iran only 'officially' introduced uranium hexafluoride (UF_6) at the pilot plant in Natanz for testing purposes in June 2003, environmental tests performed by the IAEA prior to this identified particles of high enriched uranium (HEU). The Iranian authorities claimed that this was the result of importing contaminated centrifuge components. This explanation, though, contradicted an earlier assertion that the centrifuges had been produced indigenously. Moreover, Iran maintains that it has not enriched uranium to over 1.2 per cent uranium-235 (U_{235}) using centrifuges.[14] It has been estimated that the pilot plant will eventually be capable of producing annually up to ten kilograms of weapons-grade (90 per cent enriched) uranium, while the commercial-scale centrifuge plant, which has a scheduled start-up date of early 2005, could eventually produce 500 kilograms of weapons-grade uranium annually.[15]

In response to media reports, Iran also confirmed that the Kalaye Electric Company in Tehran had been used to manufacture centrifuge components and machines. Environmental samples collected by the IAEA in August 2003 again revealed the presence of HEU particles, as well as low enriched uranium (LEU), despite Iran's initial claim that nuclear material was not present at Kalaye.[16] The authorities subsequently admitted, however, in October, that 'a limited number of tests, using small quantities' of UF_6 were conducted there in 1999 and 2002. According to Iran, the tests used 1.9 kilograms of UF_6 that had been acquired from

overseas, contradicting its initial explanation that the material had been lost as a consequence of 'leaking valves on cylinders containing the gas'.[17]

The IAEA reported in February 2004 that tests carried out on centrifuge components manufactured in Iran had revealed contamination with a different type of enriched uranium to that picked up on the imported centrifuge components. The samples taken at the Kalaye Electric Company and at Farayand Technique indicated the presence of 36 per cent enriched uranium—material that had not been declared to the IAEA and which was unlikely to have come from imported components.[18]

A focus of the IAEA investigations has been to establish the sources of all traces of enriched uranium found at sites in Iran. The government has consistently asserted that all such traces are a direct result of acquiring equipment from abroad via the nuclear black market.

In addition to Iran's work on the P-1 design centrifuge procured from Pakistan and which is being installed at Natanz, the authorities admitted in January 2004 to carrying out research into and developing a more advanced type of centrifuge based on a design known as the P-2, utilizing maraging steel and composite rotors.[19] Information on the P-2 programme should have been inserted in Iran's October 2003 declaration to the IAEA on the full scope of its nuclear activities, including centrifuge research and development. Iran claimed that it failed to incorporate the information on the P-2 due to time constraints. Along with the contamination of centrifuge components, the nature and extent of its work on the P-2 have become key elements of the IAEA's investigations.

At first the Iranian government contended that all P-2 components in the country had been produced domestically, based on drawings obtained from overseas suppliers, namely Pakistan. In 1999 or 2000 the Atomic Energy Organization of Iran reportedly concluded contracts with a private company in Tehran to develop P-2 centrifuges. All centrifuge equipment associated with the P-2 programme was allegedly moved to the Pars Trash Company in 2003.[20] Iran has since admitted to acquiring magnets for P-2 centrifuges from suppliers in Asia. The Deputy Director General of the IAEA, Pierre Goldschmidt, said in June 2004 that the agency has 'indications' that Iran 'had shown interest in acquiring up to 100,000' additional magnets from abroad. This calls into question Iran's claims that the P-2 programme

was for research and development purposes. Iran has also declared that a key component of the P-2 was produced at a facility associated with the Iranian Ministry of Defence, contradicting an earlier assertion that it had been manufactured in a private workshop.[21] The involvement of a military facility obviously adds to fears about the country's nuclear intentions. There are also concerns about the claimed pace of Iran's work on the P-2 centrifuges. According to the Iranian government, the designs were acquired from abroad in 1995, but work did not start in Iran until 2001. The IAEA is said to believe that the P-2 programme is too advanced for this to be accurate.[22]

Beyond the centrifuge programme, Iran has admitted to having been engaged in previously undeclared work on laser enrichment since the early 1990s. A pilot plant was set up in 2000 at Lashkar Ab'ad, where technicians have performed enrichment experiments using imported uranium metal.[23] Two approaches have been pursued in this field: atomic vapour laser isotope separation (AVLIS); and molecular laser isotope separation (MLIS). The Iranians have been slow to provide information on the plant's laser enrichment capabilities, and the IAEA reported in June 2004 that the details have been understated. As a result of IAEA investigations, furthermore, it has been revealed that Iran managed to produce samples of uranium enriched up to 15 per cent in laser enrichment tests.[24]

Another component of Iran's nuclear infrastructure directly related to its enrichment programme is the uranium conversion facility (UCF) at Isfahan. This plant is capable of converting uranium yellowcake into uranium hexafluoride —presumably to be sent to Natanz for enrichment—as well as uranium dioxide and uranium metal. Moreover, the previously undeclared Jabr Ibn Hayan Laboratory is known to have converted uranium tetrafluoride into uranium metal.[25] The Isfahan facility apparently became operational in February 2004 and the IAEA reported in September that Iran plans to introduce 37 tonnes of yellowcake as feedstock at the UCF for conversion into UF_6.[26]

Plutonium and polonium

IAEA investigations in 2003 revealed that Iran had concealed the fact that it had developed the capability to separate plutonium from irradiated uranium targets. From 1988–92, plutonium separation experiments were conducted in a hot cell

at the Tehran Nuclear Research Centre, using uranium targets that had been produced at the Isfahan Nuclear Technology Centre and irradiated in the Tehran Research Reactor.[27] The IAEA reported in June 2004 that Iran had understated the amount of plutonium that it had clandestinely separated, although the amounts involved were only in the milligram range. In addition, the agency suggested that separation experiments took place more recently than previously declared.[28] Indeed, it is not known if the Iranians irradiated and processed further undeclared uranium targets.[29]

In February 2003 Iran revealed that it was building a previously unknown facility at Arak to produce heavy water.[30] It is said to have claimed initially that the heavy water would be for export only.[31] Iran has since declared its intention to build a new research reactor—the IR-40—that will be fuelled by natural uranium and use heavy water as a coolant and moderator.[32] The official application of the IR-40 will be research and development of radioisotopes for civil use. However, the reactor will also be capable of producing weapons-grade plutonium. One projection is that it could produce between eight and ten kilograms of plutonium annually, sufficient for one or two nuclear bombs.[33]

IAEA investigations also revealed that from 1989–93 Iran conducted experiments to irradiate bismuth to produce polonium. The latter has few civilian applications, yet it can be mixed with beryllium to form a neutron initiator for some types of nuclear weapons. Although Iran contends that it produced polonium to examine its possible utilization in nuclear batteries, the IAEA has stated that this explanation is 'not entirely adequate'.[34]

Iranian procurement

IAEA investigations into Iran's nuclear activities have revealed a complex procurement network that spans numerous countries and regions. In particular, the investigations have highlighted the significant role played by the clandestine proliferation network established by A.Q. Khan, the 'father' of Pakistan's nuclear programme. Information provided to Pakistan by the IAEA in 2003 resulted in Khan admitting to selling nuclear technology to Iran, as well as to Libya and North Korea.[35] Iran's acquisition of technology and assistance from Pakistan has been particularly important to the progress made in its enrichment programme, including the P-1 and P-2

centrifuges. Although Pakistani President Pervez Musharraf claims that the transfers to Iran were not officially authorized,[36] there are suspicions that senior military commanders, including Musharraf, and members of the intelligence services knew about the dealings.[37] Companies in Austria, Germany, Switzerland and other states in Europe and Asia have also been investigated by the IAEA as potential sources of technology and assistance for the Iranian nuclear programme.[38] There are concerns that Iran may also have acquired nuclear weapon designs from the Khan network. The basis for such fears is that Libya acquired documentation on nuclear weapons design and fabrication from the network in late 2001 or early 2002, including engineering drawings related to nuclear weapon components.[39]

Seeking Iranian compliance, 2003–04

IAEA Director General Mohammed ElBaradei submitted six reports to the agency's Board of Governors between June 2003 and September 2004 based on investigations related to Iran. Each report highlighted concerns about the country's previously undeclared activities and its repeated failure to provide a complete and accurate assessment of the nature and scale of its nuclear programme. To date, ElBaradei has stopped short of concluding that Iran is developing nuclear weapons. Rather, Iran has been reported as failing to meet its safeguards obligations with respect to the reporting of nuclear material, the processing and use of such material and the locations where it has been stored and processed. The reports have prompted a series of resolutions from the Board of Governors, expressing serious concern about Iran's behaviour and demanding full co-operation to resolve outstanding issues. However, the board has yet to find Iran in non-compliance with the NPT, despite the piecemeal nature of its responses to the IAEA and the increasingly confrontational stance that it has taken in 2004. As of September 2004, significant issues are yet to be resolved, including the true extent of the P-2 programme, the origin of the contamination found on centrifuge parts and Iran's failure to suspend all enrichment-related activities in line with requests made by the IAEA.

The US position

The Bush administration consistently lobbied its fellow IAEA board members throughout 2003–04 to find Iran in non-compliance with its NPT obligations

and to refer the matter to the United Nations (UN) Security Council, which has the power to introduce sanctions. The Bush administration's position reflects the traditional US approach to Iran, focussing on isolation and punishment to coerce it into changing its nuclear policy. As early as September 2003, US Ambassador to the IAEA Kenneth Brill stated that: 'the facts already established would fully justify an immediate finding on [sic] non-compliance by Iran with its safeguards violations'.[40] The Bush administration is concerned that Iran is trying to get close to the nuclear threshold, using the NPT as a cover, and with the aim of withdrawing from the treaty after giving six months' notice and declaring itself a nuclear weapon power.[41] The unsuccessful efforts of the White House to escalate the issue have included attempts to insert a 'trigger mechanism' into the IAEA Board of Governors' resolutions. If Iran does not meet the board's requests to provide a complete assessment of its activities, or if it engages in further serious breaches of its safeguards agreement, such a mechanism would prompt immediate referral to the Council. Despite its efforts to refer Iran to the Security Council, the Bush administration has not yet put forward a clear and coherent strategy for managing developments following such an escalation.

European 'engagement'

In contrast to the policy of the US, several European governments—notably those of France, Germany and the UK—have sought to engage Iran in dialogue in an attempt to influence its decisions on nuclear matters. The EU-3 have sought to delay finding Iran in non-compliance with the NPT in order to avoid an escalation of the issue and to leave further room for talks and negotiations. The European view is that, if the issue escalates too rapidly, Iranian decision-makers, notably hard line conservatives, might be encouraged to take the country further down the path towards nuclear weapons acquisition. The European preference is to keep Iran engaged by offering incentives for improved behaviour. For the most part this position has received the support of the Non-Aligned Movement, Japan, Russia and the IAEA itself. For example, Japan made investment in the Iranian oil sector conditional on Tehran signing an Additional Protocol to its safeguards agreement,[42] while Russia asked Iran to be more transparent and to sign the protocol. In October 2003, Moscow even announced a 12-month delay to the start-up of the

Bushehr nuclear power plant[43] and has insisted that spent fuel will have to be repatriated to Russia for the project to proceed.

A significant element of the European approach has been to tie development of EU–Iran trade relations to improved behaviour in the nuclear field. Iran is eager to enhance its economic position and concluding an EU Trade and Cooperation Agreement is viewed as pivotal to this; two-way trade totalled US$15.4 billion in 2001.[44] In June 2002, EU foreign ministers agreed to negotiate a Trade and Cooperation Agreement with Iran,[45] but it was made clear throughout 2003–04 that the nuclear issue and trade talks are 'interdependent'.[46]

Iran's deal with the EU-3

The European approach appeared to produce dividends in October 2003 when the foreign ministers of France, Germany and the UK visited Tehran at Iran's invitation. The trip took place just ten days prior to an IAEA deadline for Iran to co-operate fully with the agency, to sign an Additional Protocol and to suspend all enrichment and reprocessing activities. The main outcomes of the meeting were that Iran agreed to sign the protocol, to act in accordance with its terms prior to signature and to suspend all enrichment and reprocessing activities. Significantly, the agreement also recognized Iran's right to use nuclear energy for peaceful purposes. It was stated, furthermore, that Iran could expect to enjoy easier access to modern technology and supplies in a range of areas once the nuclear problems were fully resolved.[47]

Despite the opposition of numerous hard line conservatives to any concessions in the nuclear field, the agreement appeared to have the backing of the main power centres in the country, since Rowhani—appointed by Supreme Leader Ayatollah Ali Khamenei—was the chief negotiator.[48] The regime appeared to have made the decision to co-operate in order to avoid diplomatic and economic isolation, in particular from the EU. Ominously, however, Rowhani stated on 22 October that the suspension of enrichment 'could last for one day or one year' depending on whether Iran continues to believe that the deferment is beneficial.[49] Indeed, the question of what constitutes 'suspension' has since complicated the international community's dealings with Iran on nuclear matters.

Although there are significant differences between the American and European approaches towards Iran, the EU-3 have consistently underlined that their nego-

tiations with the country have only occurred after consultations with other members of the international community, especially the US. Indeed, the Bush administration publicly welcomed the EU-3 initiative in October 2003, although it stressed that everything depended on Tehran meeting its commitments. It has been recognized on both sides of the Atlantic that a unified approach is key to addressing the nuclear challenge posed by Iran. After the EU-3 visit to the Iranian capital, US Deputy Secretary of State Richard Armitage said that the administration believes a united front is 'especially critical in dealing with Iran's clandestine nuclear weapons program'.[50]

The Additional Protocol

The initial breakthrough by the EU-3 was quickly followed by further promising developments. In a move clearly driven by its desire to address growing international concerns, Iran signed its Additional Protocol in December 2003. The protocol must be ratified by the Iranian parliament (the Majlis) and the Council of Guardians before it can enter into force—the latter is regarded as the most influential political entity in Iran and is controlled by conservatives. However, the Iranian government has already agreed with the EU-3 to act in accordance with the provisions of the protocol prior to its ratification. Under the protocol, Iran must provide an 'expanded declaration of its nuclear activities' and give the IAEA 'greater authority in verifying the country's nuclear programme', including broader rights of access to information and sites, as well as the power to employ the most advanced technologies in the verification process. The Additional Protocol is an important element of the strengthened safeguards system implemented as a result of past failures to detect clandestine nuclear activity in Iraq and North Korea. It is a legal document signed by a state and the IAEA, appended to an existing safeguards agreement, granting the agency 'complementary inspection authority to that provided in underlying safeguards agreements'. A principal aim is to enable the IAEA to obtain assurances about declared and possible undeclared activities.[51]

Iran also promised the IAEA in December 2003 that it would suspend the operation and/or testing of centrifuges at the pilot plant at Natanz—with or without nuclear material. It also agreed to suspend the further introduction of nuclear material into any centrifuges and the installation of new centrifuges at the pilot

and commercial plants at Natanz. In addition, Iran agreed to 'withdraw nuclear material from any centrifuge enrichment facility if [sic] and to the extent practicable'.[52]

Outstanding issues and problems of interpretation

Despite Iran's concessions it soon became evident that it had decided to adopt a narrow interpretation of 'suspension', in contrast with the EU-3 and the IAEA, which embraced a much broader definition. Reports emerged in early 2004 that Iran was continuing to assemble centrifuges and to manufacture related components, thereby raising concerns that it was not living up to its side of the bargain. The official Iranian position was that the suspension did not cover the manufacture of centrifuge parts or the assembly of centrifuge machines. After further negotiations with the EU-3, the Iranian government agreed in February 2004 to widen the coverage of the suspension to encompass the assembly and testing of centrifuges and the domestic manufacture of centrifuge components, 'including those related to existing contracts'.[53] Importantly, the EU-3 pledged in return to help Iran resolve its outstanding issues with the IAEA.[54]

Despite this supplemental agreement, several companies in Iran continued to produce centrifuge equipment and hence the IAEA Board of Governors concluded in June that the suspension was not yet 'comprehensive'.[55] Although the agency confirmed Iran's claim that component production had been suspended at three workshops, three additional workshops 'belonging to private companies' were continuing to produce, 'claiming that they have not received adequate compensation' for the postponement or termination of contracts.[56]

Iran's failure to suspend fully all enrichment-related activities, its continued failure to provide a complete assessment of the P-2 programme, and outstanding issues regarding the contamination of centrifuge parts, all contributed to the toughening of the board's stance in mid-2004. A resolution passed in June was highly critical of Iran, although the European-sponsored text avoided escalating the matter and instead pressed for further dialogue. It stated that: the board 'deplores' that, 'overall, as indicated by the Director General's written and oral reports, Iran's co-operation has not been as full, timely and proactive as it should have been'.[57] The resolution also noted with concern Iran's decision to proceed with the production

of uranium hexafluoride at its UCF, which the board described as 'at variance with the Agency's previous understanding as to the scope of Iran's decision regarding suspension'.[58] Iran had announced in late April that it intended to perform hot tests of the UF_6 production line at Isfahan. However, the IAEA has concluded that, given 'the amounts of nuclear material involved', the testing 'would technically amount to the production of feed material for enrichment processes'. Unsurprisingly, the official Iranian position is that the suspension of enrichment-related activities does not include the production of UF_6,[59] a view that contrasts markedly with that of the IAEA. As a voluntary measure to restore international confidence, the board urged Iran in June to reconsider its decision to begin production testing at the UCF, as well as its decision to start constructing the heavy water research reactor at Arak.[60]

A deepening sense of crisis

Throughout 2004 Iran adopted an increasingly confrontational approach to the nuclear issue. Its growing belligerence reflects deepening frustration at the refusal of the IAEA to give the country a clean bill of health, as well as its apparent strategy of playing Europe and the US off against each other in order to delay any future punitive action by the international community for failure to comply with NPT obligations.

Tehran responded angrily to the June resolution and resumed construction and testing of centrifuges, including breaking IAEA seals on equipment at Natanz. As one commentator noted in July 2004, the Iranian reaction was a setback for the European approach of maintaining dialogue with Iran.[61] However, this has not been for lack of effort on the part of the members of the EU-3, each of which has become increasingly frustrated with Tehran's confrontational stance, its reneging on the deal to suspend enrichment-related activities and its failure to resolve outstanding issues with the IAEA.

In a further effort to reach a compromise, EU-3 representatives met with Iranian officials in Paris, France, at the end of July. Iran was apparently warned that, if it remained on its present track, the matter would have to be referred to the Security Council. The Europeans reportedly wanted Iran to declare that it would not withdraw from the NPT, to recognize that international concerns about its activities

were justified and to commit to keeping the EU-3 informed about its nuclear programme. The Iranians responded in a now predictable fashion, accusing the Europeans of bowing to US pressure and failing to uphold their side of the agreement to help resolve the international dispute over Iran's nuclear programme.[62] After the Paris meeting Iranian Foreign Minister Kamal Kharrazzi stated that: 'We still continue suspension on uranium enrichment, meaning that we have not resumed enrichment'. He also said, though, that the government was no longer committed to its agreement not to build centrifuges.[63] Mohammad Mousavian, Head of Foreign Policy at the Supreme Council on National Security, responded by warning that 'either Europe agrees to close Iran's file at the IAEA and transfer nuclear technology to Iran—in response Iran will ratify the Additional Protocol—or we cancel all previous agreements'. According to Mousavian, if ratification of the protocol was put before the Majlis under present circumstances, it would be rejected by the now conservative-dominated parliament. Prior to the meeting, Mohamoud Mohammadi, Deputy Chairman of the Majlis' Foreign Policy and National Security Commission, had said that ratification of the protocol was 'conditional' on the IAEA approving Iran's right to employ nuclear technology for peaceful purposes. Mohammadi declared that there is concern in Tehran that the protocol could be used as an instrument for putting political pressure on Iran.[64]

A final deadline for full compliance?

It appears that Europe's growing sense of frustration with Iran pushed the EU-3 closer to the position of the US in mid-2004. However, although Washington lobbied for a tough resolution at the September meeting of the IAEA Board of Governors, the EU-3 again succeeded in pushing through a version that allowed more time for negotiations—the Bush administration had wanted to impose a pre-US election deadline of 31 October for full co-operation and to insert a 'trigger mechanism'.[65]

Although Iran has been given more time to meet the board's demands, the resolution effectively sets a deadline for co-operation. It underlines that, in November, the board will decide 'whether or not further steps are appropriate' to ensure that Iran satisfies its obligations under its safeguards agreement. The phrase 'further steps' makes it clear, for the first time in two years, that referral to the Security Council is a likely option if Iran fails to meet the agency's demands. Key elements

of the resolution include a request for further information on, and explanation of, centrifuge contamination, the scope of the P-2 programme, and the timeframe for plutonium separation experiments. Furthermore, the board registered concern about plans to introduce 37 tonnes of yellowcake at the UCF and 'deeply regrets' Iran's view that the suspension does not cover all enrichment-related activities. Perhaps most significantly, it called on Iran to suspend immediately all enrichment-related activities, including the manufacture or import of components, the assembly and testing of centrifuges and the production of feed material at the UCF.[66] Collectively, these issues provide a yardstick against which the level of Iranian compliance can be gauged.

The angry response from Tehran was predictable, given its growing belligerence throughout 2004. Rowhani stressed that, if Iran was referred to the Security Council, it would limit co-operation with the IAEA, stop short-notice inspections and pull out of the NPT.[67] Moreover, although the government said that it would continue to observe a voluntary suspension of a narrower range of activities, including actual enrichment, it would continue to prepare feedstock for centrifuges. Disturbingly, Rowhani also asserted that Iran already had the technology to produce nuclear bombs.[68] His responses appear to reflect recognition by Tehran that the nuclear crisis may be entering a new and critical phase.

What next: showdown or climb down?

The answers to two questions will define how the Iranian nuclear situation unfolds in coming months. The first question is: will the IAEA Board of Governors refer the matter to the UN Security Council if Iran continues not to fully comply with the agency's demands? The answer depends primarily on Iran's behaviour as 2004 ends, specifically the extent to which it fulfils the board's requests or whether it maintains its policy of brinkmanship. If Iran does not give ground on any of the issues identified in the September resolution, it will be difficult for the EU-3 and other board members to continue to reject a referral. Indeed, if the board did not opt for a referral in such circumstances, it would risk further undermining the credibility of both the IAEA and the wider nuclear nonproliferation regime.

Given Iran's past success in playing Europe and the US off against one another, Tehran could well opt for a policy of partial compliance designed to undermine

the consensus needed to escalate the issue (to the point at which it is referred to the Security Council). This approach appears to have worked in the past, but it is difficult to judge what level of compliance would suffice to keep the board divided. Given Europe's growing frustration with Iran, it appears that, at the very least, the country would again need to stop producing components for and assembling centrifuges, and probably would need to widen its definition of 'suspension' to include the production of uranium hexafluoride. Such action could potentially undermine any support that the US may be able to build to initiate 'further steps'. Indeed, the Europeans are unlikely to back a tougher approach if it is perceived that Iran has made significant progress towards meeting the board's demands, and if there is a feeling that engagement is likely to produce further results.

The second question is: what type of action is the Security Council likely to take if the board opts for referral? An initial step could be to condemn Iran for not living up to its NPT commitments and to impose a timeframe for compliance with the demands of the IAEA. A second step could involve attempting to coerce Iran into compliance through the imposition of specific sanctions that would target foreign assistance for the country's nuclear programme. A third step could see the imposition of broader economic sanctions.

Identifying the options is one thing, but implementing them is something else. Indeed, beyond condemning Iran for not complying with its NPT obligations, it would be difficult to gain the necessary support among the permanent members of the Security Council (China, France, Russia, the UK and the US) for the imposition of even limited nuclear-related sanctions. In this respect, Russia has the most to lose economically, given the assistance that it has provided to Iran for the Bushehr plant. Of course, if Iran continued to pursue an increasingly confrontational line and to reject international demands to comply fully, the likes of China and Russia could potentially support tougher action by simply abstaining from relevant votes and not exercising their power of veto.

There are several factors that will have an influence on future Iranian calculations and international responses. The most notable are the policies of the second Bush administration and the current ascendancy of the conservatives in Iranian politics. The commonly held view is that his administration will maintain a tough policy on Iran. Indeed, the administration is reported to be looking at the pros and cons of

the military option as a last resort to prevent Iran from going nuclear. If the US remains ensnared in Iraq, which looks likely for the foreseeable future, this would probably undermine any support in Washington for military action. The second Bush administration, though, would not be hamstrung by the need to seek re-election in 2008. The possibility exists, therefore—however slim it may be—that it could plump for an incremental strategy of engagement in an effort to stop Iran from venturing further down the nuclear path. Obviously, this would depend on the character of Bush's national security team, but it should be remembered that Armitage stated in late October 2003 that Washington was prepared to engage in limited discussions with Iran on matters of 'mutual interest'.[69] Such a strategy would require Iran to comply with the IAEA's demands, although it would receive political and economic incentives in return.

Of course, US engagement would require the participation of Iran and this is far from guaranteed given the animosity that has existed between the two countries since the current Iranian regime took power following the revolution of 1979. Indeed, the rise of the conservatives in Iranian politics does make this seem unlikely. The conservatives took control of the Majlis in the parliamentary elections of February 2004 amidst accusations of foul play—the Council of Guardians banned numerous reformist politicians from running. According to a September 2004 report, more than 200 deputies from the Majlis have urged the Iranian government to defy the international community and to press ahead with enriching uranium.[70] Moreover, reformist President Mohammad Khatami cannot run in the 2005 presidential election because he will already have served the maximum two terms in office. The stage would appear to be set, then, for the conservatives to become even more entrenched in national politics. Unfortunately, this will increase the likelihood of Iran maintaining its policy of brinkmanship on the nuclear front.

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7

Small arms: monitoring the UN action programme

Helen Hughes

It is over three years since United Nations (UN) member states adopted the July 2001 Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects (POA).[1] Although it is only politically rather than legally binding, the POA is the only international agreement that aims to tackle the proliferation of small arms and light weapons (SALW) through a series of measures aimed at curtailing the illicit trade in such arms. The reference to 'in all its aspects' in the POA's title signifies that it also includes some provisions aimed at attempting to strengthen controls on the legal trade. In their chapter in the *Verification Yearbook 2003,* Kate Joseph and Taina Susiluoto called the POA 'more a menu of measures than a binding system of controls'.[2] In the absence of a more robust, legally binding agreement, the POA does, however, provide an international framework for further action in tackling the proliferation of SALW.

Sufficient time has now passed for states to have made some progress towards implementing the agreement, thereby activating its provisions related to monitoring. This chapter will examine what these provisions are, how they relate to the principles of monitoring and verification, and the implications for states. It will discuss whether the approach taken is adequate given the nature of the agreement, especially in response to such a complex problem, and assess the strengths and weaknesses of such an approach. The role of civil society in monitoring states' progress will also be considered.

Alongside the POA, there are a number of other relevant regional and multilateral initiatives and instruments, often containing stronger provisions, including, for example, the 2004 Nairobi Protocol.[3] This legally binding instrument contains provisions relevant to monitoring and verification which warrant some discussion,

since they may prove informative for strengthening the POA—an opportunity available to states in 2006 when the agreement will be reviewed.

The Programme of Action

The POA was agreed by the UN member states following a negotiating process which comprised three preparatory committee meetings and an international conference at the UN in New York in July 2001. The final document consists of four sections and over 50 measures covering several key issues. The Preamble acknowledges the impact of the problem and establishes the norms and principles that states have agreed underpin the POA. Section II, entitled 'Preventing, combating and eradicating the illicit trade in small arms and light weapons in all its aspects', identifies operational measures at the national, regional and global level, including:

- the establishment of national focal points and commissions;[4]
- the review of existing legislation or the adoption of adequate relevant national legislation, and policy or procedures on controlling the production and transfer (import, export and transit) of SALW;[5]
- the review of existing legislation or the adoption of adequate national legislation criminalizing the illicit manufacture, possession or stockpiling of and trade in SALW;[6]
- review of present stockpile management and security regulations and practices, and the development and implementation of appropriate measures where weakness are found;[7]
- the development of disarmament and weapon collection programmes and review of the extent to which these are embedded in wider peace-building, security sector reform or development programmes;[8]
- the development and implementation of policies and procedures for the destruction of confiscated, collected and surplus weapons; and
- the development of and an increase in co-operation between governments and civil society.[9]

Section III of the POA, on 'Implementation, international co-operation and assistance', concentrates on ensuring that states provide resources to implement

the POA. It was apparently the least controversial part of the negotiations.[10] The follow-up, section IV, is the most important part of the agreement relating to monitoring implementation.

What type of monitoring?

Section IV, 'Follow-up to the United Nations Conference on the Illicit Trade in Small Arms and Light Weapons in All Its Aspects', sets out the process for the review of implementation of the POA. A more formal follow-up was resisted, particularly by the United States, which opposed the idea of a mandatory review conference which would serve 'only to institutionalize and bureaucratize' the process.[11] In the last few days of the negotiations it was widely accepted that the conference could at best establish the framework for the future development of an effective international action programme. Thus, a strong follow-up section would in part compensate for other weaknesses in the document.[12] The follow-up section recommends that a conference be convened no later than 2006 to review progress made in implementing the POA.[13] It also provides for biennial meetings to 'consider national, regional and international implementation.'[14]

The first biennial meeting was held in July 2003. The one-week meeting was used to take stock of progress thus far, but nothing more substantive was discussed. A second such meeting will be held in July 2005. States will convene at the UN in July 2006 for a full review of the POA, which in principle will be an opportunity to revise and strengthen the programme. Although at present few states have publicly spoken of such intentions, many non-governmental organizations (NGOs) are lobbying, for example, for key issues that were omitted in 2001 to be included, for stronger language to be inserted into the POA, and for some measures to be elaborated to specify how they should be implemented.

Beyond this implementation review process there are certain measures in the POA requiring states, mostly on a voluntary basis, to exchange information and submit data to the UN. Apart from this there are no other provisions in the POA that could be described as monitoring and verification.

There are several reasons for this. The political wrangling that characterized most of the negotiations meant that states could not agree on 'how formal the follow-up

to the conference and its [POA] should be'.[15] Moreover, the nature and scope of the POA—covering diffuse issues in what is only a politically binding agreement—are in some regards not conducive to a formal monitoring and/or verification system. Verification of compliance is difficult since states are under no obligation to ban or reduce the production of, trade in or possession of SALW, but rather to prevent, eradicate and combat the illicit trade. The amorphous nature of the latter means that there are no specific thresholds or limitations for states to adhere to.[16]

Perhaps the only reference in the POA that represents a commitment to restrict arms transfers is paragraph II of section II which requires states to responsibly exercise control over the licensing of SALW by ensuring that exports are consistent with their commitments under international law:

> To assess applications for export authorizations according to strict national regulations and procedures that cover all small arms and light weapons and are consistent with the existing responsibilities of States under relevant international law, taking into account in particular the risk of diversion of these weapons into the illegal trade. Likewise, to establish or maintain an effective national system of export and import licensing or authorization, as well as measures on international transit, for the transfer of all small arms and light weapons, with a view to combating the illicit trade in small arms and light weapons.

This reference, even without specifying which existing responsibilities apply, was very difficult to negotiate and has proved somewhat controversial because of its ambiguity. Its inclusion has, however, provided an opportunity for some states and NGOs to explore the policy embedded in this commitment and to identify the relevant international law in order to develop common understandings and standards on transfer controls to be taken forward at the international level. This could include a legally binding instrument which would codify states' commitments within a framework convention on arms transfers.[17]

The means to monitor: transparency and information-sharing

Unlike most other arms control agreements, the POA has no monitoring and verification regime and no organization, not even one mandated to oversee, assess and assist

in implementation. Instead it has a limited, ad hoc framework for voluntary information exchange and reporting, co-ordinated by the Conventional Arms Branch of the United Nations Department for Disarmament Affairs (UNDDA), which does create some transparency regarding states' implementation of the agreement.

The issue of information exchange and transparency was controversial throughout the negotiations: the US, China and the Arab Group were among those opposed to the inclusion of specific language on transparency measures.[18] Hence, none of the original negotiating text relating to transparency measures was retained in the final agreement. In the first draft of the POA the Preamble declared that 'enhanced openness and transparency and improved information exchange … would greatly contribute to confidence-building and security among [s]tates including a better understanding of the illicit trade in [SALW]'.[19] This principle was later removed, as was a measure calling on states to make public relevant information relating to the manufacture, transfer and transport of SALW.[20]

In the end, states did manage to agree some measures relating to transparency, information-sharing and co-operation, although these were somewhat diluted versions of previous draft language. For example, states agreed to make public relevant national laws, regulations and procedures.[21] States are also encouraged to 'develop, where appropriate and on a voluntary basis, measures to enhance transparency with a view to combating the illicit trade in SALW in all its aspects'.[22] Such provisions are similar to those in Article 7 of the 1997 Ottawa Landmine Convention relating to transparency reporting although, unlike that treaty, reporting under the POA is voluntary. Under paragraph 33 of section II, the POA also requests the UN Secretary-General to circulate information provided voluntarily by states through, for example, national reports on their implementation of the POA. These are deposited with the UNDDA and are made available on the department's Conventional Arms Branch website.

National reporting

National reporting is the main means by which states can present progress they have made in implementing the POA.[23] In 2002, 16 states submitted national reports to the UNDDA. In 2003 this increased to 103. As expected, the quality of these varied considerably.

In an attempt to encourage states to submit their national reports, the United Nations Development Programme (UNDP), in co-operation with the UNDDA and the United Nations Institute for Disarmament Research (UNIDIR), and under the auspices of the United Nations Coordinating Action on Small Arms (CASA),[24] began a project to support states requesting assistance in compiling and submitting their national reports. The assistance package includes guidelines for reporting which provide an overview of the types of information to be included and a suggested template that can be used for completing the report. Prior to the first biennial meeting in July 2003, reporting assistance was provided to 25 states; of these 20 submitted reports to the meeting.[25]

On-site support may also be provided on request, including workshops for officials from relevant government departments (such as defence, foreign affairs and customs) on how to gather information, co-ordinate and co-operate, and create opportunities for in-depth discussions on the content of national reports.[26] These capacity-building workshops (several of which have already been held, including one in Nairobi, Kenya, in May 2003) enable states to discuss issues that are applicable to and/or are sensitive for them, and allows them an opportunity to draw on best practice from other country reports.

According to the UN, states may use their annual reports to 'identify new developments in the implementation process as well as any remaining difficulties'.[27] They provide an opportunity to identify lessons learned and establish a record of progress. National reporting is undoubtedly important in helping increase transparency and build confidence among states that the POA is being implemented. States may use it to share and make public information on an array of measures, such as the enactment of national legislation to criminalize the illicit manufacture of, possession of or trade in SALW or the development and implementation of disarmament, demobilization and reintegration programmes.

The reports submitted to the UNDDA in 2003 have been analyzed to help identify progress in reporting on implementation of the POA and highlight requirements for further support from UN agencies and donors.[28] The analysis presents an account of the broad trends in reporting, but also analyses thematic areas across the reports submitted in 2003. It notes, for example, the number of references made in states' reports to different issues and the substance of these references, particularly in

terms of good practice such as marking and tracing of SALW, and whether technical or financial assistance has been offered or received. Where possible the report also analyses the links between reporting and implementation, for example, the number of national co-ordination agencies that have been mentioned in reports submitted by states as against the (larger) number that actually exist.[29]

This is a sensitive step forward for the UN since it officially has no mandate to make any assessment of states' progress, but, by identifying areas for improvement, it should encourage more comprehensive reporting and ultimately more effective implementation, as well as help states to prepare their reports for the next biennial meeting in 2005.

There is certainly considerable value in encouraging a more systematic approach to national reporting, as it should make the information more useful and meaningful provided sufficient detail is included. This latter point is quite crucial, as it is difficult to discern the effectiveness of policies that states have put in place when transparency is purely voluntary.

The capacity-building approach is at least a systematic attempt not only to encourage and facilitate national reporting, but also to streamline it so that the data reported are sufficiently meaningful to make it possible to evaluate the efficacy of such critical measures as legislation and regulations. States are also encouraged to submit national reports annually, which is critical to sustaining momentum even if there have not been any significant changes or progress since the previous year in implementing the POA.

Qualitative assessments of the information exchange are currently the preserve of civil society and NGOs, since no committee or body has been mandated by the states to assess implementation. It is probably premature even for an ad hoc committee to be set up to make assessments of implementation, which is why so far the focus on information sharing has been to build confidence among states. This is working slowly but surely.

The opportunity to strengthen the follow-up and monitoring provisions in the agreement will come in 2006, when the POA will be fully reviewed, enabling states to strengthen (or possibly weaken), the POA and its associated measures. In the meantime, and in the absence of a stronger monitoring mechanism, civil society is stepping in to fill this void.

Co-operation and partnership

Section III of the POA establishes measures on co-operation and assistance thus: 'states undertake to ensure co-ordination, complementarity and synergy in efforts to deal with the illicit trade in [SALW] in all its aspects'.[30] The agreement refers to co-operation repeatedly, particularly in relation to establishing partnerships at all levels, enhancing co-operation between arms control officials,[31] building capacities in areas including stockpile management and security,[32] and considering the promotion of assistance, when requested.

This emphasis on co-operation and partnership has enabled a certain amount of openness among some governments in tackling the problem of SALW and implementing the POA. While this is far from universally recognized or accepted, a willingness to involve civil society NGOs has begun to extend beyond the usual progressive states—those at the forefront in calling for a broader response rather than just solely tackling the illicit trade. For example, NGOs have been included in national commissions in Kenya, Tanzania and Uganda.

The role of civil society in monitoring the POA

The POA recognizes the important contribution of civil society in tackling the illicit SALW trade and in implementing the agreement. It also encourages relevant international and regional organizations to facilitate co-operation between governments and civil society, especially NGOs.[33]

The partners in the Biting the Bullet project—Saferworld, International Alert and Bradford University—along with the International Network on Small Arms and Light Weapons (IANSA) have joined forces to monitor states' progress and produce reports on their implementation efforts.[34] This consortium produced a substantial report on states' implementation for the 2003 biennial meeting, *Implementing the Programme of Action: Action by States and Civil Society*.[35] Updates will be produced for the 2005 biennial meeting and the 2006 Review Conference.

The first report, covering 156 states, produced a baseline assessment of policy and practice relating to key commitments in the POA, including on establishing national points of contact and national co-ordination agencies, the introduction or revision of relevant legislation and administrative procedures, stockpile management, disarmament, and weapons collection and destruction. It also examined in more

detail policies and practices at the national and regional level. This is particularly important since considerable progress on tackling SALW proliferation has been encouraged through regional approaches. The report concluded with recommendations for states on improving implementation of the POA, including the need for governments and other stakeholders to 'develop and strengthen regional and international mechanisms to encourage and facilitate information exchange and transparency'.[36]

Researchers from around the world collected the data and information on states to produce the report. Given the sensitive nature of the issues covered by the POA, such as stockpile management and exports and imports of SALW, this task is difficult and even risky, especially in those countries that lack stable democratic structures.

Clearly, a role for the analysis of data on implementation is necessary, and the production of such a report is certainly a valuable contribution to the UN SALW process and, in the absence of adequate reporting by states, critical to stimulating scrutiny of states' progress or the lack of it.

Extending the UN Register to include SALW?

The UN Register of Conventional Arms is a voluntary arrangement, established in 1991 by the UN General Assembly, covering seven categories of heavy weapons and military equipment.[37] States provide the UN Secretary-General with relevant data on annual exports and imports. The information submitted on arms transfers is rarely systematic, comprehensive or coherent, making it difficult to tally exports with imports. This has meant that the instrument is not as useful as it should have been, and it has therefore not succeeded in building confidence, which is essential if more countries are to participate and improve the quality of their submissions.

Governments have largely resisted extending the scope of the UN Register to cover SALW. By all accounts, the types of information and data required to make such an extension useful would not fit with the existing format. While of course this is also politically convenient for those states that are reluctant to see such information published, there are some legitimate concerns about how to categorize information on SALW transfers. Nonetheless, this has not deterred some states from submitting background information on SALW imports/exports as part of the register.[38]

The 2003 Group of Government Experts mandated to consider ways of developing and expanding the scope of the UN Register noted that 'interested states could provide voluntary information on transfers of small arms and light weapons with their annual submissions'.[39] The group also proposed that the reporting threshold for large-calibre artillery systems should be lowered from 100 mm to 75 mm, that man-portable air defence systems (MANPADS) should be included[40] (both are recognized as light weapons) and that these definitions should be used in reporting. MANPADS are now included in category VII entitled 'Missiles and Missile Launchers'. The register has thus already begun to evolve towards including at least some part of the SALW problem.

Precedents for a verification role in SALW control?

While the POA is the only international agreement covering SALW, other agreements—such as the Nairobi Protocol and the Southern African Development Community (SADC) Protocol—contain measures relating to monitoring and verification in SALW control. These illustrate how a mechanism that builds greater accountability into monitoring implementation can be developed.

The 2004 Nairobi Protocol for the Prevention, Control and Reduction of Small Arms and Light Weapons in the Great Lakes Region and the Horn of Africa is legally binding. It was agreed on 21 April 2004 and signed by all 11 states in the region,[41] but cannot enter into force until two-thirds of the signatory states have ratified it.[42] The protocol mandated the Nairobi Secretariat on Small Arms and Light Weapons in the Great Lakes Region and the Horn of Africa to oversee and monitor implementation of the agreement and ensure states' compliance.[43] The secretariat had been set up by the 2000 Nairobi Declaration on Small Arms and Light Weapons.[44] The protocol also declares that disputes will be settled 'in accordance with the principles of public international law',[45] although it is unclear what this means and exactly what disputes will requiring settling.

The 2001 SADC Protocol on the Control of Firearms, Ammunition and Other Related Materials (the SADC Firearms Protocol)[46] sets out minimum standards for addressing the priorities of the region on SALW (including firearms) control. Many of the provisions are similar to those in the POA. Article 17 establishes a

committee to oversee implementation, while Article 18 requires that disputes arising from interpretation or application of the protocol which cannot be settled amicably may be referred to a tribunal.

While these two agreements have similar monitoring provisions, the difference in their implementation demonstrates the importance of securing the political support and commitment of states to ensure that the arrangements actually function. In the case of the SADC Protocol, despite its call for a committee to oversee implementation, this has not yet been agreed due to a lack of co-ordination between the SADC and the Southern African Regional Police Chiefs Co-operation Organisation (SARPCCO), as well as political confusion over the division of responsibilities.[47] As for the Nairobi Protocol, the Nairobi Secretariat is tasked with overseeing implementation of this agreement. Governments in the region have seconded personnel to work in the secretariat and it has already begun work on implementation of the protocol. Representatives from each of the national focal points in states that have signed the protocol met in July 2004 in Tanzania to begin developing an implementation plan.

Conclusions

At present provisions relating to the monitoring of SALW agreements are geared towards encouraging and facilitating transparency, and building confidence and co-operation, rather than actually monitoring and ensuring compliance. In terms of developing the follow-up mechanism and monitoring measures in the POA, there is some possibility that the framework for information exchange and policy development will be strengthened. Of course some states are unwilling to agree to measures that involve increasing levels of transparency and accountability, and this does tend to make the inclusion of more stringent, formal provisions for oversight of the POA's implementation more difficult. Nevertheless, increased transparency would serve to enhance the effectiveness of this agreement, especially among those states that are endeavouring to put their commitments into practice.

It will be interesting to see how negotiations taking place in the Open Ended Working Group (OEWG) on Marking and Tracing of SALW will address the monitoring issue and what follow-up process will be decided. The origin of this group lies in

the section of the POA in which states agreed that a study be undertaken to examine the feasibility of 'developing an international instrument to enable [s]tates to identify and trace in a timely and reliable manner illicit small arms and light weapons'.[48] Following the recommendations of this study, the UN General Assembly adopted a resolution to establish an OEWG to negotiate such an instrument.[49] The OEWG held the first of three planned negotiating sessions in June 2003 in New York. At the very least there should be standardized annual reporting by and annual meetings of state parties.

Meanwhile, opportunities for strengthening co-operation among all stakeholders (states, regional organizations, international organizations and civil society) in relation to all aspects of the POA should be pursued. At present, efforts should centre on encouraging co-operation and assistance in those regions where initiatives are absent or are poorly implemented.[50] Comprehensive, standardized, good-quality annual national reporting is particularly useful as it provides states with an opportunity to identify their needs and the help they require to implement the POA.

To promote the implementation of the POA, a different approach to an intrusive regime is required, one where states recognize and are willing to genuinely combat the proliferation and misuse of SALW through increased transparency, leading to greater accountability. Highlighting strengths and weaknesses is also something states should welcome in order to collectively help them adopt best practices. While a more systematic and formal approach to reviewing and monitoring implementation of the POA is likely to be resisted for the time being, the Review Conference in 2006 does at least provide a forum for further dialogue. At the very least states should seek to build on the existing process.

States are being encouraged to implement the POA by civil society and by the more 'progressive' states. They are being provided with technical and other assistance through partnerships and increased co-operation at the regional and international levels. This approach is reaping some results as states become less circumspect about civil society organizations and recognize the advantages of working with them, given the expertise and experience they have to offer on an array of SALW issues. However, in the long run, for SALW efforts to be truly effective there is a need for formalized and institutionalized monitoring of compliance.

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Endnotes

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5 Section II, para. 2.
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12 Helen Hughes, *Falling Short: Limited Action to Curb Small Arms,* United Nations Association of the UK, London, September 2001, p. 11.
13 Section IV, para. 1(a).
14 Section IV, para. 1(b).
15 *Small Arms Survey Yearbook 2002,* p. 227.
16 Joseph and Susiluoto, p. 136.
17 A draft legally binding instrument has been developed by a group of NGOs working for an international Arms Trade Treaty. See www.controlarms.org/the_issues/ATT_0504.pdf. Other initiatives include the Biting the Bullet Small Arms Consultative Group, which is examining transfers to non-state actors and the development of guidelines for transfer controls; and the UK-led Transfer Control Initiative which aims to develop support among regions for common international controls on SALW transfers.
18 The British American Security Information Council (BASIC), International Alert and Saferworld, *Implementing the UN Action Programme for Combating the Illicit Trafficking in Small Arms and Light Weapons in All Its Aspects,* Biting the Bullet Briefing paper no. 15, BASIC, International Alert and Saferworld, London, 2001, p. 14.
19 Para. 16, Preamble. UN document A/Conf.192/L.4, December 2000.
20 BASIC, International Alert and Saferworld, *Implementing the UN Action Programme for Combating the Illicit Trafficking in Small Arms and Light Weapons in All Its Aspects,* p. 14. This measure was originally para. 26 of section II in the first draft, UN document A/Conf.192/L.4.
21 'To make public national laws, regulations and procedures that impact on the prevention, combating and eradicating of the illicit trade in small arms and light weapons in all its aspects and to submit, on a voluntary basis, to relevant regional and international organizations and in accordance with their national practices, information on, inter alia, (a) small arms and light weapons confiscated or destroyed within their jurisdiction; and (b) other relevant information such as illicit trade routes and techniques of acquisition that can contribute to the eradication of the illicit trade in small arms and light weapons in all its aspects'. POA, section II, para. 23.
22 Section II, para. 31.
23 In addition to states, UN agencies, regional organizations, NGOs and other entities have also provided the UNDDA with information on relevant projects and programmes. These demonstrate the great relevance

of small arms issues to many others, including health, human rights and child welfare. There are a multitude of initiatives happening in response to and alongside the POA at all levels.

24 The Small Arms Survey in Geneva is the technical adviser.

25 United Nations Development Programme (UNDP), UNDDA and the United Nations Institute for Disarmament Research (UNIDIR), 'The UN [POA] on Small Arms: implementation and reporting' (brochure) (no date), www.undp.org/bcpr/smallarms/PoA.htm.

26 UNDP, UNDDA and UNIDIR, 'The UN [POA] on Small Arms: implementation and reporting'.

27 UNDP, UNDDA and UNIDIR, 'Assistance package: guidelines for reporting on implementation of the [POA]', p. 5. See www.undp.org/bcpr/smallarms/docs/POA_package.pdf.

28 The analysis of reporting was conducted under the auspices of the United Nations Coordinating Action on Small Arms (CASA), as a joint UNIDIR, UNDP and UNDDA project, with the Small Arms Survey as a project partner. See Elli Kytömäki and Valerie Yankey-Wayne, 'Implementing the United Nations Programme of Action on Small Arms and Light Weapons: analysis of the reports submitted by states in 2003', Geneva, UNIDIR, 2004.

29 Kytömäki and Yankey-Wayne, p. 20

30 Section III, para. 2.

31 Section III, para. 7.

32 Section III, para. 6.

33 Section II, para. 40.

34 See www.international-alert.org/policy/biting.htm.

35 Biting the Bullet/International Network on Small Arms and Light Weapons (IANSA), *Implementing the Programme of Action: Action by States and Civil Society,* London, 2003. See www.iansa.org/documents/03poareport/index.htm.

36 Biting the Bullet/IANSA, *Implementing the Programme of Action: Action by States and Civil Society,* p. 191.

37 UN General Assembly Resolution 46/36 L, 9 December 1991. The categories are: battle tanks; armoured combat vehicles; large-calibre artillery systems; combat aircraft; attack helicopters; warships; and missiles and missile launchers.

38 Poland and Sweden have apparently included details on small arms transfers in their reports for 2003 to the UN Register. The UK has also included an aggregate of its transfers of small arms. See UN, 'Report of the Secretary-General: the UN Register of Conventional Arms', UN document A/59/193, 30 July 2004.

39 UN, 'Report on the continuing operation of the United Nations Register of Conventional Arms and its further development', UN document A/58/274, New York, 13 August 2003, para. 107.

40 UN, Press Release DC/2880, 1 August 2003. See also UN, 'Report on the continuing operation of the United Nations Register of Conventional Arms and its further development', UN document A/58/274, para. 112.

41 The signatories are Burundi, the Democratic Republic of the Congo (DRC), Djibouti, Ethiopia, Eritrea, Kenya, Rwanda, the Seychelles, Sudan, Tanzania and Uganda.

42 The signatories have apparently agreed an ambitious plan for this to happen by the end of 2004.

43 According to Article 18, Institutional Arrangement, '(a) State Parties mandate the Nairobi Secretariat to oversee the implementation of this protocol; (b) In this regard the Nairobi Secretariat shall be responsible for: development and issuance of guidelines and instructions for the implementation of, monitoring the implementation of, the execution of, and the evaluation of this Protocol, in liaison with law enforcement agencies, and ensuring adherence to the standards set out therein informing Ministers on a regular basis of progress thereof; and, attending to the difficulties experienced in the application of this protocol'.

44 See www.saligad.org/declarations/declaration_nairobi.html.

45 Article 19, Settlement of Disputes. 'Disputes arising out of the interpretation or application of this

Protocol, which are not settled amicably, shall be settled in accordance with the principles of public international law'.

46 SADC members have signed the protocol, bringing it into force on 31 July 2004. The SADC countries are Angola, Botswana, the DRC, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.

47 As a result of the treaty establishing the SADC, the secretariat is mandated to oversee implementation of all agreements that come under it, including, in principle, this protocol. However, at one point it looked as though the Southern African Regional Police Chiefs Co-operation Organisation (SARPCCO) would become the agency to oversee implementation of the protocol. It is still unclear which body will take responsibility.

48 Section IV, para. 1(c).

49 UN General Assembly Resolution 58/241, 'The illicit trade in small arms and light weapons in all its aspects', 23 December 2003, operative paras 8 and 9. See http://disarmament.un.org:8080/cab/salw-oewg.html.

50 Biting the Bullet/IANSA, *Implementing the Programme of Action: Action by States and Civil Society,* p. 7.

The environment

8

Monitoring greenhouse gases

Larry MacFaul

In order to tackle climate change it is necessary to have reliable information on the greenhouse gases (GHGs) which cause this phenomenon. Equipped with this information it is possible to make assessments of emissions trends and of the effectiveness of emissions mitigation policies, strategies and initiatives. Furthermore, this information allows assessments to be made of how far emissions reduction targets are being met at company, sector, national or global level. It also allows emissions trading schemes to function, since without credible emissions trading units such schemes have no integrity. This credibility is crucial to the confidence that buyers and sellers and the public will have in such a scheme. Accurate GHG emissions data are also vital for the study of the relationship between GHGs and global warming. This chapter will describe how greenhouse gases are monitored. It will provide a simple overview of this complex area that is not intended to be exhaustive, nor does it seek to cover all GHG-emitting entities, sectors or monitoring techniques.

The methods used to monitor GHG emissions vary greatly depending not only on the type of activity under scrutiny but also on the scale and the goal of the monitoring project undertaken. This chapter begins by looking briefly at greenhouse gases and their respective effects on climate. It then touches on the development of GHG emissions monitoring systems. The systems for emissions monitoring under the 1992 United Nations Framework Convention on Climate Change (UNFCCC) and its 1997 Kyoto Protocol are then explained, followed by the European Union (EU) Emissions Trading Scheme. These sections explain how emissions are monitored and the rationale behind the structure of the monitoring system. They also examine the problem of how uncertainties in emissions estimation are dealt with and how emissions data are collected and managed. The recent emergence of

non-state GHG registries of companies' and municipalities' emissions is also described. Finally, global and regional atmospheric emissions monitoring systems, which can complement the information provided by inventory-based emissions monitoring systems, are described.

Greenhouse gases and their effect on climate

The main greenhouse gases are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6). Carbon dioxide is the most common GHG produced by human activities, accounting for 60 per cent of the increase in radiative forcing[1] since pre-industrial times.[2] Emissions of these six gases must be reported to the UNFCCC by each treaty party and constitute the 'basket' of gases to be reduced under the Kyoto Protocol. Annex I parties (that is, developed countries listed in Annex I to the UNFCCC) must also provide information on indirect greenhouse gases, namely carbon monoxide (CO), nitrogen oxides (NO_x) and non-methane volatile organic compounds (NMVOCs),[3] and also sulphur oxides. For policy formulation purposes greenhouse gases are often measured by their global warming potential (GWP) (see table 1).[4]

Greenhouse gas monitoring and the UNFCCC

Efforts to monitor gas emissions have developed as various risks and needs have been identified. Systems have evolved which either have been specifically designed or have come to include greenhouse gas monitoring. States (or regions) use emissions inventories to account for these gases. Emissions inventories are characterized by which gases they include, the geographic area they cover, the sectors or activities covered and the time range over which gases are emitted.[5] The greater the level of detail and the sectoral breakdown within an inventory the clearer will be the evaluation of what activities or entities are producing emissions and in what quantity. Greater detail also allows greater precision in formulating methods for reducing these emissions. However, the greater the level of detail the more difficult it is to draw up an inventory.

Many international organizations and states have initiated emissions monitoring schemes to manage the risks from various air pollutants. For example, in 1977

Table 1 **The main greenhouse gases**

Greenhouse gas	Anthropogenic sources	Atmospheric lifetime (years)*	Global Warming Potential (GWP)**
Carbon dioxide (CO_2)	Fossil-fuel combustion, land-use conversion, cement production	variable	1
Methane (CH_4)	Fossil fuels, rice paddies, waste dumps, livestock	12.2 +/–3	21***
Nitrous oxide (N_2O)	Fertilizer, industrial processes, combustion	120	310
CFC-12	Liquid coolants, foams	102	6,200–7,100****
HCFC-22	Liquid coolants	12.1	1,300–1,400****
Perfluoromethane	Production of aluminium	50,000	6,500
Sulphur hexafluoride (SF_6)	Dielectric fluid	3,200	23,900

Notes

* No single lifetime for CO_2 can be defined because of the different rates of uptake by different sink processes.
** GWP for a 100-year time horizon. Units are relative to CO_2.
*** Includes indirect effects of tropospheric ozone production and stratospheric water vapour production.
**** Net global warming potential (i.e. including the indirect effect due to ozone depletion).

Source

United Nations Environment Programme (UNEP), www.grida.no/climate/vital/05.htm (from 'Radiative forcing report', contribution of Working Group 1 to the Second Assessment Report of the IPCC, UNEP and WMO, in J.T. Houghton et al. (eds), *Climate Change 1995: The Science of Climate Change,* Cambridge University Press, Cambridge, 1996.

the United Nations Economic Commission for Europe (UNECE) initiated the European Monitoring and Evaluation Programme (EMEP), which provides an emissions inventory system for the 1979 Convention on Long-Range Transboundary Pollution (LRTAP) and supports monitoring of the progress of implementation of its protocols. Subsequently in 1985 the European Union (EU) set up the EU emissions inventory programme (CORINAIR) to establish a European air emissions inventory for a number of gases. In 1990 the European Environment Agency Task Force initiated inventories which extended the list of substances covered under CORINAIR to include greenhouse gases. EMEP and CORINAIR then began working closely together through the UNECE and in 1996 the Joint EMEP/CORINAIR *Atmospheric Emission Inventory Guidebook* was published. The EMEP/CORINAIR system

is highly detailed and allows considerable accuracy in emission source description. This level of detail was required by the UNECE in order to gain not only total national emissions estimates by sector but also a precise awareness of the physical sources and geographical distribution of emissions.[6]

In response to the growing recognition of the threat of climate change, a global approach to greenhouse gas emissions monitoring began to be developed by the Intergovernmental Panel on Climate Change (IPCC).[7] Work began on this system in the early 1990s and also involved the Organisation for Economic Co-operation and Development (OECD) and the International Energy Agency (IEA). The goal of the IPCC is to develop guidelines and the use of comparable methodologies for GHG emissions monitoring and review systems to assist UNFCCC parties in developing national inventories of GHG emissions and removals. Under the UNFCCC, parties must now use the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* or compatible methodologies to estimate and report on their GHG emissions.[8]

The IPCC system provides both national totals of GHG emissions and a breakdown of emissions by economic sector. This sectoral approach demands less detail than the CORINAIR system,[9] which is based on individual emission sources (which are then categorized into sectors). The UNFCCC, being global in scope, aims to obtain information on national emissions from all states, whereas CORINAIR was primarily designed for use in EU countries. Drawing up a national inventory is a complex task which requires significant financial and institutional resources and, while CORINAIR requirements suited a group of states which is relatively homogeneous in terms of development, the IPCC had to cater for a diverse range of countries with different institutional, political, technical, geographical and economic circumstances. It is, however, the goal of the IPCC to continue to promote harmonization with other international and national GHG inventory methodologies in order to facilitate inventory compilation and improve accuracy and consistency.[10]

The IPCC system

Under the UNFCCC, Annex I parties (that is, developed countries listed in Annex I to the convention) must annually report to the UNFCCC Secretariat national inven-

tories of their greenhouse gas emissions for a period covering a base year (normally 1990[11]) up to the last year but one prior to the year of submission. Non-Annex I parties (developing countries) submit inventories less frequently. The precise timing and frequency of their submissions are still under negotiation. The goal of the UNFCCC reporting requirements is to ensure that inventories are transparent, consistent, comparable and complete. These inventories will help in reviewing the implementation of the convention and assist in policy decisions relating to emissions reduction strategies. The inventories are publicly available on the UNFCCC website.

National inventories should consist of a national inventory report (NIR) containing detailed information on parties' inventories, and the common reporting format (CRF) which parties use to report their GHG data and for which the UNFCCC secretariat provides a software tool to facilitate reporting. To compile these inventories, states must identify the range of possible source and sink[12] activities that exist in their territory and evaluate their relative importance. According to the IPCC guidelines, parties are supposed to report all important GHG emissions. However, in practice the capacity to do this varies widely. Countries with little prior experience instead prioritize possible gases, sources and sinks in terms of their relative importance to global and national totals, and non-Annex I parties are only required to report to the extent that their capacities permit. According to the IPCC, CO_2, CH_4 and N_2O have the highest priority.[13]

Under the IPCC approach to emissions monitoring found in the *Revised 1996 IPCC Guidelines,* emissions estimates are usually a product of activity data and emission factors. The calculations can be highly complex, with many steps involved in the calculation of each term.[14] Activity data provide information on the amount of human activity which results in emissions or removals occurring over a given period. For example, in the energy sector annual activity data for fuel combustion sources are the total amounts of fuel burned. Emission factors provide a representative rate of emission for a particular activity level under a particular set of operating conditions.[15] The formula for this calculation is:

Emissions = activity data x emission factor.

Emissions estimates can also be produced using an emissions measurement over a period of time (for example, an hour) multiplied by the number of such periods

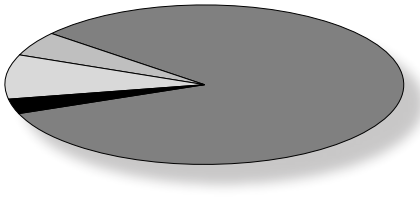
in a required estimation period (for example, the number of operating hours per year).

The IPCC provides default methodologies and values for emission factors and some activity data within a tiered structure of increasing levels of detail. However, these default methodologies, data and factors are necessarily general and it is therefore preferable, if possible, for states to create and use more detailed methodologies, emission factors and activity data as long as these are compatible with those of the IPCC. The IPCC guidelines often refer to methodologies developed elsewhere, such as those of the US Environmental Protection Agency (EPA), rather than providing their own in every case. It is also preferable for states to use higher tiers. The greater the level of detail and accuracy in the inventories the better informed policy decisions on emissions reduction will be.

Direct measurement of individual emissions sources is also permitted under the IPCC guidelines but is comparatively rare in this system. The subsections below outline the IPCC approach to emissions estimation by sector.

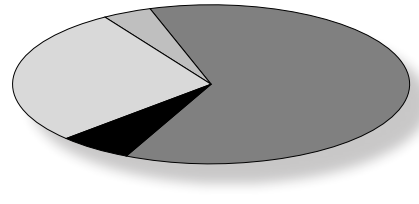
Figures 1 and 2 below show the sectoral emission profiles of Annex 1 and non-Annex 1 parties.

Figure 1 **Annex 1 parties (2004)**



- Agriculture (3%)
- Industrial processes (9%)
- Energy (5%)
- Waste (83%)

Figure 2 **Non-Annex 1 parties (1994 or closest)**



- Agriculture (6%)
- Industrial processes (28%)
- Energy (4%)
- Waste (62%)

Note Solvent and other product use and land-use change and forestry sectors are not included in order to preserve the simplicity of the charts.

Source UNFCCC, 'Counting emissions and removals, greenhouse gas inventories under the UNFCCC', 2003, www.unfccc.int.

Energy

When burned, carbon-based fuels produce CO_2 emissions.[16] By far the largest source, the oxidation of carbon when fossil fuels are burned, accounts for 70–90 per cent of total anthropogenic CO_2 emissions.[17] However, the energy sector is also responsible for emissions of CH_4, N_2O, NO_x, CO and NMVOCs. Emissions in this sector are divided into those from fuel combustion and those from fugitive emissions.[18] Examples of fuel combustion activities are public electricity and heat production, manufacture of solid fuels, manufacturing industry and construction, and transport (including civil aviation, road transport and navigation),[19] while examples of fugitive emissions are emissions from coal mining and handling, and oil and natural gas activities. Where local energy data are not available, data from the IEA or the United Nations Statistical Division (UNSD) can be used.

Two main approaches are available for calculating greenhouse gases in this sector —the reference approach and the sectoral approach. The reference approach requires the calculation of the national supply of fuel and of CO_2 emissions from fuel combustion. The IPCC breaks the process down into six steps: estimate apparent[20] fuel consumption in original units; convert to a common energy unit; multiply by emission factor to compute carbon content; compute carbon stored; correct for carbon unoxidized; and convert carbon oxidized to CO_2 emissions. The reference approach provides a speedy estimate of total CO_2 emissions but does not break down the emissions by sector. In order to make accurate abatement policy decisions, a sectoral breakdown of national CO_2 emissions is required using more detailed calculations than the reference approach. The estimation of non-CO_2 GHG emissions requires more detailed knowledge of activities and technologies (for example, combustion conditions, technology, emissions control policies and fuel characteristics) and here a sectoral approach is needed.

Industrial processes

The main emission sources in the industrial processes sector are production processes which chemically or physically transform materials. Many GHGs, including CO_2, CH_4, N_2O, PFCs, NO_x, NMVOCs and CO, can be released during these processes. There are several types of industrial process: in the chemical industry,[21] metal production, and the production and consumption of halocarbons and SF_6. Often total

emissions from a sector originate from just a few plants. To estimate emissions in this sector, activity-level data are multiplied by the appropriate emission factor per unit of consumption/production. Production data for this sector are available from the UN and the US Bureau of Mines.

Solvent and other product use

Solvents and related compounds are a major source of NMVOCs but a small overall contributor to a state's greenhouse gas emissions. They are used in cleaning products for both domestic and industrial use. Paints and lacquers are also included in this category. These gases are emitted from a variety of dispersed activities which can be referred to as 'area' sources as they come from a large number of dispersed applications rather than large centralized 'point' sources, such as those in the industrial processes sector. Accurate emissions estimation in this sector is difficult and results can be highly uncertain. Emissions calculations can be based either on production, using annual production data and an appropriate emission factor, or on consumption of solvents or related substances. Emissions estimates based on consumption assume that any paint purchased is used shortly after purchase. Less original IPCC guidance exists for this sector because of the lower priority given to these gases.

Agriculture

Monitoring of the agriculture sector is divided into emissions from domestic livestock, rice cultivation, prescribed burning of savannas, field burning of agricultural residues and agricultural soils. Data for these areas come from the Food and Agriculture Organization (FAO),[22] the International Rice Research Institute (IRRI) and the IPCC, as well as from individual country studies.

Enteric fermentation and manure management are the primary sources considered in domestic livestock. Enteric fermentation produces CH_4 as a by-product of animals' digestive processes. Decomposition of animal manure under anaerobic conditions also produces CH_4.[23] The methodological issues are complex in this sector. However, in simple terms, in order to estimate emissions, an emission factor is applied to the number of animals of each livestock type. The IPCC provides default emission factors for the calculation. The same methodology applies to manure management.

In rice cultivation, anaerobic decomposition of organic material in flooded rice fields produces CH_4. Methane fluxes differ temporally, and with different soil types and textures. Fluxes also depend on other factors, in particular the water management regime. Because of the manifold complexities involved, a range of emission levels is required instead of a single number. The methodology for rice cultivation involves multiplying a methane emission factor by the annual harvested area, multiplied by the number of cropping seasons a year.

Savannas are tropical and subtropical formations with continuous grass coverage. Burning of savannas occurs every one to four years and produces CO_2 emissions.[24] The CO_2 will, however, be reabsorbed during the next growing season (although with the degradation of land over time some CO_2 will be lost). Other greenhouse gases (CH_4, CO, N_2O and oxides of nitrogen) will not, however, be reabsorbed. To estimate emissions for this sector the quantity of biomass that burns is calculated and then multiplied by the fraction oxidized and by the carbon fraction.[25] Ratios must then be applied to the carbon released in order to derive estimates of the non-CO_2 gas emissions.

Field burning of agricultural residues occurs sometimes for energy and sometimes as a way of disposing of waste. It results in emissions of CH_4, CO, N_2O and NO_x. Again, although CO_2 is emitted it is normally later reabsorbed during the next growing season.

Finally, N_2O emissions occur from direct emissions from soils and from nitrogen used in fertilizers. The emission estimation methodology for this area is based on emission factors and data from the FAO.

Land-use change and forestry[26]

Monitoring of this sector covers emissions to and removals from the atmosphere of greenhouse gases. This sector is responsible for emissions of CH_4, N_2O and certain indirect GHGs, but CO_2 is the main GHG in this sector. The primary activities to be monitored here are changes in forest and other woody biomass stocks, forest and grassland conversion, and the abandonment of managed land (cultivated and pasture land).[27] Methodologies for estimating emissions in this sector have traditionally been considered as particularly complex and direct measurements are difficult to perform. Problems of land area monitoring and complexities involved

in monitoring natural processes are acute. The use of satellites to monitor land use and forestry has been suggested as one way of overcoming some of the difficulties of obtaining reliable data. A basic approach to emissions estimation is 'to make simple assumptions about the effects of land-use change on carbon stocks and the subsequent biological response to the land-use change, and to use these assumptions to calculate carbon stock changes and hence the carbon dioxide flux'.[28]

Waste

This sector is responsible for many greenhouse gases but the most important is CH_4. Disposal (for solid waste this means landfill, recycling or incineration) and treatment of industrial and municipal wastes can produce emissions of most of the important GHGs. With regard to land disposal of solid waste, the data needed for estimation are population statistics, waste statistics, degradable organic carbon (DOC) content and categories of waste disposal sites. The methodology for emissions estimation involves information such as the amount of waste deposited in different categories of waste disposal sites, the fraction of DOC and the amount which actually degrades, and the fraction of CH_4 in landfill gas. With regard to CH_4 from waste-water handling, the data needed include population statistics, the DOC, industry output, the amounts of industrial waste water and sludge produced, and the types of handling system in use. The amount of organic material in these streams determines the amount of CH_4 production. The methodology for this sector entails multiplying the amount of organic material in the waste water or sludge by an average emission factor for each waste-water or sludge source to derive the emissions estimates. Estimating N_2O emissions from human sewage requires knowledge of average annual per capita protein consumption, population statistics, the fraction of nitrogen in protein and an emission factor. To estimate emissions in waste incineration the carbon emitted must be separated into biomass and fossil fuel-based fractions, with only the fossil fuel portion being counted. Traditional air pollutants can be estimated from existing inventory systems.

Inventory management

Each party to the UNFCCC uses a different system to compile its inventory, based on its particular institutional structure. For instance, in the United Kingdom the

Department for Environment, Food and Rural Affairs (DEFRA) is responsible for planning and co-ordinating the UK inventory as well as its submission. The compilation and updating of the inventory is contracted out to a private consulting company. This company obtains data from yet other specialist organizations. Other government departments are also involved in providing data and methodological work.[29]

In order to maintain and improve the quality of inventories, certain procedures must be undertaken, including uncertainty management, verification and review. Users of emissions inventories need to understand the reliability of the estimations, both the totals and the component parts, depending on how detailed they need their information to be. National inventories usually contain a wide range of emission estimate types; for some it is easy to maintain a high level of accuracy, for others it is more difficult. Uncertainty estimates that are consistently produced will not only render decisions based on inventory estimates more informed but will also help prioritize efforts to improve the accuracy of inventories in the future. To this end the IPCC has not only provided instructions in its *Revised 1996 Guidelines* but has also produced an extensive new set of guidelines to provide good practice guidance and help states in uncertainty management of their national inventories; the guidelines were adopted by the Conference of the Parties (COP) to the UNFCCC in 2000.[30] Moreover, another good practice guidance report has been compiled solely for the land-use, land-use change and forestry sector in order to improve emissions estimation in this complex area. Finally, the IPCC hopes to produce a new revision of all these guidelines, to be released in 2006.

Quality assurance (QA) and quality control (QC) procedures form an integral part of inventory quality management and assist in the assessment of inventory completeness. QA is a 'system of routine technical activities, to measure and control the quality of the inventory as it is being developed', for example, accuracy checks on data acquisition. QC activities 'include a planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process'.[31] QA/QC procedures also cover the use of direct emissions measurement through continuous emissions monitoring.

Verification of emissions estimates reduces the risk of inaccurate inventories. It can be undertaken in a variety of ways. At the national level, comparison with other independently compiled national or regional inventories is useful to check

completeness. Comparisons with other countries' inventories, comparison of activity data with independently compiled data sets, comparison of emission factors between countries and comparisons of national emission inventories with independently compiled international data sets (see below) are also useful. Comparison can be made with atmospheric measurements at the local, regional or global levels (see below). Direct source testing of key source categories can also be carried out.

The final step in ensuring that inventories are accurate and finding areas needing of improvement is the review procedure. Review of inventories is carried out annually and has three parts. First, the UNFCCC Secretariat conducts a brief check on the completeness of the inventory and checks that it is in the correct format; second, the secretariat then compiles a synthesis and assessment document which compares data across parties and highlights areas to be considered in the third part, which is the individual review process. Individual reviews are carried out by groups of experts who are nominated to a roster and co-ordinated by the secretariat. The individual review can be carried out in three ways: by in-country review, by centralized review (which takes place at the UNFCCC Secretariat) or by desk review (where the experts work from their home countries). The results of the reviews and the synthesis and assessment documents are made publicly available on the UNFCCC website.

The secretariat aims to ensure that expert review teams can cover all economic sectors and that their membership is balanced between Annex I and non-Annex I parties. Some 150 experts from 73 parties had been involved in review procedures as of 2003.[32] In addition, an inventory review training programme developed by the secretariat was launched in 2004 to promote broader representation from parties and to increase the number of available experts.

The quality of greenhouse gas monitoring so far

In general the quality of inventory compilation by Annex I parties to the UNFCCC has steadily improved, as has the timeliness of national inventory reporting: 36 parties[33] submitted their inventory within six weeks after the due date for 2004 compared to 29 in 2003 and 22 in 2002. However, there is room for improvement in parties' inventories: some were still incomplete when submitted.[34] Under the

Kyoto Protocol (article 5.1) Annex I parties must have in place national systems (institutional, legal and procedural arrangements) for estimating GHG emissions and removals no later than one year before the start of the first commitment period (2008). Annex I parties are still in the process of setting these systems up and progress in meeting the UNFCCC requirements differs widely between them. If parties do not meet the eligibility criteria for national systems they will be in non-compliance with the Kyoto Protocol and will be unable to participate in the protocol's flexible mechanisms.[35] If a sufficient number of parties are in this position at the beginning of the first commitment period, the protocol will be considerably weakened and time will be lost. Parties should therefore do their utmost to ensure that these systems are implemented promptly.

Non-Annex I parties are not as yet required to submit inventories annually. However, in the long term it is vital that these states are able regularly to compile high-quality national inventories. The UNFCCC has set up capacity-building measures for these states. The financial, technical and institutional barriers to inventory compilation differ from country to country but can often be severe. The degree to which Annex I parties support these measures financially will determine how quickly the developing country parties can improve their own inventories.

Other international emissions inventories

There are several independently compiled international emissions inventories that can be used to verify national inventories under the UNFCCC (as referred to above) and are valuable additional sources of information on greenhouse gases.

The IEA produces an annual statistical report on CO_2 emissions from fossil fuel combustion for more than 140 countries, including data going back to 1960 for highly developed countries and 1971 for other countries. The Carbon Dioxide Information Analysis Centre (CDIAC), which is part of the US Department of Energy (DOE) and was established in 1982, also provides various data on CO_2 emissions. The Global Emissions Inventory Activity (GEIA) Center, which was established in 1990 and is also based in the US, develops global emissions inventories from both natural and anthropogenic sources. The National Institute for Public Health and the Environment (RIVM) in the Netherlands, and TNO, a

Dutch consultancy, co-operated with the GEIA (so as not to duplicate its work) in developing another global emissions source database in the early 1990s. The Emission Database for Global Atmospheric Research (EDGAR) uses less detailed national data than the GEIA but seeks to be more comprehensive and complete in geographical coverage and source categories. Both the GEIA and EDGAR provide inventories for historical and recent emissions. It should be noted that the data used to compile these inventories are not entirely independent of each other or even of some of the data used for national inventories.

The EU Emissions Trading Scheme

On 1 January 2005 the EU Emissions Trading Scheme (ETS) is due to start. Although flexible mechanisms[36] to make emissions reduction efficient are provided for under the Kyoto Protocol, the EU decided to expand the environmental and economic efficiency benefits to be gained from emissions trading by creating an emissions trading scheme for companies in the EU. The ETS is designed to be compatible with but independent of the Kyoto Protocol. Under the ETS, member states devise national allocation plans which divide carbon emission allowances between companies and sectors (covering in total some 12,000 installations[37]). The allocation plan should lead to a given level of emissions reduction in the particular state. Trading occurs as companies with excess allowances sell them to other companies which need them.

A sound monitoring and reporting system is the backbone of a credible and functioning trading scheme. The EU has passed legislation[38] for monitoring greenhouse gas emissions under the ETS. A number of nations and various state governments in the United States have already implemented or are in the process of implementing emissions trading schemes of their own.[39] It is important that the monitoring provisions stipulated by these schemes are compatible with those of the ETS. In this way it will be possible to link the schemes, since the integrity of the emissions trading units can be ensured.

The monitoring of emissions under the ETS differs from monitoring practices under the UNFCCC and the Kyoto Protocol because the purposes and scope of the two monitoring systems differ: under the ETS only CO_2 is currently set to be

monitored during the first commitment period, 2005–2007, in order to facilitate the inauguration of the scheme. More GHGs may be included in future commitment periods. Furthermore, the only sectors covered are energy activities, the production and processing of ferrous metals, the mineral industry, and industrial plants for the production of pulp and paper (accounting for about 45 per cent of CO_2 emissions from the EU countries).[40] The principles governing the monitoring and reporting guidelines are similar to those of the IPCC and the UNFCCC in that they strive for completeness, consistency, transparency and accuracy. Since the ETS is intended to be compatible and consistent with the UNFCCC and the reporting of other emissions data for the European Pollutant Emission Register (EPER), emissions must be labelled by applying codes from the IPCC common reporting format and the Integrated Pollution Prevention and Control (IPPC) source category code of the EPER.[41]

Under the ETS, operators[42] of installations must report their emissions annually to specified competent national authorities. The member states themselves must submit a report annually to the European Commission covering allowance allocations, application of the monitoring guidelines and compliance issues.

Under the monitoring requirements, emissions can be determined using a calculation-based methodology or a measurement-based methodology or a combination of the two.[43] Monitoring of emissions under the ETS by calculation uses an approach similar to that found in the IPCC guidelines. The formula is:[44]

Emissions = activity data x emission factor.

If emissions are calculated, the activity data, emission factors, oxidation factors, total emissions and uncertainty estimates must be reported. The determination of emission factors must be based on European Committee for Standardization[45] (CEN) standards and, if these are not available, with International Standards Organization (ISO) standards. If measurement is used, total emissions, information on the reliability of the measurement methods and uncertainty assessments must be reported.

The measurement of emissions under the ETS requires the use of continuous emission measurement systems (CEMS): an instrument monitors emissions directly and continuously by taking a part of the flue gas stream from a stack, measuring the pollutant concentration in this part and then extrapolating to the total gas flux. Adherence to certain CEN or ISO standards is again required. Measurement has

been traditionally thought of as the most accurate form of monitoring for many parts of industry; indeed, the US Acid Rain Program and the EU Large Combustion Plant Directive require the use of CEMS. However, this may not be true for CO_2 emissions from energy use. In addition, although modifying a CEM which measures sulphur dioxide (SO_2) or N_2O to also measure CO_2 is relatively inexpensive, installing a CEM from scratch can be extremely costly. Furthermore, it has been found that CEMS tend to overestimate emissions. It is likely therefore that, on the whole, emissions calculation will be used instead.[46]

The ETS monitoring guidelines provide a selection of approaches, referred to as tiers, for determining activity data, emission factors, oxidation and conversion factors. The successful use of higher tiers has increased levels of accuracy.[47] Under the scheme, operators must use the highest tier approach unless it can be shown to the competent authority that it 'is technically not feasible or will lead to unreasonably high costs',[48] in which case a lower tier may be used.

Inventory management

The ETS contains several provisions for inventory management, including requirements for operators to use QA/QC and uncertainty assessment. It also requires operators' emissions reports to be checked by an independent accredited verifier who will consider the 'reliability, credibility and accuracy of monitoring systems and the reported data relating to emissions'.[49] However, several aspects of the verification regime are not yet fleshed out, including those relating to the responsibilities of the verification process and the verifier, verification methodology and level of assurance,[50] meaning the 'degree to which the verifier is confident in the verification conclusions that it has been proved whether or not the information reported for an installation taken as a whole is free from material misstatement'.[51] These issues are currently being worked on in order to have an effective system up and running before 1 January 2005.

Future success of monitoring

The ETS was developed and is being implemented rapidly. Early preparation by business and member states is fundamental to ensuring a smooth start to the first commitment period. Whether there will be a smooth start is in the balance:

many difficulties at the member state level relating to the transposition of legislation and the timely submission of appropriate national emissions allocation information have beset preparations for the scheme. To a great extent these difficulties are to be expected in the context of normal political bargaining and manoeuvring, and as long as the European Commission maintains a firm line this aspect of the preparations should not be an impediment to the start of the first commitment period. However, a recent report[52] has suggested that many companies are unprepared for the scheme in a variety of ways due to lack of confidence in its underlying framework. This lack of preparation has also affected the potential reporting capabilities of companies at an operational level.[53]

The success of the scheme therefore depends on (a) the ability and willingness of business to implement appropriate strategies for participation in and compliance with the scheme quickly, and (b) the ability of member states' governments both to inspire confidence in the scheme by ensuring that serious emissions allocation limits are set and to ensure that they have the administrative capacity to monitor and regulate the functioning of the scheme in their territory.

Corporate greenhouse gas registers

International and national emissions inventory systems are maturing both in terms of their coverage of emitting sectors (although some gaps still remain) and in terms of the quality of states' competence in this field. However, such systems are unable to show emissions from multinational corporations holistically: since the activities of these companies span the globe they fall, in terms of emissions accounting, between the limited legislative reach of national emissions monitoring systems, which target specific installations but can only do so in their own jurisdiction, and international monitoring systems, such as that of the UNFCCC, which have global reach but do not target specific companies. A number of initiatives have recently been launched in response, a prominent example being the Global Greenhouse Gas Register of the World Economic Forum (WEF), announced in December 2003.

The Global Greenhouse Gas Register is a web-based tool for corporations to voluntarily and publicly record their GHG emissions and reduction targets. It is

the first global platform for corporations to make their emissions known and is designed to promote corporate GHG emissions transparency through companies committing themselves to a set of common measurement and reporting principles. It is also hoped that it will enhance energy efficiency and effective greenhouse gas management, and support the development of emissions trading schemes and regulatory requirements. So far 12 large companies which together account globally for some five per cent of Annex I parties' emissions have joined the scheme. The target is to have 20–25 companies included by the end of 2004. Companies are required to prepare an annual corporate-wide inventory for the register of the same six GHGs as under the UNFCCC. The major benefit of this venture for multinationals is that it allows the global emissions data of a company to be viewed, as opposed to only its national emissions data under national emissions reporting or trading schemes. Emissions registers can play an important role in engaging business in climate change activities.

The methodological basis for preparing the inventory is the Greenhouse Gas Protocol (see below) of the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD).[54]

The register also makes provisions for verification: companies either can arrange independent verification of their inventories or must allow checks to be made by accredited[55] verifiers organized by the register. Whichever type of verification companies undergo will be made clear in the reports.[56] The register will randomly select a number of companies which have not arranged independent verification (or are not already required to have it) for a review. Issues to be examined include credibility, reliability, and the accuracy of monitoring and documentation procedures. This process is not intended to be as detailed or accurate as verification under GHG trading schemes such as those of the EU or the UK and is designed to verify only to a 'minimal' level the principles mentioned above, in order to keep costs down. Consequently the focus of the verification procedures is to be at head-office level and site-specific visits are not intended.

The Greenhouse Gas Protocol Initiative was established in 1998 to develop internationally accepted accounting and reporting standards for use by companies and other organizations. It is currently used by a number of companies, including several global corporations. Moreover, in August 2004 Mexico decided to use a version

of the protocol to assist its businesses in preparing GHG inventories, the first country to do so. The harmonization of reporting and accounting standards under this initiative should make policies such as carbon taxes, regulations and standards on emissions and emissions trading schemes easier to implement for both companies and governments. It aims to be consistent with most other GHG reporting schemes.

Sector-specific guidelines are also beginning to emerge: guidelines for reporting greenhouse gas emissions produced by the International Petroleum Industry Environmental Conservation Association (IPIECA) were completed in December 2003 and a compendium of GHG emissions estimation methodologies for the oil and gas industry was produced in April 2001 by the American Petroleum Institute. In addition, the ISO is currently developing an international standard for GHG accounting and verification which should be published within two years.

The recent emergence of these various initiatives to monitor greenhouse gas emissions demonstrates both that there is growing commercial support for action on climate change and a clear recognition of the importance of monitoring and reporting in such efforts. Even though the initiatives are often different in scope, structure and aims, it is encouraging that uniformity in monitoring, reporting and verification standards is being sought. Indeed, it is crucial, as these reporting platforms, trading schemes, standards and emissions reduction programmes grow in size and increase in number, that harmonization and standardization of accounting procedures continues in order to ensure that the data produced are truly comparable, transparent, accurate and credible, and therefore useful for mitigation policy decisions and emissions trading.

Global and regional atmospheric monitoring systems

International, national and corporate emissions inventories provide information that identifies who and what is responsible for greenhouse gas emissions, and in what quantity. The use of atmospheric emissions monitoring systems which measure concentrations of GHGs in the atmosphere complements this information. These systems are essential for understanding how emissions interact with the atmosphere and for furthering our understanding of how the climate responds to emissions from both natural and anthropogenic sources.

Several organizations currently perform atmospheric greenhouse gas monitoring. The National Oceanic and Atmospheric Administration (NOAA) monitors atmospheric CO_2 concentration from four observatories, in Alaska, Hawaii and Samoa and at the South Pole. In addition, the Global Atmosphere Watch (GAW) programme of the World Meteorological Organization (WMO) measures GHGs in the atmosphere from several ground-based stations around the world. It is also possible to use aircraft equipped with monitoring instrumentation for atmospheric GHG monitoring.[57] Furthermore, satellites can be particularly useful for monitoring GHGs (as well as monitoring land-use change). A number of new ventures are under way: the Greenhouse Gas Observing Satellite (GOSAT)[58], due to be launched in 2007, will monitor the distribution of the density of CO_2 while Aura, developed and launched on 15 July 2004 by the US National Aeronautics and Space Administration (NASA), will distinguish between the natural and industrial influences on climate change. Data from Aura will also help to improve climate change computer models.

Efforts to monitor greenhouse gases in the atmosphere have hitherto been largely unco-ordinated, at least globally. However, as governments have recognized the need for more accurate climate-related information there has been a surge in initiatives to co-ordinate the diverse monitoring systems scattered around the world. In 1992 the Global Climate Observing System (GCOS) was established to co-ordinate and facilitate the observations and information required to understand climate change; subsequently in 1998 the Integrated Global Observing Strategy (IGOS) was set up to harmonize land- and space-based observing systems; and most recently, in April 2004, a framework plan for a co-ordinated earth observation system (known as the Global Observation System of Systems) was adopted at the Earth Observation Summit in Tokyo, Japan. If successfully implemented this initiative could substantially improve our ability to monitor GHG emissions and climate change.

Conclusion

It is apparent that in certain regions, such as Europe, there is already substantial capacity to perform monitoring at most levels, from the individual industrial plant to national estimates. However, this is not the case in much of the developing

world, and efforts by the developed world to remedy this situation, using channels such as the UNFCCC, must therefore continue to be supported and be increased. Furthermore, emissions monitoring systems and techniques, while comparatively advanced in Europe, are by no means flawless, and there is a considerable amount of work to do to improve the quality of emissions monitoring. Corporate greenhouse gas registers are an effective means of spurring business into finding innovative ways to reduce emissions and of pinpointing the extent to which companies are succeeding. It is encouraging to see robust corporate monitoring schemes appearing. It is important that these schemes receive as much positive exposure as possible in order to encourage more companies to use them.

It is also encouraging to see the growth of initiatives to co-ordinate global atmospheric monitoring and satellite use: the combined results of the manifold systems will provide a wealth of new information. Finally, although GHG monitoring techniques now cover many sectors, several, such as international aviation, still need harmonized monitoring and reporting procedures.

Accurate greenhouse gas monitoring is vital for our understanding of what effect humans have on the environment and for deciding what actions to take to mitigate the problems identified. This chapter has shown that GHG monitoring is required at many different levels. GHG emissions monitoring is a relatively new phenomenon but the capacity to perform it is advancing quickly in terms of reliability, sectoral coverage and consistency between systems: the international community should continue to build on the progress already made.

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Endnotes

1 The term 'radiative' is used by the IPCC to denote 'an externally imposed perturbation in the radiative energy budget of the Earth's climate system' (J.T. Houghton et al. (eds), *Climate Change 2001: The Scientific Basis,* Contribution of Working Group I to the Third Assessment Report of the IPCC, Cambridge University Press, Cambridge, 2001, section 6.1.1).

2 Intergovernmental Panel on Climate Change (IPCC), *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, *Volume 3,* ch. 1.8, www.ipcc-nggip.iges.or.jp/public/gl.invsi.htm.

3 These are known as indirect greenhouse gases since they are not important GHGs themselves but can influence the concentration of some GHGs. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3,* ch. 5.1.

4 In the IPCC Third Assessment Report, 2001 (see J.T. Houghton et al. (eds), *Climate Change 2001*), some GWP values have changed from those in the IPCC Second Assessment Report (SAR). However the values found in the SAR are currently being used for calculations in inventories under the UNFCCC. For the Second Assessment Report see J.T. Houghton et al. (eds), *Climate Change 1995: The Science of Climate Change,* Cambridge University Press, Cambridge, 1996.

5 US Environmental Protection Agency, www.epa.gov.

6 *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, *Volume 1,* annex 2.

7 The IPCC was established by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) in 1988 in recognition of the potential threat of climate change.

8 UNFCCC, 'Review of the implementation of the commitments and of other provisions of the convention. National communications: greenhouse gas inventories from Parties included in Annex I to the convention. UNFCCC guidelines on reporting and review', FCCC/CP/1999/7, 1999, p. 5, www.unfccc.int/resource/docs/cop5/07.pdf.

9 One major difference between the systems is that the IPCC approach includes only anthropogenic sources, whereas the CORINAIR approach includes natural sources as well.

10 Moreover, a CORINAIR inventory can, with some manipulation, be converted into an IPCC inventory. Much progress has already been made in harmonizing the IPCC and EMEP/CORINAIR approaches. Over time various EU states have used different combinations of these systems, including basing data predominantly on CORINAIR or national methodologies or the IPCC approach or a combination of these systems. Few EU countries have used only the IPCC approach, since other approaches predate that of the IPCC. Andrea Moran and Julian Salt, 'International greenhouse gas inventory systems: a comparison between CORINAIR and IPCC methodologies in the EU', *Global Environmental Change,* vol. 7, no. 4, 1997, pp. 317–336; and 'International greenhouse gas inventory compilation systems: CORINAIR and the IPCC', 1996, Prepared for the EU Directorate General XII Environment Programme.

11 Some parties with economies in transition (EIT parties) use a different base year. See 'UNFCCC guidelines on reporting and review', FCCC/CP/1999/7, for details of which base year each EIT party may use.

12 'Sinks' refer to activities which remove greenhouse gases from the atmosphere.

13 The highest priority source is CO_2 energy sources, then CO_2 from land-use change. The next are CH_4 from major source categories—rice production, coal mining, oil and natural gas, enteric fermentation and animal waste, landfills and other waste, and biomass burning—then N_2O from agriculture, and other greenhouse gases. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, *Volume 2,* 'Introduction'.

14 *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, *Volume 3,* 'Introduction'.

15 *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, *Volume 1,* 'Glossary 2'.

16 *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, *Volume 2,* ch. 1.2.

17 Most carbon is emitted as CO_2 immediately during the combustion process. Some carbon is released as CO or CH_4 or non-methane hydrocarbons, which oxidize to CO_2 in the atmosphere within a period from a few days to 10–11 years.

18 Fugitive emissions can be intentional or unintentional and may arise from production, processing, transmission, storage or use of fuels and non-productive emissions from combustion. See *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, *Volume 3,* ch. 1.1-2.

19 Under the UNFCCC parties do not include emissions from fuels purchased on their territory for use by international aviation and maritime traffic (known as 'bunker fuels') in their national totals, but report them separately.

20 'Apparent' consumption here signifies that the calculation tracks the consumption of primary fuels in an economy with adjustments from net imports and stock changes in secondary fuels but does not give actual consumption. See *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, *Volume 1,* 'Glossary', for more details.

21 In the chemical industry a major source of GHG emissions is cement production: CO_2 is produced during the production of clinker, which is an intermediate product from which cement is made.

22 Data are published in the FAO *Production Yearbook*. The FAO mainly obtains these data from national data and questionnaires, although several other sources are used in the compilation process.

23 Nitrous oxide is also produced from this sector.

24 The burning of savannas is intentional and is used to improve the quality of the land. Benefits from the burning process include nutrient cycling and weed eradication.

25 A carbon fraction determines the amount of carbon released from the oxidized biomass.

26 Although the IPCC guidelines refer to land-use change and forestry, the term 'land use, land-use change and forestry' has now become the usual title for this sector in the UNFCCC negotiations.

27 This is broken down into three sectors: changes in carbon stored in soil and litter of mineral soils due to changes in land-use practices; CO_2 emissions from organic soils converted to agriculture or plantation forestry; and CO_2 emissions from the liming of agricultural soils.

28 *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, *Volume 3,* ch. 5.3.

29 UNFCCC, 'Report on the in-depth review of the third national communication of the United Kingdom of Great Britain and Northern Ireland', FCCC/IDR.3/GBR, 8 May 2003, www.unfccc.int.

30 *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, 2000, www.ipcc-nggip.or.jp/public/gp/english/.

31 *IPCC Good Practice Guidance*, ch. 8.4.

32 UNFCCC, 'Counting emissions and removals, greenhouse gas inventories under the UNFCCC', 2003.

33 The number of parties that are obliged or have volunteered to report as Annex I parties has fluctuated between 35 and 41.

34 UNFCCC, 'Methodological issues, greenhouse gas inventories', FCCC/SBSTA/2003/14, 2003; and individual reviews of greenhouse gas inventories 2003 and 2004, www.unfccc.int.

35 Flexible mechanisms include emissions trading, joint implementation and the clean development mechanism. See Molly Anderson, 'Verification under the Kyoto Protocol', in Trevor Findlay and Oliver Meier (eds), *Verification Yearbook 2002,* Verification Research, Training and Information Centre (VERTIC), London, December 2002, pp. 147–169.

36 See previous endnote.

37 Defined in the monitoring legislation as 'a stationary technical unit' where an activity covered by the scheme is carried out. European Commission, Decision of 29 January 2004 establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council, Brussels, 29 January 2004, C(2004) 130 final.

38 European Commission, Decision of 29 January 2004 establishing guidelines for the monitoring and reporting of greenhouse gas emissions.

39 Australia, Denmark, New Zealand, Norway and the UK have national emissions trading schemes. States in the US which are interested in emissions trading include California and some in the northeast.

40 The Carbon Trust, www.thecarbontrust.co.uk, accessed September 2004.

41 European Commission, Decision of 17 July 2000 on the implementation of a European pollutant emission register (EPER) according to Article 15 of Council Directive 96/61/EC concerning integrated pollution prevention and control (IPPC), 2000/479/EC.

42 An operator is defined as a person who operates or controls an installation or, where this is provided for in national legislation, to whom decisive economic power over the technical functioning of the installation has been delegated (European Commission, Decision of 29 January 2004 establishing guidelines for the monitoring and reporting of greenhouse gas emissions).

43 The operator must demonstrate that measurement will give higher accuracy than calculation. In addition, the operator must corroborate the measured emissions by calculation.

44 If the emission factor does not take account of the fact that some of the carbon is not oxidized, the emission factor and activity data should also be multiplied by an oxidation factor.

45 For further information see www.cenorm.be/cenorm/index.htm.

46 Center for Clean Air Policy/TNO/FIELD, 'Study on the monitoring and measurement of greenhouse gas emissions at the plant level in the context of the Kyoto mechanisms', 2001, www.europa.eu.int/comm/environment/climat/pdf/finalreport0110.pdf.

47 For instance, with respect to emission factors for CO_2 emissions from combustion, tier 1 requires using IPCC factors, tier 2 requires using specific emission factors as reported to the United Nations Framework Convention on Climate Change Secretariat by the member state, and tier 2b requires the operator to derive emission factors for each batch of fuel based on either density measurement or net calorific value in combination with empirical correlation as determined by an external laboratory (European Commission, Decision of 29 January 2004 establishing guidelines for the monitoring and reporting of greenhouse gas emissions).

48 European Commission, Decision of 29 January 2004 establishing guidelines for the monitoring and reporting of greenhouse gas emissions, p. 12.

49 European Commission, Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.

50 The European Accreditation Body has set up a working group to develop a Greenhouse Gas Guidance Note. The International Emissions Trading Association (IETA) has created several new working groups to develop, inter alia, Greenhouse Gas Auditor Training Programme requirements and a Greenhouse Gas Verification Protocol.

51 European Commission, Decision of 29 January 2004 establishing guidelines for the monitoring and reporting of greenhouse gas emissions, p. 6.

52 Ernst and Young, 'The European Emissions Trading Scheme: A challenge for industry or just an illusion?', 2004, www.ey.com.

53 Companies in the UK and the Netherlands are better prepared as they have emissions trading experience from their domestic trading schemes.

54 Companies can use other inventory programmes' protocols as long as they incorporate the standards provided for in the Greenhouse Gas Protocol.

55 The Global Greenhouse Gas Register will use existing GHG verification accreditation processes such as the United Kingdom Accreditation Service (UKAS).

56 Some companies have emissions from operations in both developed and developing countries. Their emissions in the developed countries are independently verified, but those in the developing countries are not. For such cases the register stipulates that emissions in the developing countries do not need to be verified as long as the companies' verified sites account for more than 75 per cent of their total emissions.

57 For instance, see www.earthobservatory.nasa.gov:8000/Newsroom/Campaigns/COBRA.html and, on the GAW programme, www.wmo.ch/web/arep/gaw/gaw_home.html.

58 This satellite is being developed by the Japan Aerospace Exploration Agency (JAXA) and Japan's Ministry of the Environment. See www.jaxa.jp/missions/projects/sat/eos/gosat/index_e/html.

9

International systems for monitoring and verifying fisheries agreements

Judith Swan

International fisheries agreements have been gathering significant momentum on a global scale, particularly since the 1992 United Nations Conference on Environment and Development (UNCED). A number of post-UNCED international fisheries instruments have been developed that build on the general framework established in the 1982 United Nations Convention on the Law of the Sea,[1] and address issues connected to such concerns as unsustainable fishing practices, inadequate fisheries management and insufficient controls on the high seas. They have responded to the need for clearer global agreement on emerging fisheries problems and their solutions, and for continuing recognition of the role of fisheries in food security.[2]

There is no doubt that these mechanisms were needed. Information continues to confirm that, despite local and regional differences, the global potential for marine capture fisheries has been reached.[3] From 1974–2003 there was a consistent downward trend in the proportion of stocks offering scope for the expansion of fishing. At the same time, there has been a rise in the proportion of overexploited and depleted stocks, although this appears to have stabilized in recent years.[4]

More specifically, the Food and Agriculture Organization (FAO) of the United Nations (UN), the leading international fisheries institution, has estimated that about one-quarter of the main fisheries stocks monitored in 2003 were underexploited (three per cent) or moderately exploited (21 per cent).[5] About one-half of the stocks were fully exploited (52 per cent) and producing catches close to their maximum sustainable limit. Approximately one-quarter were overexploited (16 per cent) or depleted (eight per cent), up from an estimated ten per cent in the mid-1970s.

Yet there may be cause for a degree of cautious optimism that the status of fish stocks will improve over the medium-to-long term. Given the strengthened inter-

national framework for fisheries governance developed over the past decade, including monitoring and verification systems, the surging international commitment to tackle over-fishing and growing social pressure to generate sustainable fisheries, and technological advances, it is conceivable that the proportion of stocks currently being over-fished could decrease significantly in coming decades.[6]

This chapter describes the key post-UNCED international fisheries instruments, as well as the monitoring mechanisms of the principal international institution —FAO—that facilitates their implementation. It also analyzes the activities of, and the measures introduced by, the regional institutions through which these instruments are put into effect, the regional fishery bodies or arrangements (RFBs), and a voluntary network that monitors compliance with international agreements. Throughout the chapter, areas of concern with respect to future monitoring and verification are noted.

International fisheries instruments and institutions

International instruments

Four major post-UNCED fisheries instruments constitute the framework for international fisheries governance. Two of these are legally binding on parties, and two are voluntary. Monitoring and verification are important elements of all of them.

The two legally binding international instruments, or core 'rulebooks', focus on principal areas like fisheries management, flag state responsibilities,[7] monitoring, compliance and enforcement and dispute settlement.

- **1993 Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (FAO Compliance Agreement).**[8] Its primary objective is to respond to the problem of fishing vessels acquiring and operating under 'flags of convenience' to avoid complying with conservation and management measures agreed by regional fisheries management organizations (RFMOs) (a subset of the RFBs mandated to adopt binding fisheries conservation and management measures). It applies to fishing vessels that are used for fishing on the high seas and contains detailed provisions regarding the information that states parties should supply to FAO.[9]

- **1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UN Fish Stocks Agreement).**[10] It elaborates on the provisions of the Law of the Sea Convention, and is applied in the context of, and is consistent with, that convention.[11] Its objective is 'to ensure the long-term conservation and sustainable use of straddling fish stocks and highly migratory fish stocks through effective implementation of the relevant provisions of this Convention'.[12] It concerns the conservation and management of straddling fish stocks and highly migratory fish stocks that are situated beyond areas under national jurisdiction, with the following exceptions: employment of the precautionary approach;[13] compatibility of conservation and management measures; and application by the coastal state of the general principles governing conservation and management.[14] It contains provisions on the collection and supply of information and on co-operation,[15] and standard requirements for the procurement and sharing of data.[16]

Importantly, both instruments specify requirements concerning compliance, information, catch verification and reporting for the purposes of monitoring and enforcement. See Table 1 for details of the measures that a state must adopt under Article 18(3) of the UN Fish Stocks Agreement with respect to vessels flying its flag.

Although the instruments apply mainly to high seas fishing, many of their requirements have been widely implemented by the RFMOs and states and, as appropriate, have been extended to fisheries within areas of national jurisdiction. Their provisions have also formed the basis for the establishment of two new RFMOs: the South-East Atlantic Fisheries Organization (SEAFO); and the Western Central Pacific Fisheries Commission (WCPFC).

The two voluntary international instruments, meanwhile, are holistic and interrelated. They can be seen to comprise a comprehensive blueprint for responsible fisheries.[17] They are management oriented, and were formulated to be interpreted and applied in line with relevant international law. They address threats to the long term sustainability of fisheries and the contribution of fisheries to the world's food supply, including overexploitation of important fish stocks, modifications to

Table 1 **Measures that a state must adopt under Article 18(3) of the UN Fish Stocks Agreement with respect to vessels flying its flag**
• Control such vessels on the high seas by means of fishing licences, authorizations or permits.
• Establish regulations to apply terms and conditions to such licences, authorizations or permits.
• Prohibit fishing without authorization on the high seas.
• Require that vessels fishing on the high seas have the licence, authorization or permit on-board at all times and produce it on demand for inspection.
• Ensure that vessels flying its flag do not conduct unauthorized fishing in areas under the national jurisdiction of other states.
• Establish a national record of fishing vessels allowed to fish on the high seas and provide access to the record, on request, to states with a direct interest, taking into account any national laws of the flag state regarding the release of such information.
• Require marking of fishing vessels and gear for identification in accordance with uniform and internationally recognizable vessel- and gear-marking systems.
• Require the recording of, and timely reporting on, vessel position and relevant fisheries data.
• Require catch verification through observer programmes, inspection schemes, unloading reports, supervision of trans-shipments and monitoring of landed catches and market statistics.
• Require the monitoring, control and surveillance of such vessels and their fishing operations via national inspection and observer schemes and vessel monitoring systems.
• Regulate trans-shipment on the high seas to ensure that the effectiveness of conservation and management measures is not undermined.
• Regulate fishing activities to ensure compliance with global, regional or sub-regional measures.

ecosystems, significant economic losses and international conflicts over the management of fisheries, and trade in fish and fish products. Irresponsible fishing activity that directly undermines management efforts is clearly identified, as are steps that should be taken by the flag state and others to counter such action.

- **1995 FAO Code of Conduct for Responsible Fisheries (FAO Code of Conduct),**[18] with its continuing series of Technical Guidelines for implementation, its four International Plans of Action (IPOAs)[19] and the 2003 FAO Strategy for Improving Information on Status and Trends of Capture Fisheries (FAO Strategy). The

substantive articles of the Code of Conduct address general principles, fisheries management, fishing operations, aquaculture development, integration of fisheries into coastal area management, post-harvest practices and trade and fisheries research. The Code of Conduct was purposely designed to be non-binding and voluntary. Drafted in a legally friendly format, its requirements can, as appropriate, be easily transformed into binding provisions and embedded in national legislation or regional agreements.

- **2002 Johannesburg Political Declaration on Sustainable Development and Plan of Implementation of the World Summit on Sustainable Development (WSSD-POI).**[20] This seeks to 'reinvigorate the global commitment to sustainable development', and accords high prominence to fisheries issues.[21] It is difficult to locate in the WSSD-POI aspects of fisheries not addressed by the Code of Conduct. In fact, many of the specific WSSD-POI fisheries provisions are a reflection of commitments contained in the four FAO IPOAs adopted within the framework of the Code of Conduct, although the various issues are treated unequally in terms of detail in the two instruments.

Both the Code of Conduct and the WSSD-POI aim to reduce fleet capacity, rebuild fish stocks, combat illegal, unreported and unregulated (IUU) fishing and minimize the impact of fishing on biodiversity and the environment. In addition, they foresee broad stakeholder participation, transparency, strengthening of institutions and implementation of the precautionary and ecosystem approaches.

The WSSD-POI recognizes the need for certain activities and more decisive implementation of fishery instruments within specified timeframes, including: implementation of the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU) and the establishment of a process for global marine assessment by 2004; implementation of the IPOA-Capacity[22] by 2005; application of the ecosystem approach to fisheries and a significant reduction in the rate of loss of biological diversity by 2010; the creation of networks of marine protected areas (MPAs) by 2012; and the maintenance or restoration of fish stocks to levels that can generate maximum sustainable yields by 2015.

Other agreements have been reached and documents signed to implement the above instruments at the global, regional, sub-regional and bilateral levels.[23] In addi-

tion, many of the RFMOs are implementing these instruments in accordance with their mandates, and states are incorporating the requirements into national legislation.

There is a significant number of bilateral and multilateral fisheries access treaties and agreements between coastal states and fishing states or entities. While it is beyond the scope of this chapter to describe and analyze them, it is important to note that coastal states are increasingly adopting regional and international standards for required information and monitoring purposes. Such standards include details of the information to be supplied on fishing operations and vessels, and the installation and maintenance of automatic location communicators for vessel monitoring systems.

International institutions

The only organization with a global fisheries mandate is FAO. The Committee on Fisheries (COFI), consisting of 188 FAO members,[24] meets biennially and, among other things, reviews the Programme of Work for fisheries.[25] At its twenty-fifth session, in February 2003, COFI identified a number of priorities for FAO's Fisheries Department, including implementation of the Code of Conduct and related instruments like the IPOAs, as well as elaboration of technical guidelines and execution of the strategy for improving status and trends reporting (see below).[26]

FAO enjoys working relations with environmental and other international organizations, including other UN agencies and forums, that serve to strengthen implementation of the Code of Conduct and the IPOAs.[27] The FAO/International Labour Organization (ILO)/International Maritime Organization (IMO) Working Group, for example, is updating existing guidelines and developing working papers to promote the implementation of the Code of Conduct.

Some international institutions that do not have fisheries-specific mandates, such as the Organisation for Economic Co-operation and Development (OECD),[28] are considering particular fisheries issues highlighted by post-UNCED instruments. Although this is a positive step towards achieving sustainable fisheries, it is beyond the scope of this chapter to describe all such actions.

Regional fishery bodies or arrangements

Major contributions to implementing fisheries agreements have been made at the regional level by the RFBs, including the RFMOs. There are over 30 RFBs globally,

with areas of competence in all of the world's oceans. While their mandates, membership, functions and funding levels vary, many have made great progress in strengthening fisheries governance at the regional level by implementing international fisheries instruments.[29]

Both the FAO Compliance Agreement and the UN Fish Stocks Agreement afford a prominent role to the RFMOs through requirements relating to the adoption of 'international conservation and management measures'. These are defined as measures to conserve or manage one or more species of living marine resources that are adopted and applied in accordance with the relevant rules of international law as reflected in the Law of the Sea Convention. Such measures may be adopted either by global, regional or sub-regional fisheries organizations, subject to the rights and obligations of their members, or as part of treaties or other international agreements. The corresponding decision-making role of the RFBs has also taken on a new significance in these instruments.[30]

The Code of Conduct encourages the RFBs to collaborate in fulfilling and implementing its objectives and principles. The roles and functions that they are called on to perform are quite extensive.[31] The Code of Conduct, together with the other post-UNCED instruments, underlines the need for all such bodies to address related issues and to be strengthened appropriately to deal with new responsibilities.

Monitoring and verification arrangements for fisheries

International level

Most, if not all, fisheries problems are global in nature and require global solutions. Monitoring and verification arrangements at the local or national levels often employ the type of arrangement and require reporting information that is determined in agreed regional or international standards or models. This is especially beneficial for the fisheries sector due to the mobile nature of the resource: many species move between areas under national jurisdiction and the high seas. Moreover, it also allows for the development of coherent standards for regional or global databases.

However, although common, and effective, monitoring and verification standards are agreed at the international level, implementing arrangements are unevenly developed at the local and state levels as a result of constraints such as inadequate

human or institutional capacity or a relatively weak legal framework. It is a positive development that increasing implementation of the international instruments, together with ongoing initiatives to establish capacity development programmes (for example the programme linked to the FAO Strategy described below), are strengthening the framework within which the implementing arrangements can be advanced.

International monitoring arrangements for the primary voluntary international instrument, the Code of Conduct, and, by association, the WSSD-POI, are extensive. Monitoring is an ongoing FAO activity, utilizing informal and formal mechanisms. The most important monitoring resource is the self-assessment information provided biennially by governments and stakeholders in response to an FAO questionnaire. Over 100 FAO members responded to the questionnaires distributed in 2000 and 2002, providing a sound profile of activity.[32] The information is collated and analyzed by FAO, and, in turn, is presented to COFI at each of its biennial sessions for review, in accordance with the request made at its twenty-second session in 1997. COFI, in its deliberations, suggests measures that might be adopted by the organization to broaden and deepen implementation of the Code of Conduct.

The constraints and proposed solutions identified by FAO members in response to the 2002 FAO questionnaire on the implementation of the Code of Conduct and reported to COFI at its twenty-fifth session in 2003 were wide ranging (see below). It is encouraging that the proposed solutions addressed such important matters as the need for policy and legislation reviews, greater emphasis on the social and economic aspects of fisheries management and enhanced fisheries monitoring, control and surveillance (MCS) systems.

Recurring constraints across regions included:

- a lack of political will to support implementation;
- fisheries not being assigned high priority nationally because of the small economic contribution that they make and the fisheries sector being poorly organized;
- high levels of over-fishing in open-access fisheries not subject to management;
- insufficient attention being paid to the development of management plans and the application of the precautionary approach;

- strong social and economic pressures on fisheries, including vulnerability to poverty and a lack of alternative employment opportunities for members of fishing communities;
- insufficient resources (funds, trained personnel, equipment, research capabilities and facilities);
- poor levels of scientific research and weak institutional capacity (including national inter-agency coordination);
- conflicts between artisanal and industrial fishers;
- meagre and inappropriate policy and legal frameworks;
- poorly developed MCS systems;
- lack of participation by fishers in decisions concerning management;
- lack of awareness by stakeholders, including officials, about the Code of Conduct and implications for fishing communities, co-operation and irresponsible action;
- continual IUU fishing;
- failure to adapt the Code of Conduct to local needs; and
- insufficient copies of the Code of Conduct and related instruments for distribution and limited numbers of documents in local languages.

Proposed solutions included:

- the provision of additional technical support from FAO and the international donor community to strengthen capacity and institutions (including training and meetings to disseminate information about the Code of Conduct to officials and other stakeholders);
- improved national inter-agency co-operation to enhance implementation of the Code of Conduct;
- the expansion of vessel buy-back programmes and industry restructuring arrangements to reduce fishing capacity;
- enhancing the research capacity of FAO members, with emphasis possibly being placed on 'twinning', or co-operative arrangements between the research facilities of different members;
- the implementation of plans to enable the recovery of overexploited stocks;
- the placement of observers on vessels to promote the implementation of better fisheries management controls;

- paying greater attention to the social and economic aspects of fisheries management;
- the initiation of policy and legislation reviews (to incorporate elements of the Code of Conduct);
- making improvements to MCS systems;
- the promotion of alternative employment opportunities for fishers;
- the translation of the Code of Conduct and related instruments into local languages so as to widen dissemination and increase awareness—while also ensuring that adequate numbers of copies of the Code of Conduct are available;
- launching education and outreach campaigns to improve awareness of the Code of Conduct, including encouraging stakeholders to better organize themselves; and
- the development of technical guidelines for small-scale fisheries management, the provision of support to encourage greater involvement by non-governmental organizations (NGOs) in the implementation of the Code of Conduct, and the facilitation of co-operation among fishers and national and regional organizations concerned with fisheries management.

A recent development has broadened the scope of the FAO Secretariat's responsibilities for monitoring implementation of the Code of Conduct. The Advisory Committee on Fisheries Research (ACFR), at its fourth session in December 2002, welcomed a draft strategy for improving information on the status of, and trends in, capture fisheries. It was later developed by a Technical Consultation,[33] which concluded that improved information on the status of, and trends in, capture fisheries should be afforded high priority in respect to implementation of the Code of Conduct. The FAO Strategy, which is scheduled to come into effect in late 2004, sets out guiding principles[34] and required actions[35] for its implementation.

As a first step, the FAO Strategy aims to determine what fishery statistical and data collection systems related to fisheries are being used by states and RFBs, and what stocks or management units are being monitored. This information will form the basis of efforts to identify gaps in monitoring and, above all, to assess the quality of the systems being employed. Subsequently, the FAO Strategy will address capacity-building initiatives in developing countries. The FAO Strategy is considered

to be even more necessary following the WSSD-POI, because better information is needed to monitor progress towards the time-bound goals for fisheries that it established.

FAO maintains other mechanisms for monitoring information on the world's fisheries, generally and specifically. On a general level, the *State of World Fisheries and Aquaculture* (SOFIA)[36] is the Fisheries Department's premier advocacy document. Published every two years, it provides policymakers, civil society representatives and those who derive their livelihood from the fisheries sector with a comprehensive, objective and global appraisal of capture fisheries and aquaculture, including associated policy issues. Although SOFIA does not monitor the implementation of specific treaties or agreements, it does indicate trends in fisheries resources, including production, utilization and trade, and this information can be used in assessing the effectiveness of the implementation of international agreements. SOFIA also looks at particular issues facing fishers and aquaculture—in 2002, these included the importance of reliable statistics in effective fisheries management, and catch certification and documentation—and reviews the fisheries activities of country groupings, another useful monitoring tool.

There are a number of components of FAO's fisheries information systems[37] that provide information on world fisheries that facilitates monitoring. In practice, the systems perform both monitoring and information functions. Some key examples are set out below:

- The Fisheries Global Information System (FIGIS)[38] was conceived in a context of global concern about the great stress being placed on most major fisheries and the non-sustainable applications of such resources. When the Code of Conduct was approved in 1995, a major need for reliable, high-quality and relevant information on the state of the world's fisheries was identified. FIGIS was created to meet this need. It serves as a tool to implement the FAO Strategy currently being established.
- The High Seas Vessels Authorization Record (HSVAR) is a database that is part of FIGIS. The HSVAR implements requirements contained in the Compliance Agreement regarding the need for flag states to report on vessels that they have authorized for high seas fishing. There were 5,517 vessel records in the database

as of August 2004, including vessels registered in Canada, Japan and the United States, as well as in member states of the European Union (EU).[39] The user may query the database for a particular vessel by radio call sign, flag state, vessel name or port or registration number, and may request details of all queries made in the past seven days. Information categories include agreements, exemptions and recent additions.

- GLOBEFISH[40] is the unit in the FAO Fisheries Department responsible for providing information on the international fish trade, and at its core is the GLOBEFISH Databank. GLOBEFISH produces a number of publications, including fish price reports (European Fish Price Report), market studies (GLOBEFISH Research Programme) and trend analysis (GLOBEFISH Highlights). GLOBEFISH is an integral part of the FISH INFONetwork (FIN)[41] and performs a coordinating role with regard to its activities.
- ARTFISH, which stands for Approaches, Rules and Techniques for Fisheries statistical monitoring, is a standardized tool that can be adapted to most fisheries in developing countries. Its design was driven by the need to provide users with robust, user-friendly and error-free approaches and computer software, and to implement cost-effective fishery statistical systems with minimal external assistance.

Implementation of the Code of Conduct is addressed at all meetings of the FAO RFBs. The meetings promote the Code of Conduct and garner feedback on national implementation schemes underway, as well as on difficulties being encountered. This has resulted in numerous initiatives, including the organization of technical consultations, workshops and seminars at various levels with a view to strengthening regional co-operation and facilitating the exchange of experiences, materials and expertise, which could assist in the implementation of the Code of Conduct at the national, regional and sub-regional levels. Most non-FAO RFBs are active in implementing the Code of Conduct.[42]

In addition to addressing the Code of Conduct and the IPOAs generally, some RFBs are focusing on specific issues like the precautionary approach, ecosystem-based management, enhanced MCS systems and vessel monitoring systems (VMS) and measures to deal more effectively with 'flag of convenience' or non-compliant

vessels. It is recognized that regional action is indispensable in promoting implementation of the Code of Conduct and the IPOAs.

FAO has facilitated the convening of biennial meetings of FAO and non-FAO regional fishery bodies or arrangements to identify and address common problems and constraints, identify and develop strategies and mechanisms to respond to them, and to share experiences and lessons learned. These meetings, held in tandem with COFI sessions, have, among other things, considered ways in which the RFBs can promote implementation of the Code of Conduct as part of the series of recent international instruments and initiatives. They have also noted related implementation activities (such as developing regional plans of action in support of IPOAs), the WSSD goals calling for the IPOAs relating to IUU fishing and capacity to be put into effect by 2004 and 2005 respectively, and the need for strengthening the RFBs and developing ecosystem management.

FAO has also contributed to the development of future monitoring and verification arrangements by convening a series of technical consultations for its members to consider current issues and make recommendations to COFI, which, inter alia, address gaps in existing arrangements. In 2004, these have included the Technical Consultation to Review Progress and Promote the Full Implementation of the IPOA-IUU and the IPOA-Capacity,[43] the FAO Technical Consultation on the Use of Subsidies in the Fisheries Sector and a Technical Consultation to Address Substantive Issues Relating to the Role of the Port State to Prevent, Deter and Eliminate IUU Fishing.

Regional level

In addition to monitoring and verification arrangements at the international level, including through international coordination and co-operation among RFBs as described above, a great deal of activity is taking place at the regional level through individual RFBs. The 2001 IPOA to combat IUU fishing incorporated and built on activities and measures that had already been undertaken by RFBs, and provided a framework for future measures and action. The definition of IUU fishing in the IPOA-IUU relates, inter alia, to contravention of regional and international obligations or laws,[44] including the two legally binding post-UNCED international fisheries instruments described above. Its provisions are comprehensive and cover a wide range of tools for monitoring and verification. The monitoring and verification

activities of the RFBs can therefore, to a great extent, be described through reviewing their implementation of the IPOA-IUU.

In 2003, the RFBs were asked to respond to an FAO questionnaire on implementation of the IPOA-IUU.[45] Of the 15 respondents, most perceived the main causes of IUU fishing to be lack of effective flag state control by both members and non-members (of the responding RFB), the operation of open registries and the profit motive. Flag state control was also highlighted as an area where some effective steps have been taken, but mostly where improved measures are required.

A predominant issue for most RFBs was the MCS system. MCS activities were identified as major challenges in combating IUU fishing activity, and certain MCS measures were cited as 'effective' by some and 'needed' by others. Trade and marketing measures, a major issue for those RFBs that have already adopted this type of initiative, were described as both effective and having a positive impact on reducing IUU fishing.

In general, the responding RFBs pointed to significant activity in implementing certain aspects of the information, institutional and policy provisions of the IPOA-IUU, and in developing MCS and compliance measures. Items where moderate but increasing activity was reported tended to be those that were prominent in the battle against IUU fishing, such as flag state responsibility, port state control and the development of action plans.

In the case of items where only a few respondents reported implementation activity, items largely focused on initiatives that were not completely applicable, such as those relating to marketing, trade, chartering arrangements and coordination with other RFBs on matters concerning policy and enforcement.

More specifically, the greatest number of 'yes' responses (ten or 11 RFBs responding per item) were related to the following points:[46]

- institutional strengthening to enhance the capacity to combat IUU fishing;
- compiling and exchanging records of authorized vessels;
- developing compliance measures;
- maintaining a record of authorized fishing vessels;
- compilation and exchange of information on details of measures introduced to counter IUU fishing; and

- regularizing coordination with other RFMOs in respect of information exchanges.

Each of the following points was identified as 'under review' by three RFBs. This is a significant number considering that, for all of the other items on the questionnaire, up to two RFBs stated that they were reviewing the matter. The activity shown indicates that there may be future strengthening in the areas noted below, many of which relate to monitoring and other information activities.

- MCS port control measures.
- Development of boarding and inspection regimes.
- Development of observer programmes.
- Market-related measures to combat IUU fishing.
- Development of action plans to counter IUU fishing.
- Determination of policy objectives for coordination with the RFMOs.
- Regularizing coordination with other RFMOs in respect of information exchanges.
- Initiatives relating to flag state responsibility.

Three items were marked as being 'highly effective':

- the exchange of information on IUU fishing and support vessels;
- the development of observer programmes; and
- the creation of action plans to combat IUU fishing.

When asked to identify major challenges to tackling IUU fishing, a number of RFBs expressed concern about the lack of flag state control, the difficulty of carrying out MCS/inspections at sea, inadequate reporting, economic or trade disincentives and the need for co-operation with other states. Other challenges reported by RFBs related to aspects of fisheries management included the exchange of information on industrial vessels, limiting destructive fishing practices, gaps in fisheries regulatory regimes, assessing fishing by non-members, awareness-raising, weak capacity and a lack of political will. Trends indicate that the RFBs are continuing to adopt an increasing number of measures to implement the IPOA-IUU, but that there is a need for intensified effort to combat IUU fishing on a global scale, accompanied by timely monitoring and evaluation.

International MCS network

The International Monitoring, Control and Surveillance Network is another effective tool in the fight against IUU fishing, including the monitoring of international agreements and obligations. The network, created in 2001, consists of governmental MCS organizations and others that co-operate voluntarily and share information and experiences. The purposes of the network include advancing MCS efficiency, sharing training, building MCS capacity, and helping countries satisfy their national MCS responsibilities and international commitments.[47] The network is proving highly useful in MCS information dissemination and as a means of verifying background data related to vessel registration applications.

Conclusion

Monitoring and verification arrangements for international fisheries instruments take many forms and are in effect at all levels. This chapter has focused on the international and regional levels, while acknowledging that the primary actors are the states that co-operate through the relevant institutions.

At the international level, FAO members continue to place a high priority on implementation of the Code of Conduct and, by association, other international fisheries instruments. In this context, constraints on implementation and proposed solutions are continuously monitored and the latter are advanced as appropriate. The FAO Strategy, as it is implemented, will strengthen databases for future monitoring and verification purposes. Increasingly, other international institutions are also addressing issues related to the monitoring and verification of fisheries instruments.

It is encouraging that fisheries governance through the RFBs is continuously being strengthened via a range of activities, including implementation of international instruments (legally binding and voluntary), the establishment of new RFMOs, the development of international and regional databases, implementation by the RFBs of new technology, such as the VMS, the creation of 'IUU vessel lists' and 'authorized vessel lists' and agreement on actions to be taken against IUU vessels, and increasing co-operation among the RFBs, between the RFBs and non-parties and between the RFBs and international institutions.

Ultimate responsibility for implementation of international fisheries instruments lies at the national level—the will and ability of states to act and to introduce the measures needed to ensure implementation. Support through human capacity development and the provision of technical assistance, for example, reflects recognition of the importance of achieving the objectives of the international instruments—long-term sustainable use of fisheries resources. It underlies the optimism, described above, that global fish stocks may now have the opportunity of enjoying a period of stability and gradual recovery.

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Endnotes

1 Opened for signature on 10 December 1982 and entered into force on 16 November 1994.

2 The United Nations Millennium Declaration of September 2000 consolidated broad consensus reached on specific time-bound targets. A set of International Development Goals (IDGs) constitutes a global agenda for the twenty-first century. All 191 UN member states have pledged to eradicate, inter alia, extreme poverty and hunger by 2015, including by halving the number of people living on less than one US dollar a day.

3 This information is based on 427 stocks monitored by FAO in 2003 and for which assessment information is available. There are wide variations among fishing regions in the percentage of stocks exploited at or beyond their maximum sustainable level.

4 The plateau is around 25 per cent, according to reports contained in *The State of World Fisheries and Aquaculture 2002,* Food and Agriculture Organization (FAO), Rome, Italy, 2002, and preliminary information for *The State of World Fisheries and Aquaculture 2004*.

5 Based on initial data for *The State of World Fisheries and Aquaculture 2004*.

6 For a full discussion, see Serge Garcia and David Doulman, 'FAO's Fisheries Programme and the Implementation of the Plan of Action from the World Summit on Sustainable Development', in Syma Ebbin, Alf Hoel and Are Sydnes (eds), *A Sea of Change: The Exclusive Economic Zone and Governance Institutions for Living Marine Resources,* Kluwer Academic Publishers, Dordrecht, Netherlands (forthcoming 2004).

7 That is, the state that authorized the vessel to fly its flag and which, therefore, has certain legal responsibilities in relation to that vessel.

8 Entered into force on 24 April 2003. As of 29 October 2004, the agreement had 29 states parties and one international organization party (the European Community).

9 Article VI, FAO Compliance Agreement.

10 Entered into force on 11 December 2001. As of 29 October 2004, the agreement had 52 states parties and 59 states signatories. It specifies mechanisms for international co-operation, describes the roles and responsibilities of non-members and non-participants in regional fisheries management organizations or arrangements, sets out the duties of the flag state and provides for compliance and enforcement. The requirements of developing states and methods of dispute settlement are additional important matters that fall within its framework.

11 Article 4, UN Fish Stocks Agreement.

12 Article 2, UN Fish Stocks Agreement.

13 Principle 15 of the 1992 Rio Declaration codified for the first time at the global level the precautionary approach, which indicates that lack of scientific certainty is no reason to postpone action to avoid potentially serious or irreversible harm to the environment. Central to Principle 15 is the element of anticipation, where effective environmental measures need to be based on actions that take a long term approach and that might anticipate changes on the basis of scientific knowledge.

14 Article 3, UN Fish Stocks Agreement.

15 Article 14, UN Fish Stocks Agreement.

16 The requirements include: general principles; principles concerning data collection; compilation and exchange; basic fishery data; vessel data and information; reporting; data verification; and data exchange. See Annex I, UN Fish Stocks Agreement.

17 For a full discussion of these instruments and the relationships between them, see Garcia and Doulman.

18 FAO, 'Code of Conduct for Responsible Fisheries', FAO, Rome, 1995, p. 41.

19 FAO, 'International Plan of Action for reducing incidental catch of seabirds in longline fisheries. International Plan of Action for the conservation and management of sharks. International Plan of

Action for the management of fishing capacity', FAO, Rome, 1999, p. 26, and FAO, 'International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing', FAO, Rome, 2001, p. 24.

20 United Nations, 'Johannesburg Declaration on Sustainable Development and Plan of Action of the World Summit on Sustainable Development', UN, New York, 2003, p. 89.

21 The WSSD-POI addresses many aspects of responsible fisheries, including: international fishery instruments and mechanisms; high-level goals (reduction of hunger and the restoration of stocks); factors that lead directly to unsustainable fisheries (fishing capacity and illegal, unreported and unregulated (IUU) fishing) and associated factors (subsidies and poor gear selectivity); primary consequences of unsustainable resource use (over-fishing); collateral effects (destructive practices, by-catch and discards, threats to biodiversity); and mitigating measures (marine protected areas and closed areas or seasons).

22 See endnote 19.

23 For example, the 2000 Convention on the Conservation of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean and the various FAO Technical Guidelines for implementation of the Code of Conduct.

24 On 3 December 2003 FAO's membership was 187 states and one organization (the European Community).

25 COFI's terms of reference as set out in Rule XXX of the General Rules of the Organization include: review the organization's programmes of work in the field of fisheries; conduct periodic general reviews of fishery problems of an international character and examine possible solutions with a view to concerted action by nations, FAO and other intergovernmental bodies; similarly review specific matters relating to fisheries referred to the COFI by the FAO Council or the Director-General, or placed by the COFI on its agenda at the request of a member state in accordance with the Rules of Procedure, and make recommendations as may be appropriate; consider the desirability of preparing and submitting to member states an international convention under Article XIV of the FAO Constitution to ensure effective international co-operation and consultation on a global scale; and report to the FAO Council or tender advice to the Director-General, as appropriate, on matters considered by the COFI.

26 FAO, *Report of the Twenty-fifth Session of the Committee on Fisheries, Rome, 24–28 February 2003, FAO Fisheries Report,* No. 702, 2003, p. 88.

27 These include intergovernmental organizations and the secretariats of international conventions with competence in promoting sustainability in aquatic systems, other regional organizations, global and regional development banks, and agencies or organizations like the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES), the International Labour Organization (ILO), the International Maritime Organization (IMO), the International Union for the Conservation of Nature (IUCN), the Network of Aquaculture Centres in the Asia-Pacific (NACA), the United Nations Division for Ocean Affairs and the Law of the Sea (UN/DOALOS), the United Nations Educational, Scientific and Cultural Organization–Intergovernmental Oceanographic Commission (UNESCO–IOC), the United Nations Environment Programme (UNEP) and the United Nations Global Environmental Facility (GEF). FAO participates in the United Nations Informal Open-ended Consultative Process on Oceans and the Law of the Sea.

28 In 2003, the OECD established a Ministerial Task Force on IUU fishing under its Round Table on Sustainable Development. Its work takes into account the IPOA-IUU.

29 For a review of the measures introduced by the RFBs to implement the post-UNCED fisheries instruments, see Judith Swan, 'Summary information on the role of international fishery organizations or arrangements and other bodies concerned with the conservation and management of living aquatic resources', *FAO Fisheries Circular,* no. 985, 2003, p. 114, and Judith Swan, 'International action and responses by regional fishery bodies or arrangements to prevent, deter and eliminate illegal, unreported and unregulated fishing', *FAO Fisheries Circular,* no. 996, 2004, p. 64.

30 Judith Swan, 'Decision-making in regional fishery bodies or arrangements: the evolving role of RFBs and international agreement on decision-making processes', *FAO Fisheries Circular,* no. 995, 2004, p. 82.

31 These include: to apply a precautionary approach widely to the conservation and management of resources; to promote compliance with, and the enforcement of, management measures; to adopt appropriate measures aimed at maintaining or restoring stocks to the maximum sustainable yield (MSY), as qualified by relevant environmental and economic factors; to compile and distribute data; to determine stock-specific reference points; to promote the use of selective and environmentally safe gear; to promote and implement effective monitoring, control and surveillance (MCS) systems and law enforcement mechanisms; and to encourage members to deter the activities of non-member vessels that engage in activities that undermine effective conservation and management initiatives.

32 These can be accessed at www.fao.org/DOCREP/MEETING/005/Y8370E.HTM.

33 The Technical Consultation involved participants from 60 FAO member states, as well as observers from regional fishery bodies and other organizations.

34 The guiding principles (Part 4 of the FAO Strategy) comprise: sustainability; best scientific evidence; participation and co-operation; objectivity and transparency; and timeliness and flexibility.

35 The required actions are described in Part 5 of the FAO Strategy, and consist of: the need for capacity building in developing countries; data collection systems in small-scale fisheries and multi-species fisheries; an expansion of the scope of information on the status of, and trends in, fisheries, including the incorporation of ecosystem considerations into fisheries management; global inventory of fish stocks and fisheries; the participation of the Fisheries Global Information System (FIGIS) in structuring and capacity building; the development of criteria and methods for ensuring the quality of information and its security; the development of arrangements for the provision and exchange of information; the role of working groups in assessing the status of, and trends in, fisheries; sustaining data collection, information on the status of, and trends in, fisheries.

36 See www.fao.org/sof/sofia/index_en.htm.

37 The full list can be found at www.fao.org/fi/default_all.asp.

38 See www.fao.org/figis/servlet/static?dom=root&xml=index.xml.

39 As of 2 August 2004, the HSVAR database provided the following breakdown of vessel records according to state: Canada (six); Japan (1,890); US (874); and the European Union (2,747) (consisting of vessels registered in Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden and the United Kingdom). The HSVAR database also noted that new vessel data had been received, but had not yet been inputted—for Benin (12), Cyprus (54), Ghana (110), Namibia (six) and Syria (22).

40 See www.globefish.org/index.php?id=994.

41 The FISHINFONetwork (FIN) consists of seven independent intergovernmental and governmental organizations plus the GLOBEFISH unit, situated in FAO's Fisheries Department. Set up to assist the fishery sector, particularly in developing nations and in countries in transition, the network provides services to private industry and governments. The execution of multilateral and bilateral projects is one of the main activities of the network. It is also widely known for its range of publications and periodicals, as well as for its organization of international conferences, workshops and training seminars. FIN has more than 70 full-time staff members and works with over 100 additional international consultants in all fields of fisheries. Fifty governments have signed international agreements with the different FIN services and are using their expertise to develop the fishery sector worldwide.

42 See Swan, 'FAO Summary information on the role of international fishery organizations or arrangements and other bodies concerned with the conservation and management of living aquatic resources'.

43 At the twenty-fifth session of COFI, held in 2003, the body: agreed that strenuous efforts should be made to control fleet capacity, particularly that of large-scale fishing vessels, and, as appropriate, to

implement measures to reduce overcapacity and prevent the excess fleet capacity from migrating to other fully-exploited or overexploited fisheries; noted the need to monitor the fleet capacity of large-scale fishing vessels on a global basis; and endorsed a Japanese proposal that FAO should convene a Technical Consultation in 2004 to review progress and promote full implementation of the IPOA-IUU and the IPOA-Capacity.

44 Definitions of illegal, unreported and unregulated fishing are provided in paragraph 3 of the IPOA-IUU.
'3.1 Illegal fishing refers to activities:
3.1.1 conducted by national or foreign vessels in waters under the jurisdiction of a State, without the permission of that State, or in contravention of its laws and regulations;
3.1.2 conducted by vessels flying the flag of States that are parties to a relevant regional fisheries management organization but operate in contravention of the conservation and management measures adopted by that organization and by which the States are bound, or relevant provisions of the applicable international law; or
3.1.3 in violation of national laws or international obligations, including those undertaken by co-operating States to a relevant regional fisheries management organization.
3.2 Unreported fishing refers to fishing activities:
3.2.1 which have not been reported, or have been misreported, to the relevant national authority, in contravention of national laws and regulations; or
3.2.2 undertaken in the area of competence of a relevant regional fisheries management organization which have not been reported or have been misreported, in contravention of the reporting procedures of that organization.
3.3 Unregulated fishing refers to fishing activities:
3.3.1 in the area of application of a relevant regional fisheries management organization that are conducted by vessels without nationality, or by those flying the flag of a State not party to that organization, or by a fishing entity, in a manner that is not consistent with or contravenes the conservation and management measures of that organization; or
3.3.2 in areas or for fish stocks in relation to which there are no applicable conservation or management measures and where such fishing activities are conducted in a manner inconsistent with State responsibilities for the conservation of living marine resources under international law'.

45 See Swan, 'International action and responses by regional fishery bodies or arrangements to prevent, deter and eliminate illegal, unreported and unregulated fishing'. A total of 34 RFBs were polled. Responses were received from 22 marine RFBs, and, of these, the total field of responses reported and assessed was 15: 12 RFMOs; and three RFBs that do not have a management mandate. Seven respondents, including four RFMOs, advised that implementation of the IPOA-IUU was not then possible or relevant to their activities and/or did not complete the questionnaire. All 16 RFMOs in existence in October 2004 responded either to the questionnaire or by providing other information.

46 Generally, only between one and three RFBs said 'no' to each of these points.

47 As of 2 August 2004, the International Monitoring, Control and Surveillance Network comprised 19 member states and entities; other states are reported to be actively considering membership. See www.imcsnet.org (user name: mcs; password: mcsnet).

48 The views expressed in this chapter are solely those of the author.

Other issues

10

Intelligence, verification and Iraq's WMD

Brian Jones

Iraq's programmes to acquire weapons of mass destruction (WMD) have raised significant questions about arms control and intelligence since the 1980s. This chapter seeks to interpret the Iraq experience with regard to the relationship between the verification of compliance with international arms control and disarmament agreements on WMD and the assessment of intelligence about WMD programmes and capabilities. The two activities—verification and intelligence—are not, of course, totally separate and independent. If not essential, interaction between the two is highly desirable despite the potential problems inherent in the relationship. It is therefore sensible to seek out lessons which might have more general relevance to the problem of the proliferation of WMD.

Intelligence and weapons of mass destruction

WMD are deemed to possess exceptional properties which pose a threat to security of a different order to that posed by conventional weapons. National security is the main reason why all governments that can afford to do so invest in gathering and analysing secret intelligence on the existing and possible future capabilities of foreign nations to produce WMD and their intentions with regard to their use.

Generally, to produce intelligence assessments secret material is collected and combined with more readily available open source data to provide a pool of information for analysis. The purpose of the assessments is to inform policy that is designed to reduce the potential threat from WMD. In the United Kingdom, assessments are provided for a wide range of customers—foreign and defence policymakers, arms controllers, export controllers, military strategists, military

commanders, civil defence planners and those responsible for the procurement of civil and military protection.

The verification of a particular nation's compliance with its obligations under international agreements is only one aspect of one element in a layered approach to defending against WMD. The overlapping elements are: to prevent or minimize possession; where this fails, to deter use; and, in the event of use, to reduce the effectiveness of the weapons.

From the intelligence perspective the overall requirement is to know as much as possible about all aspects of the WMD programmes of countries of concern. A country may be of concern if it is likely to pose a threat to national security or to national interests, including by undermining or circumventing an international agreement. The actual possession of WMD, efforts to acquire them or contributions to their proliferation are reasons for concern. The involvement of a particular country in WMD can be revealed by a voluntary declaration on its part or by intelligence that arouses suspicion about possession of WMD or WMD-related activities.

Verification of compliance with WMD agreements

The basic requirement of verification is similar to that of intelligence-gathering for national security purposes. The need is to obtain knowledge that is as comprehensive as possible about all aspects of programmes and activities potentially related to WMD in order to acquire confidence in compliance or, alternatively, to demonstrate non-compliance. Crucial to this is the generation of a good baseline assessment against which to make subsequent comparisons. This is especially important where the process is conducted in a hostile environment when baseline data can be used to develop specific criteria against which compliance can be judged. An important difference between the requirements of verification and the general intelligence requirement is that verification applies exclusively to states parties that have signed and/or ratified an international treaty.

Verification of compliance is ultimately the responsibility of the international organization established by the treaty parties to help implement their agreement. However, such organizations are not directly supported by their own secret intelligence collection system. Rather, they rely on the obligation on treaty parties to provide declarations for study and analysis and to submit to such inspection regimes

as are agreed. Some member states, in addition, conduct their own process of verification using contributions from their national intelligence collection and analysis system. Where they develop concerns about compliance, they generally have the option of investigating and perhaps resolving issues bilaterally, or even multilaterally, before referring them to the treaty authority, including by providing intelligence or intelligence-derived information to that body.

The challenges of detecting and identifying WMD capabilities

Nuclear, biological and chemical weapons are very different in many important respects and failure to recognize this creates problems for intelligence and verification alike. Use of the term 'WMD' can itself sometimes cause problems. The following observations illustrate some of the important differences between the three types of WMD that relate specifically to intelligence.

Nuclear weapons are generally the least difficult of the three from an intelligence perspective. A national nuclear weapons capability would require the involvement of many experts and a large dedicated infrastructure, even if the weapons were supplied by another nation. It would be difficult to hide a mature or maturing programme from a competent national intelligence organization or from intrusive and comprehensive compliance monitoring. A full nuclear test is likely to be detected, but it is not essential for a state to conduct such a test in order to have confidence in its nuclear capability. Once it has been acquired, there is probably little advantage for a nation to keep its nuclear weapons capability secret, deterrence generally being its most valuable property.

It would be virtually impossible for non-state actors such as terrorists to develop a nuclear capability comprising a permanently available stockpile of weapons. It would not be impossible, but it would still be very difficult for terrorists to acquire even one nuclear weapon much less a small number of them. To do so they would probably need the witting or unwitting assistance of a nuclear-capable state, especially in the supply of appropriate fissile material. It could be difficult for intelligence agencies to detect such activity.

Biological weapons (BW) are a much more challenging intelligence target. The few kilograms of biological warfare agent required to produce large numbers of casualties can be made by a state or knowledgeable terrorists within days, using

dual-purpose equipment in a very small facility involving one or two experts. Relatively simple devices can be made to spread the agent, for example by spraying. It would not be difficult to conceal such a programme and capability, even from the best intelligence organizations or the most comprehensive and intrusive compliance monitoring processes. However, large-scale field testing to ultimately validate the effectiveness of the systems involved would be highly desirable in a military programme, even for use by special forces, and this would be more vulnerable to detection. The biological weapon produced would be much easier to conceal and transport than a nuclear weapon.

Chemical weapons (CW), although far from being easy to detect, are not quite such a difficult intelligence target as BW. A few kilograms of chemical warfare agent can also be made by a state or knowledgeable terrorists within days with dual-purpose equipment in a very small facility employing one or two experts. But such quantities would not be of great value to an offensive national military programme, and, if used by special forces or terrorists, would not have the same potential impact as the BW equivalent. Yet, large legitimate chemical plants which had been modified to provide a standby capability for the production of chemical warfare agent in time of crisis would provide a degree of disguise which would not be possible for nuclear weapons.

As with BW, relatively simple devices can be made to spread the chemical warfare agent (for example, by spraying), but a given quantity of chemical has a much smaller potential to produce casualties than the same quantity of biological agent. Additionally, chemical warfare agents are generally more difficult to handle and transport because they have a rapid effect on those exposed, for example, as a result of accidental leakage. There is less risk of an attempt to use biological warfare agents failing because an operator has been exposed.

Military programmes tend to use suitably modified munitions such as warheads, bombs and shells. It would not be so easy to conceal a national military offensive CW programme and capability which would require quantities of hundreds or thousands of tons of agent and weapons. Large-scale field testing to validate the effectiveness of the systems involved would probably be essential in a military programme and would add to their vulnerability to detection. The CW produced would be as difficult or more difficult to conceal and transport than a nuclear weapon.

Iraq and WMD

In the 1980s Western intelligence organizations identified Iraq as pursuing all three types of WMD. By the end of the decade it became clear that Iraq possessed chemical weapons, including nerve agents, and was able to use them effectively on the battlefield, at least against a poorly protected enemy. It was also assessed that Iraq possessed an offensive biological warfare programme and it was suspected that it had an actual capability. It was further believed that it had an active nuclear weapons development programme but that it was still years from fruition.

This estimate was made in the context of Iraq's eight-year war with Iran in which the numerical superiority of the Iranian conventional forces had occasionally threatened to overwhelm Iraq. Iran, in the throes of its Islamic revolution, was avidly anti-Western. Many in the West saw the preservation of a balance of power as an important factor in a region responsible for the supply of strategic quantities of energy to the global economy. Iraq used chemical weapons—probably mustard gas—on the battlefield against the Iranians from 1982, gaining experience and improving its capability until the ceasefire in 1988, by which time a number of nerve agents and improved delivery systems had been developed.

The West's muted response to Iraq's development and use of chemical weapons possibly resulted from a recognition that Iraq needed the force-multiplying advantage of such weapons to resist the human wave attacks being mounted by Iran. Presumably, it was perceived that the problems of longer-term regional stability and the nonproliferation of WMD could be tackled once the Iran–Iraq war was ended. In any case, it was not contemplated that Western forces would become directly involved in a conflict in the region. It seems likely that Iraq's use of its rapidly advancing CW capability was an important factor in the negotiation of a ceasefire with Iran in August 1988.

Iraq's disarmament and the role of UNSCOM and the IAEA

The invasion and occupation of Kuwait by Iraq in 1990 was a cathartic event. The US mobilized a political and military coalition of nations to eject Iraq from Kuwait with the full authority of the United Nations (UN). Arguably, the political decision in favour of military intervention did not initially take full account of Iraq's known and potential WMD capabilities. It was only after the political commitment

was made that the coalition was forced to contemplate the possibility that Iraqi resistance might include the use of chemical and/or biological weapons. The direct WMD threat to coalition forces brought the issue into sharper focus than ever before for the modern generation of political and military leaders, not least because shortcomings in the level of preparedness emerged and required rapid attention and some 'quick fixes'. The ejection of Iraq from Kuwait in 1991 also led to the inclusion in the ceasefire terms of the requirement that Iraq should relinquish its WMD capabilities and programmes, verifiably demonstrate that it had done so, and submit to long-term monitoring to ensure they were not reconstituted. The exact requirements were defined in United Nations Security Council resolution 687 of 3 April 1991.

Responsibility for verifying Iraq's compliance with this resolution was given to the International Atomic Energy Agency (IAEA) in relation to nuclear weapons and to a new, specially created United Nations Special Commission (UNSCOM) for chemical and biological weapons and ballistic missiles.[1] The IAEA is a large permanent organization that has existed since 1957, with responsibility for verifying compliance with the 1968 Nuclear Non-Proliferation Treaty (NPT). UNSCOM was not envisaged as a permanent body and comprised only a small core of permanent staff at the UN in New York. Both organizations made extensive use of temporarily recruited experts to support their core staff, especially to conduct missions to inspect facilities, examine records and interview Iraqi personnel.

Even prior to obligations being imposed on it by resolution 687, Iraq was party to several international agreements relating to WMD. It had ratified the NPT in 1968 and its safeguards agreement with the IAEA entered into force in 1972. It had signed the Biological Weapons Convention (BWC) when it was opened for signature in 1972, but had not ratified it until effectively required to do so by resolution 687. Since the BWC does not have a verification regime, Iraq was not, in any event, subject to inspections in regard to that treaty. While the Chemical Weapons Convention (CWC) was not agreed until late 1992 (and Iraq never indicated that it would become a party to it), it was party to the 1925 Geneva Protocol which bans the use of chemical and biological weapons. In respect of its use of CW against Iran, however, Iraq claimed never to have used them on territory it did not believe to be its own and that it was therefore not in violation of the Protocol.

The requirements accepted by Iraq under resolution 687 for disclosure and inspection thus far exceeded those under its existing treaty obligations. As a result, the implementation of resolution 687 provided a rare opportunity for the intelligence community to compare its pre-war estimates to Iraq's declarations of its WMD capabilities and the discoveries of the IAEA and UNSCOM. It also provided a unique opportunity to test methodologies for the verification of compliance.

Iraq's initial response

Despite the strict and intrusive requirements accepted by Iraq, the environment in which verification was attempted proved hostile. It was made much more difficult by President Saddam Hussein's decision, in contravention of resolution 687, to commence dismantlement and destruction unilaterally. Had this not been the case, the direct contact which subsequently developed between the IAEA/UNSCOM and the national intelligence communities might have been much less necessary. Had Iraq co-operated, national governments, receiving verification reports through the UN Security Council, would simply have required their own intelligence organizations to endorse Iraq's declarations as being credible and complete.

But Iraq's initial disclosures were not credible. It denied that any of its nuclear facilities, equipment and materials were part of a programme to acquire nuclear weapons and, despite the fact that incontrovertible evidence to the contrary began to accumulate in the first few months of the IAEA investigation, continued to do so for several years. It tried to explain away some of the evidence by suggesting that it represented embryonic research to inform a political decision should Iraq's security require the development of a nuclear weapons capability in the future. It acknowledged no more than a similar incipient interest in BW, but proof of the existence of a more advanced programme proved to be difficult for the UNSCOM inspectors to find. It was to be some years before significant progress was made on the BW problem. Iraq's possession of large numbers of chemical weapons meant that it could not deny having an offensive CW capability. However, it soon became apparent that the regime was not willing to co-operate unreservedly even on the CW issue.

With Saddam Hussein still in power, Iraq remained a closed society ruled by terror. There was no ready source of secret informants and individuals feared

being open with the inspectors. The inadequacy of Iraq's initial response in terms both of its declarations and of its co-operation in the conduct of inspections and inquiries created suspicion. In order for progress to be made the verification agencies recognized that intelligence from national governments was necessary to assist with their investigations. Additionally, the UK and US in particular were beginning to understand the need for the integration of intelligence with verification processes following their experiences in attempting to deal with the Soviet Union's CW and BW capabilities and programmes in the early 1990s.[2]

Designated IAEA and UNSCOM inspectors were thus given detailed intelligence briefings by the UK and US national intelligence authorities, which allowed disclosure of information to them at very high levels of security. Arrangements were also made to provide appropriate lower-level but comprehensive briefings for multinational teams about to embark on specific missions in Iraq. Recognizing the challenge of meeting this unique requirement, the Deputy Chief of the Defence Intelligence Staff (the UK intelligence community's analytical arm) established a small cell of analysts to focus on the intelligence requirements of UNSCOM and the IAEA. The activity and the cell were identified as Operation Rockingham.

Progress to 1998

Despite Iraqi obfuscation, rapid progress was made by the IAEA and UNSCOM in the nuclear and CW fields, respectively. It transpired that the intelligence estimate of Iraq's CW capability and programme had been highly accurate in terms of the facilities and senior personnel involved in the programme, the type and quantity of agents produced, and the nature and size of the weapons stockpile. Using some of this information and its own inspection and interrogation resources, UNSCOM was able to press Iraq towards ever more credible 'full, final and complete' declarations. However, Iraq's reluctance to be more forthcoming than was absolutely necessary to placate the Security Council created the impression, shared by intelligence and UNSCOM officials alike, that Iraq was seeking to retain as much of a CW capability as possible.

There had been less confidence in the original intelligence picture provided of Iraq's BW capability. There had been certainty that a programme existed. Some, but by no means all, of the facilities, personnel, agents and delivery systems of

interest proved to have been identified in intelligence assessments. It had been estimated that an offensive capability probably existed and the possibility that Iraq possessed ballistic missile warheads filled with anthrax spores and botulinum toxin had been reported. Although no 'smoking gun' evidence was available to be provided to UNSCOM during the years before Iraq admitted possession, the intelligence information available, together with suspicions arising from UNSCOM's own tenacious investigations, was sufficient to keep the inspectors engaged long enough for the breakthrough to be made in 1995.

It was the persistence of the inspectors, particularly in the matter of bacterial growth media that could be used for the production of some biological warfare agents, that forced Iraq to admit to the production of large quantities of the micro-organisms for anthrax and of botulinum toxin, but it took the defection of General Hussein Kamel Hassan, Saddam's son-in-law, to prompt the fuller disclosure that led to the acknowledgment of BW production. The capability and programme that Iraq admitted to in a progressive series of declarations between 1995 and 1997 indicated that intelligence assessments had been conservative. Progress with a few BW agents was more advanced than estimated and at least one undetected agent (aflatoxin) was declared to have been loaded into bombs and possibly ballistic missile warheads.

Kamel's defection also pushed Iraq to finally acknowledge the existence of the extensive nuclear weapons programme that IAEA inspectors had uncovered. It transpired that the programme was considerably more advanced than intelligence had estimated before the war with respect to both the production of weapons-grade fissile material and the design and development of an implosion device.

It may be instructive to speculate on why knowledge of the nuclear programme which was so quickly revealed after the Gulf War was significantly more limited before it. It has been suggested that the focus by intelligence analysts with a background in advanced Western nuclear technology on the sophisticated Soviet nuclear weapons programme had reduced the sensitivity of the intelligence community to signatures of the more primitive aspects of the programme that Iraq was pursuing. Another factor may be that, as a party to the NPT subject to IAEA safeguards, Iraq was not afforded a high priority for close monitoring by stretched intelligence services which were, justly, preoccupied with the much

more urgent Soviet and Chinese threats and with the activities of four non-NPT parties—India, Israel, Pakistan and South Africa. Perhaps there was a general presumption, albeit unwarranted, that the IAEA had Iraq covered. The question that follows from this is whether membership of the NPT and apparent verification of compliance by the IAEA by means of nuclear safeguards provided some advantage for Iraq in the concealment of its illegal activities. The IAEA and its membership at least implicitly acknowledged this by strengthening nuclear safeguards after this episode.

During the post-Gulf War period up to at least 1995–96 there was a high degree of co-operation and collaboration between the IAEA/UNSCOM and national intelligence organizations. It was later, when the IAEA effectively closed the book on the nuclear programme but UNSCOM was unable to do the same, that significant problems arose. The problem, especially in the BW field, was that, although no 'smoking gun' could be found, UNSCOM did not feel confident that Iraq's declarations and future intentions were honourable. This uncertainty was shared by most of those in the intelligence organizations that were closely involved. It resulted in the UK and US governments demanding that the verification process be kept alive. There was consequentially a demand on intelligence to provide leads for the inspectors to follow up. In the absence of tangible physical evidence, this led to UNSCOM being provided with increasingly speculative information.

There were contradictory pressures for progress from some member states which appeared to believe that, in the absence of 'proof' of non-compliance, Iraq should be given the benefit of the doubt, despite the reservations of at least some of their intelligence agencies. Humanitarian organizations highlighted the severe impact of economic sanctions on the long-suffering Iraqi population, while the Iraqi leadership benefited disproportionately from the UN's Oil for Food programme.

Iraq claimed, apparently with justification, that it had discovered injudicious intelligence collection activity by certain participants in UNSCOM missions and used this to end its co-operation with the UN inspectorate in the second half of 1998. All IAEA and UNSCOM inspectors were withdrawn before the US and the UK in December 1998 launched Operation Desert Fox to destroy 'WMD-related facilities' by aerial bombardment. Ultimately this led to UNSCOM being disbanded and to the absence of inspectors from Iraq until late 2002.

The United Nations Monitoring, Verification and Inspection Commission

The United Nations Monitoring, Verification and Inspection Commission (UNMOVIC) was created to replace an UNSCOM which was seen by many as having been discredited by its association with the collection of intelligence. To avoid this problem, UNMOVIC's Executive Chairman, Hans Blix, presumably supported by his College of Commissioners and on the recommendation of the 1999 Amorim report, insisted that intelligence agencies be kept at arm's length.[3] He also appeared determined to ensure that some of the leading personalities in UNSCOM were not dominant players in the new organization.

As a result, some long-established links at the working level between individual UNMOVIC inspectors and intelligence analysts were lost and Blix apparently had no channel by which he might discover the views of specialist intelligence analysts, as distinct from high-level political projections of intelligence assessments. This was important because there had been no new intelligence to stimulate the change in UK and US policy towards a more alarmist view of Iraq's WMD capability in the first half of 2002. As has subsequently become clear, the intelligence on which much of the political rhetoric was based in the period up to the war was not as voluminous as that rhetoric implied, nor was it judged to be of high quality by the experts. Although senior UNMOVIC personnel were briefed by national intelligence analysts, those involved have noted a significant reduction in the degree of interaction compared to that which took place with UNSCOM. Once inspections began again and the political stakes grew, the insights that might have come from working-level contact between individual inspectors and their national intelligence organizations could have better informed the UNMOVIC leadership.

Misjudgement of the status of Iraq's WMD programmes

The verdict of the Iraq Survey Group (ISG), an Australian/UK/US inspection team deployed to Iraq after the coalition invasion in March 2003, was that, after 1991, Iraq had not systematically retained biological or chemical weapons, although a few 'forgotten' and apparently barely usable munitions were found. Moreover, although the ISG judged that an intention to eventually do so existed, Iraq had no significant programmes for reconstituting its pre-war WMD capabilities or any tangible plans to re-establish such programmes.[4] The question must therefore be asked why

Iraq failed to convince UNSCOM of this and why UNSCOM was unable to verify it (the IAEA was largely content with verification of Iraq's programmes after 1995). Equally important is the question why intelligence failed to establish that this situation existed.

Secret offensive CW and BW capabilities and programmes are difficult intelligence targets. The existence of militarily significant stockpiles of CW should not be difficult to establish because the industrial-scale production and storage of toxic agent and weapons require careful handling that is hard to conceal. However, the possession of a breakout capability by rapid production in weeks or months using facilities converted from legitimate activity is difficult to detect and, therefore, also difficult to dismiss as a possibility. Although field trials and exercises using chemical weapons, which the military would normally consider essential, would tend to be 'visible', they can be concealed as defensive in nature. However, such activity would arouse suspicion. Their absence in Iraq, especially in the earlier part of the 1990s, was not considered especially significant because Iraq's knowledge and experience of the use of CW on the battlefield would have been retained from the war against Iran. Furthermore, there was a continuing undercurrent of evidence of covert attempts to procure dual-use chemicals and equipment that had relevance to CW agent production.

This circumstantial evidence from intelligence, together with the absence of any clear, positive indications that Saddam had ordered the elimination of all of Iraq's WMD programmes, fed into a verification process in which Iraq did not seem concerned to inspire trust and was unwilling or unable to account for relevant materials and weapons.

As for BW, strategically significant quantities of some biological warfare agents are so small that detection of their secret production might be highly unlikely even for the most advanced intelligence capabilities. Under such circumstances, especially where a previous capability has been established, there is a great onus on the suspected country to inspire trust. By failing throughout to fully characterize the nature, objectives and concepts of use of its previous BW programme, even when its acknowledgement had been unavoidable, Iraq created a high degree of suspicion among intelligence analysts and verification experts alike.

Arching over the deep suspicions of both groups was a failure to comprehend that, having been deprived, or having divested himself, of his WMD capabilities

and programmes, Saddam might still be unwilling to adopt a more positive approach to UNSCOM. It seemed implausible that he would not have grasped the opportunity to relieve Iraq of the sanctions that were so constraining its economic and military recovery. With the benefit of hindsight a number of possibilities arise that might explain the situation:

- Did Saddam, whose supporters gave him great credit for Iraq's apparently successful defiance of the West, feel that he could not lose face by submitting and acknowledging that Iraq had been disarmed? Hans Blix has suggested that such considerations might explain why so much of Iraq's programmes were quietly and unilaterally destroyed by Iraq away from the glare of humiliating publicity.
- Or could it have been that for reasons of Iraq's security in a region where several states either possessed or were pursuing WMD Saddam felt unable to acknowledge that he no longer possessed a deterrent?
- Or was Saddam encouraged to continue this deception by the growing support of some Security Council members for the removal of sanctions?

An important further question is whether a better understanding of Iraqi culture and Saddam's personal traits could have led to an appreciation of these possibilities. These aspects have not figured significantly in the debate over Iraq. They would also appear to be a variation on a theme relating to North Korea's attitude to WMD—that Pyongyang sees them as a politico-diplomatic tool as much as a military or security capability. Such possibilities should be a more significant feature of arms control and disarmament discourse, and indeed may have been newly recognized as part of the negotiations aimed at securing the WMD disarmament of Libya.[5]

A workable interface between intelligence and verification

Access to good intelligence is a highly desirable requirement for those concerned with the verification of compliance with international agreements related to WMD. For a variety of good reasons it is unlikely that the international bodies would wish to become directly involved in secret intelligence collection. The need is for national intelligence organizations to provide appropriate guidance to the international bodies, which must in turn develop the capacity to be wise users and guardians of intelligence.

There are several reasons why nations and their intelligence agencies will be concerned about passing secret information to an international body and, in the process, losing control over how it is used. The protection of the sources from which intelligence is derived is the most obvious, but the reasons will also include a reluctance on the part of different countries to provide general indications of their technical capabilities and capacities in collecting intelligence. From a security perspective, there will also be a danger that limitations in either intelligence or defensive capability might be deduced directly from the information offered or indirectly from what is not forthcoming. A further consideration may be a concern about the impact of a particular verification initiative on broader national policy objectives.

One possible solution is that the organization associated with verification could include on its permanent or semi-permanent staff individuals from states parties with significant national intelligence capabilities who are recognized by both sides as conduits for intelligence information. The inclusion of individual national intelligence experts to advise inspection teams on specific missions has been considered and rejected in the past because of fears of spying. The suggestion here is that the individual acting as the conduit should not be a serving national intelligence officer but an international civil servant and that his or her status should be declared publicly in order to counter accusations such as that made by Iraq against UNSCOM, that it was providing cover for national spies. The onus would be on the state to accurately qualify the intelligence advice that it provided to the conduit, otherwise the individual concerned could be placed under intolerable pressure. The national incentive would be the advantage gained by assisting in the establishment of general confidence in the status of the individual by demonstrating his or her legitimacy. The international body would, of course, retain the right to veto the continued employment of the individual should that confidence not be established or retained.

It is ironic that the UK, having recognized a specific need to dedicate part of its intelligence effort to the Iraq WMD inspection process through Operation Rockingham, should subsequently be accused of the deliberate misuse of intelligence to create a false impression of the continued existence of Iraq's programmes. While political imperatives may have led to the unusual circumstances in which

speculative suggestions from intelligence were transmuted into more significant advice for inspectors, the concept of national intelligence organizations creating groups focused on supporting international efforts at verification of compliance is, potentially, a good one.

Another possibility would be for the verification body to provide a focal point for the receipt of intelligence, probably in the form of a small unit of specialists, the membership of which would be agreed by all the nations involved. However, the difficulties of assembling a universally accepted and trusted group are obvious, and there are always likely to be limits to the degree of openness and transparency in such an arrangement. The inhibition might be reduced if the nation supplying intelligence had the option of limiting access to only those specialists it was content should see the information.

While none of these suggestions would provide an ideal solution, they would establish a transparent process by which intelligence could be introduced and help develop an improved capability for the verification body to make its own judgements about what was offered.

Conclusion

There seems little doubt that the verification and intelligence communities will have to continue to operate in an environment that is sometimes subject to strong influences from national political interests. Such influences hampered attempts to verify Iraq's compliance with its obligations to the UN Security Council and it is sensible to acknowledge that there will always be a danger of this sort at the interface between verification and intelligence. It will generally be easier for an international verification organization to operate independently of such pressures than national intelligence agencies. The onus must therefore be on the verification organization to continuously review the quality of intelligence advice on the basis of direct experience and to consider this as a factor in making its assessments.

However, national governments need to recognize both the long-term advantage of cultivating trusting relationships with international organizations and the dangers of abusing their access to the verification process. With respect to intelligence,

the guiding principle might be for national intelligence organizations to treat the international body as though it were an intelligence ally.

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Endnotes

1 For further analysis of UNSCOM and the IAEA in Iraq, and of the later UNMOVIC, see the chapter by Trevor Findlay in this volume, and Trevor Findlay and Ben Mines, 'UNMOVIC in Iraq: opportunity lost', in Trevor Findlay (ed), V*erification Yearbook 2003,* Verification Research, Training and Information Centre (VERTIC), London, December 2003, pp. 45–63.

2 See David Kelly, 'The Trilateral Agreement: lessons for biological weapons verification', in Trevor Findlay and Oliver Meier (eds), *Verification Yearbook 2002,* VERTIC, London, December 2002, pp. 93–109.

3 Hans Blix, *Disarming Iraq,* Bloomsbury Publishing, London, 2004, p. 50.

4 US Central Intelligence Agency, *Comprehensive Report of the Special Advisor to DCI,* 30 September 2004, www.cia.gov/cis/reports/iraq_wmd_2004/index.

5 See the chapter by Jack Boureston and Yana Feldman in this volume.

II

Monitoring human rights treaties

Patricia Watt

The United Nations (UN) has human rights as one of its central ideals. The Preamble of the UN Charter seeks 'to reaffirm faith in fundamental human rights, in the dignity and worth of the human person, in the equal rights of men and women and of nations large and small'. In pursuing this goal UN member states have concluded seven major human rights treaties which establish human rights standards in a variety of different areas.

However, while states have been willing to agree human rights treaties, they have not been as enthusiastic about the monitoring of their own compliance with such agreements. This has produced a monitoring system that relies on the voluntary co-operation of states parties rather than one that induces or can compel compliance through incentives and/or disincentives.

Nonetheless each of the main human rights instruments does have its own committee to monitor its implementation. This allows the international community to become aware of breaches; sends a signal to victims that they are not alone; can result in perpetrators being held accountable, politically and in some cases legally; and can be a catalyst for change. Such monitoring is essential, as victims are often unable to hold their governments accountable due to a lack of democracy, shortcomings in the rule of law or the absence of independent domestic monitoring or enforcement bodies.

This chapter will analyze the monitoring arrangements for the main UN human rights treaties, focussing on the role of their corresponding committees. It will introduce the committees, describe the way in which they operate, consider criticisms of their work and discuss proposed reforms to their operation individually and collectively.

Custom and treaties

There are two main sources of international human rights law—custom and treaties.[1] Customary international law develops through the emergence of a general, uniform, consistent and settled practice which is joined by a sense of legal obligation. Such norms are considered to be applicable to all. While there is no consensus among commentators on the extent and scope of human rights norms under customary international law, it is accepted that some do exist. These include protection from slavery, genocide and torture. Treaties, meanwhile, are negotiated and agreed by states and only bind those states which become party to them.

Table 1 **Principal human rights treaties**

Treaty	Date adopted	Entry into force	Current signatories/ parties*
International Convention on the Elimination of all Forms of Racial Discrimination (CERD)	21 Dec. 1965	4 Jan. 1969	7 signatories 169 parties
International Covenant on Economic, Social and Cultural Rights (ICESCR)	16 Dec. 1966	3 Jan. 1976	7 signatories 149 parties
International Covenant on Civil and Political Rights (ICCPR)	16 Dec. 1966	23 Mar. 1976	8 signatories 152 parties
Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW)	18 Dec. 1979	3 Sep. 1981	1 signatory 177 parties
Convention against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment (CAT)	10 Dec. 1984	26 June 1987	12 signatories 136 parties
Convention on the Rights of the Child (CRC)	20 Nov. 1989	2 Sep. 1990	2 signatories 192 parties
International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families (ICMW)	18 Dec. 1990	1 July 2003	10 signatories 26 parties

Note * As at 18 August 2004.
Source Office of the United Nations High Commissioner for Human Rights (OHCHR), www.ohchr.org.

The two main sources of international law are not mutually exclusive. Many rights now embodied in human rights treaties were previously established as norms under customary international law.

The seven core human rights treaties listed in table 1 cover a range of rights, including the right to life,[2] the right to equality before the law,[3] the right to equal pay for equal work,[4] the rights of self-determination,[5] the right to work[6] and the right not to be subjected to discrimination.[7] As of 18 August 2004 every state had ratified at least one of the treaties, and 161 states (84 per cent) had ratified four or more.[8]

Monitoring mechanisms

The key means of monitoring implementation of, and compliance with, human rights within the UN system is the main human rights committees (see table 2).

The work of these committees is essential because of the unique character of human rights law. Although concluded by states, human rights treaties principally govern not the relationship between states parties but the relationship between governments and individuals and among groups and individuals within states.

Moreover, many states have no independent internal mechanism to guarantee adherence to standards that govern the treatment of individuals. International monitoring is therefore vital to ensure that human rights are fully realized. Each human rights committee may only consider the rights established in the relevant treaty and can only relate these rights to states that are party to the treaty. Hence it is important for the international community to strive for universalization of the core human rights treaties.[9]

The committees have many features in common. They are made up of state party nominees who are expected to act in their personal capacity. Each state party may nominate an individual for election to a committee. Election to each committee is by secret ballot. To ensure balanced geographical representation each state may only have one of its nationals on a committee at any one time.[10] As with any election in the UN system, elections to the human rights committees are subject to political considerations.

Each state party is required to submit reports to the relevant committee, although the reporting frequencies differ. Each committee reports annually to the UN General

Table 2 **UN human rights committees**

Treaty	Committee
International Convention on the Elimination of All Forms of Racial Discrimination	Committee on the Elimination of All Forms of Racial Discrimination (CERD Committee)
International Covenant on Economic, Social and Cultural Rights	Committee on Economic, Social and Cultural Rights (CESCR)
International Covenant on Civil and Political Rights	Human Rights Committee (HRC)
Convention on the Elimination of All Forms of Discrimination Against Women	Committee on the Elimination of Discrimination against Women (CEDAW Committee)
Convention against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment	Committee Against Torture (CAT Committee)
Convention on the Rights of the Child	Committee on the Rights of Child (CRC Committee)
International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families	Committee on Migrant Workers (ICMW Committee)

Assembly, except for the Committee on Economic, Social and Cultural Rights (CESCR), which reports to the UN's Economic and Social Council (ECOSOC).

At least four of the committees permit the submission of complaints by individuals about a violation of a treaty right. A state party must, however, first elect to recognize the competence of the committee to consider such complaints. Individuals, for their part, must show that they have exhausted all effective domestic remedies before a committee will consider their communication. The committee's proceedings are not meant to be an appeal process against national decisions, but rather an independent assessment. Although most committees only allow individual persons to lodge complaints, the Optional Protocol to the 1979 Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) has broadened this to groups of individuals.

Below is a brief introduction to each committee and its monitoring role. As the 1990 International Convention on the Protection of the Rights of All Migrant

Workers and Members of their Families (ICMW) only entered into force on 1 July 2003 and its committee has only recently started work it will not be considered further here.

Committee on the Elimination of All Forms of Racial Discrimination

The Committee on the Elimination of All Forms of Racial Discrimination (CERD Committee) is made up of 18 experts of 'high moral standing and acknowledged impartiality'. It has three means of monitoring. First, it examines reports submitted by states parties. Second, it may receive communications from a state party or parties alleging that another party is not fulfilling its obligations under the convention. Finally, it can receive individual communications. The committee meets for two sessions of three weeks each year.

Committee on Economic, Social and Cultural Rights

Established by ECOSOC in 1985[11] to monitor implementation of the 1966 International Covenant on Economic, Social and Cultural Rights (ICESCR), the CESCR is the only body not established by the treaty that it monitors. It meets twice yearly for three-week sessions. Its membership consists of 18 people who are 'experts with recognized competence'. The CESCR examines states' reports on their implementation of the convention. While it does not have the ability to hear communications from individuals or groups on complaints about specific breaches, a draft optional protocol is currently being considered by a working group of the Commission on Human Rights[12] in Geneva, Switzerland, that will allow the committee to do so.

Human Rights Committee

The Human Rights Committee (HRC) has 18 members, 'persons of high moral character and recognized competence in the field of human rights', who must be nationals of states parties. It meets three times a year for a session of three weeks. Its three principal activities are: reviewing states' reports; issuing General Comments that clarify states' obligations and interpret the substantive provisions of the 1966 International Covenant on Civil and Political Rights (ICCPR); and handling communications from individuals as allowed under the treaty's First Optional Protocol. The HRC may also hear a complaint from a state party that another

party is not fulfilling its obligations under the convention. This process only applies to states parties which have made a declaration accepting the competence of the committee in this regard. As with the other interstate complaint procedures, this process has never been utilized.

Committee on the Elimination of Discrimination against Women

The Committee on the Elimination of Discrimination against Women (CEDAW Committee) is composed of 23 experts. In electing them, attention is paid to the representation of 'different forms of civilization',[13] as well as the principal legal systems. Its main monitoring tool is the examination of reports submitted by states parties. It can also formulate general recommendations to states parties that elaborate on the nature of the rights contained in CEDAW. While the convention does not provide for a communications procedure, its Optional Protocol allows for complaints to be heard from individuals or groups of individuals and for the CEDAW Committee to inquire into systematic violations of the treaty. The inquiry mechanism is only applicable if a state party has recognized the competence of the committee.

The Committee Against Torture

The Committee Against Torture (CAT Committee) consists of 10 members. A state party must report to the committee on its compliance one year after the entry into force of the convention for the state party concerned. Thereafter reports must be submitted every four years. The committee examines the reports and issues 'concluding observations' comprising 'main findings' and recommendations to the state party. The convention establishes three other mechanisms through which the CAT Committee performs its monitoring functions—the inquiry procedure, examination of interstate complaints and examination of individual complaints. As with the interstate complaint process under the ICCPR and the 1965 International Convention on the Elimination of all Forms of Racial Discrimination (CERD), this only applies to states parties which have accepted the committee's competence.

The inquiry procedure is available only to the CAT and CEDAW Committees. Pursuant to Article 20 of the 1984 Convention against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment (CAT), the committee may

conduct an inquiry if it receives reliable information which appears to it to contain 'well-founded indications that torture is being systematically practiced in the territory of a State Party'. As in the case of CEDAW, a state party may decline to recognize the competence of the committee to carry out such an inquiry, by making a declaration to that effect. Another radical development under the CAT is found in its Optional Protocol. When this comes into force, it will create a sub-committee that will allow in-country inspections of places of detention.

Committee on the Rights of the Child

States parties must submit an initial report to the Committee on the Rights of the Child (CRC Committee) two years after joining and then every five years thereafter. The committee also publishes its interpretation of the content of human rights provisions, known as General Comments, and General Recommendations on thematic issues or its methods of work. The committee currently has 18 members selected on the basis of 'high moral standing and recognized competence in the field covered by the convention'.

The committees' monitoring methods

The current UN system of human rights treaty bodies is not well equipped to carry out the more stringent monitoring, verification and compliance functions found in other types of international agreements, such as in the field of arms control and disarmament. The reporting system, when working effectively, allows states to demonstrate their compliance, but is inadequate in detecting and/or in deterring non-compliance.

States may be found to be in breach of human rights norms as evidenced by the comments of a committee, including an opinion given pursuant to an individual communication. However, determination of a breach does not automatically produce a change in behaviour or practice since there is nothing to compel a state to adopt a committee's findings, although international embarrassment and political pressure from other states may induce it to do so. Steps are being taken to overcome this problem. The HRC, for instance, now designates a member to follow up individual communications, including by conducting on-site visits.[14]

The detection of violations is also problematic. Some states fail to report, while others report sporadically and poorly. The committees do not have their own fact-finding processes to verify the content of reports. Even the HRC has not used on-site visits at the evidence-gathering stage. Committees have attempted to overcome this problem by using other sources of information, including international organizations and non-governmental organizations (NGOs). For example, the CRC Committee has a close working relationship with the United Nations Children's Fund (UNICEF), permitted under Article 45 of the 1989 Convention on the Rights of the Child (CRC), that provides a regular flow of empirical information. NGOs are also used by the CRC Committee to supplement reports.[15]

There has been much criticism of the performance of the UN monitoring system. Yet 50 years ago the concept of committees of states parties' nominees being able to hear individual communications or to issue reports on the human rights records of states parties was unheard of. The pre-eminence of the doctrine of state sovereignty left state practice towards their own citizens largely quarantined from international relations. This has been slowly eroded by many factors, including the development of human rights norms, advances in telecommunications, pressure on governments from civil society and hard evidence of human rights abuses. The work and role of the human rights committees have now been accepted as a norm in international relations and a model that should be used for future treaties.

Reporting

Reporting by states parties is the main mechanism by which monitoring is currently carried out. Each report is supposed to contain information on the measures adopted by a state party to give effect to the rights enumerated in each treaty, progress made in the enjoyment of those rights, and any factors and difficulties affecting the fulfilment of the treaty's objectives. The central purpose of the reporting system, to promote compliance by states parties with their obligations, is achieved in a variety of ways, including by:[16]

- a state carrying out a comprehensive review of its national legislation, administrative rules, procedures and practices in implementing the treaty;
- ongoing monitoring by a state of its actual situation with respect to each of the rights through regular reporting;

- the use of feedback on reports to make states aware of the extent to which the various rights are or are not being enjoyed by all individuals within their territory or jurisdiction; and
- the identification of factors inhibiting implementation of the treaty.

States are asked to investigate their own human rights practices and to file a self-critical public report. When reports are examined, representatives of the state party are given the opportunity to meet with the committee. The usual practice is for a day-long session: committee members raise questions in the morning and states parties respond in the afternoon. This clearly does not allow states parties to always prepare detailed responses to the issues raised, diminishing the prospect of a constructive dialogue.

The reporting requirements for the different committees vary. Most require an initial report within one year of the treaty entering into force for the state party. The CERD and the CRC, however, require an initial report after two years. The timing of subsequent reports also differs: every two years (the CERD Committee), four years (the CAT Committee, the CEDAW Committee and the HRC) or five years (the CRC Committee and the CESCR).

The shortcomings of the reporting system are considerable. They include late reporting by states parties or complete failure to report; the lack of substantive content; and a backlog in the work of the committees themselves. Opinions on the value of the system range from the view that it is an empty diplomatic ritual that should be disbanded, at one extreme, to the opposite view that, while the system is not flawless, it is a valuable tool in ensuring implementation.[17] Table 3 summarizes the situation.

The reasons states parties give for not submitting reports include their being overburdened by the number of reports required and the lack of human and financial resources and capacity to complete them. However, of the 200 initial reports currently overdue, 46 are required from states parties that are classified by the World Bank as high- or upper-middle-income countries. It is therefore doubtful that the lack of reporting is only attributable to resource constraints.

The fact that none of the committees can oblige states to submit reports that are overdue or provide further information where reports are incomplete is a major failing of the current process. The only inducement available, besides political

Table 3 **Parties' compliance with human rights reporting requirements**

	No. of parties that have not complied with reporting obligations for more than 5 years	No. of reports more than 5 years overdue*	Percentage of non-reporting parties from high- and upper-middle-income categories
CEDAW Committee	70	121	27%
CRC Committee	66	59	18%
CESCR	57	78	25%
CERD Committee	54	216	24%
HRC	44	68	21%
CAT Committee	34	51	18%

Note * Includes cases where the state party has more than one overdue report for the same treaty.
Source Office of the United Nations High Commissioner for Human Rights (OHCHR), treaty bodies database, March 2003, www.unhchr.org/english/bodies/docs/RatificationStatus.pdf.

pressure, is that of embarrassing states parties by compiling an annual list of reports overdue. Reminders are sent to the defaulting states parties and in some cases meetings are arranged to discuss the reasons for the delay. Only some of the committees allow for a state party to be examined in the absence of its report. The CERD Committee in 1996 decided to conduct reviews on the basis of any prior reports submitted by the state, any information supplied by the state to any other UN body, and any information on the state prepared by UN organs.[18]

Another issue facing the reporting system is the lack of substantive content in most reports. Some states parties submit reports simply in order to be given credit as having reported. This again presents a difficulty for the committees. While they do not want to discourage states parties from submitting reports by insisting on rigorous standards, they also do not want the system undermined by parties carrying out a box-ticking exercise without ever providing substantive information. A balance needs to be struck to allow effective monitoring. Guidelines on the content of the reports have been issued by the committees, for example by the HRC.[19]

The committees are currently under-funded, only meet for a limited number of sessions a year and can only consider a certain number of reports. The resulting

backlog means considerable delay between reports being submitted and being examined, rendering many out of date by the time they are considered. It has been suggested that reports should be updated immediately prior to being examined, but this would only increase the burden on states parties and might result in further delays as committees wait for updates. The delays in examining reports need to be addressed at the same time as the issue of overdue reports.

Paradoxically, the delay between reporting and examination will worsen if the level of reporting improves. The committees therefore need either to streamline their procedures or to increase the number of sessions per year. Only then will reports be examined in a meaningful way, with relevant and up to date information.

Committee procedure

The current failings of the reporting system are not all attributable to states parties. The inefficiencies of the committees themselves contribute. Committees reportedly waste time on procedure and minor issues, resulting in important issues being avoided or neglected. The CEDAW Committee's proceedings have been criticized thus: 'Each member seems to feel compelled to repeat congratulatory remarks and to reiterate questions already posed by a colleague. An even worse tendency is to associate one's self with the question of another, often at greater length than the initial question.'[20] Other criticisms include premature praising of governments' efforts, failure to insist on satisfactory answers in cases of wrong, incomplete or inadequate responses to committee enquiries, and the lack of depth of oral inquiries.[21] Committee recommendations have been criticized as too vague or impractical.

Committee expertise

The lack of expertise of committee members is another important factor that affects the success of the system. The membership is loaded with foreign ministers, serving or retired ambassadors and other officials.[22] The close relationship of some committee members to their governments has an impact on their ability to be impartial. It has been suggested by an inter-chairman meeting that, in order to avoid conflicts of interest, committee members should refrain from participating in any aspect of consideration of the reports submitted by their own country.[23]

The communications procedure

Four of the treaty bodies provide for individual complaints to be heard by each committee. These serve at least three functions:[24]

- providing an effective and timely remedy to the person whose rights have been violated;
- bringing about changes in law and practice in the respondent state which will benefit others in a similar position to the complainant, now and in the future; and
- the elaboration of a jurisprudence for the relevant treaty, providing guidance to states parties and others on the content of the guarantees contained in the treaty and the measures needed to protect those rights.

There has been much debate about whether the communications procedure does manage to carry out the three functions to the same degree. A former member of the HRC maintains that the individual complaints procedure 'can do little' to protect an individual's rights as it 'starts too late, takes too much time, does not lead to binding results and lacks any effective enforcement'.[25] There is some merit in this, but it does not mean that the system should be abandoned. Rather, it should be improved.

An additional tool available to the committees under the communications procedure is interim measures. The HRC, the CERD Committee and the CAT Committee have the power to request a state party to take such measures pending consideration of a complaint. This goes some way towards dealing with the delay between communications being submitted and their consideration by a committee.

Recommendations made by a committee are non-binding and there is no enforcement mechanism to ensure that implementation. Under the ICCPR, if a communication is found to be admissible, the HRC will forward its 'views' to the state party concerned and to the individual, but neither the ICCPR nor the Optional Protocol shed light on the status of such views.

One issue that needs to be examined is the lack of correlation between the frequency of complaints and the state of human rights compliance in a given country. In many countries where human rights violations are prevalent, individuals are not aware of the existence of the treaty bodies and their right to submit a

communication. The absence of communications concerning a state party is not therefore an indication that it has a flawless human rights record.

The role of civil society in monitoring

NGOs have an increasing role to play in the UN human rights system, especially in the reporting process. Their information can give the committees a more complete picture of the situation, highlight breaches of human rights and help the committees in determining non-compliance. However, the role of NGOs in respect of the reporting procedure needs to be carefully handled. They may not, for instance, have access to the same information as states parties. They may also have hidden agendas.

The committees do not all involve NGOs to the same extent. The CERD Committee's rules of procedure make no reference to NGOs being able to participate in its work by attending committee meetings or producing reports, in contrast with Article 45 of the CRC, which allows its committee to ask any bodies it considers appropriate to provide it with expert advice.[26] The HRC's rules of procedure invite NGOs to provide written reports containing country-specific information and to give oral statements at committee meetings.[27]

The lack of specific reference to NGOs in the CERD Committee's rules of procedure does not altogether preclude their participation. Members can meet with NGOs prior to state reports being considered and can take part in side-events during committee sessions.

NGOs, however, have additional parts to play in promoting human rights and awareness of the avenues available to individuals to address their grievances. NGOs also provide assistance to individuals wanting to use the procedure and may play an important role after states' reports have been examined. While there remains a lack of follow-up of reports by the committees, NGOs can continue to lobby and campaign to ensure that any changes suggested by committees are implemented.

Reforms

While the system has matured over the years, there are many issues that still need to be resolved and reforms to be considered.

Reporting

The consensus among human rights experts is that reform of the current reporting system is needed. In 2002 a report by UN Secretary-General Kofi Annan proposed two measures to help alleviate current shortcomings:[28]

- a more coordinated approach to the committees' activities and standardization of their varied reporting requirements; and
- allowing each state to produce a single report summarizing its implementation of the full range of provisions of the human rights treaties to which it is party.

A brainstorming meeting on reform of the human rights treaty bodies, organized jointly by the Office of the United Nations High Commissioner for Human Rights (OHCHR) and the government of Liechtenstein, was held in Geneva, Switzerland, from 4–7 May 2003. The meeting, agreeing that there was a need to improve coordination and cohesion of the system, produced several consensus recommendations.[29]

The meeting agreed that there was a need to harmonize reporting guidelines to govern the technical and formal elements of reports. They should provide guidance as to the length, format and modalities of submissions and the information that should be included in respect of each treaty. It was suggested that the UN Secretariat prepare draft guidelines for consideration by the committees.

All participants, however, rejected the idea of a single report. Reasons included practical considerations such as the need for the treaties to be amended to allow for a single report and the unmanageable length of such a report. More substantive arguments included the potential for specific issues to be marginalized and the danger of such a report becoming a mere summary. Treaty-specific reports were considered useful for building national constituencies around particular issues and identifying lacunae in domestic legislation, policies and programmes. The lack of focus of a single integrated report could lead to less transparency in relation to states parties' actions as specific rights were skimmed over.

It was noted that states parties are already able to submit a so-called core report to reduce the burden of reporting, but that not all were aware of this possibility. Few of the parties that had submitted a core report had subsequently updated it, thereby diminishing its advantages.

Another suggested reform is the development of a follow-up procedure by the committees. If a committee has made a specific request for information, this should be provided before the next full report by that state party is submitted. Failure of a state party to do this should be noted in the committee's annual report.

If one of the aims of the reporting system is to influence state behaviour, the way in which states parties' reports are examined also needs to be reconsidered. More time needs to be spent on preparation prior to examination of reports to permit more meaningful dialogue. Justice Elizabeth Evatt of Australia suggests the need for a comprehensive, progressive analysis of the situation in each state prior to the examination of a report.[30] In the context of the HRC, Evatt suggests that the process should start with a written study by a country rapporteur. This would include, at a minimum, the details of areas where reporting was inadequate and a summary of the significant issues to be covered in the dialogue. This study would go before a working group of the committee for approval. This request would then be sent to the state party at least one session before a report is to be examined by the committee. The benefits of this process include the focusing of the dialogue and the presentation of a clear analysis of the human rights situation in a country.

As monitoring of human rights under the UN treaty system is based on the consideration of reports and communications, one apparent solution to the current problem of delays would be to increase the resources available to each committee. However, no substantial injection of resources for the system is currently likely.[31]

A novel reform suggested for the CAT Committee is for members to conduct visits to states parties where reports have not provided enough information, allowing for a range of views to be heard through interviews with officials and citizens. The experience of monitoring committees established to assess compliance with UN Security Council arms embargoes has been that state visits are more effective than relying solely on examination of reports.[32]

This new role would also allow committees to obtain early warning of potential breaches. While this would increase the already huge scheduling and financial pressures on committees, the benefits would be great. While there are numerous NGOs that carry out fact-finding missions and provide reports on actual and potential human rights breaches, the committees' status as treaty-monitoring bodies would bring credibility to their reports.

Another possible reform is the use of different reporting schedules for states depending on their level of development. This practice is currently implemented under the 1992 United Nations Framework Convention on Climate Change.[33] However, this must be carefully implemented so that states with reduced reporting requirements are not allowed to assume that their reports are less important than others'.

The communications procedure

The long delay between submission of a complaint and its consideration undermines the effectiveness of the communications procedure. For example, in relation to the final decisions adopted by the HRC between 1995 and 1999, the average length of time from submission of the communication to the final committee decision was three and a half years, the shortest was three months and the longest was six years and three months.[34]

Some commentators have suggested that oral presentations, in addition to the current written submissions, would be beneficial. However, this would need to be carefully considered, especially if individuals were not legally represented. Oral arguments may result in an imbalance between states parties and individuals, with governments having the upper hand because of the greater resources available to them. But some cases may be suitable for oral arguments and this should allow for cases to be considered faster.

Another possible reform relates to the way in which decisions are rendered. Because committee members come from countries with different legal systems, the reasoning behind decisions is not always clear. A clearly reasoned decision is beneficial both for the case being decided and so that potential future petitioners can see why a decision has been made and whether the decision is applicable to their own situation

There is currently no international legal aid to help individuals finance their participation in the process. However, the OHCHR does give guidance on the submission of individual complaints.[35]

Coordination between committees

While there is already an annual meeting of chairpersons, possible further coordination measures include having some members sit on a number of committees

and having members of committees observe others' sessions. Observation would permit sharing of information and would give members better insight into the overall situation in the countries being considered. However, common membership could reduce the number of states involved in the committees, leading to the exclusion of some geographical regions.

Improving expertise

Improving the expertise of committee members by appointing members for longer terms and on a full-time basis, could also increase effectiveness. A more radical approach is for the United Nations High Commissioner for Human Rights to establish a Group of Eminent Persons from which committee members would be elected.[36] The High Commissioner would receive nominations from any person, group or organization, taking into account their experience in the human rights field.

Conclusion

While some of the suggested reforms to the human rights monitoring process can be implemented at minimal cost, others are far-reaching and will require widespread change and revision of the treaties themselves. But states cannot be left to regulate themselves. While the current system has its shortcomings, there is no other viable alternative at present. There are regional bodies that also monitor human rights, but they should not become an alternative to an international system lest the implementation of human rights depend on regional location.

In addition to increased funding, many of the necessary reforms require greater co-operation and transparency from states parties. Ultimately, states need to be more active in promoting the monitoring process, including by submitting better, more timely reports. States should implement recommendations from committees that arise from an examination of reports or from individual communications procedures. Compliant states parties should bring pressure to bear on fellow states that submit late or incomplete reports. All of these measures, if combined with procedural reforms and increased funding, should result in a significantly more effective human rights monitoring system.

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Endnotes

1 Less traditional sources of international human rights law include general principles of law from domestic jurisdictions and judicial decisions.
2 Article 6, 1966 International Covenant on Civil and Political Rights.
3 Article 15, 1980 Convention on the Elimination of All Forms of Discrimination Against Women.
4 Article 7, 1966 International Covenant on Economic, Social and Cultural Rights.
5 Article 1, 1966 International Covenant on Civil and Political Rights and Article 1, 1966 International Covenant on Economic, Social and Cultural Rights.
6 Article 6, 1966 International Covenant on Economic, Social and Cultural Rights.
7 Article 2, 1965 International Covenant on the Elimination of All Forms of Racial Discrimination.
8 See UN, Office of the United Nations High Commissioner for Human Rights (OHCHR), 'Status of ratifications of the principal international human rights treaties', as of 18 August 2004, at www.unhchr.org/english/bodies/docs/RatificationStatus.pdf.
9 While the committees may not be in a position always to monitor the observance of customary international law, the UN has other mechanisms to promote and even enforce such law. These include the inclusion of human rights programmes in the civilian component of peacekeeping and related field missions, and the use of humanitarian intervention in the case of gross violations of human rights.
10 While this rule is not been made explicit in the case of the CESCR, it has been implied in committee practice.
11 Economic and Social Council (ECOSOC) resolution 1985/17.
12 The principal multilateral human rights body in the UN system, comprising 53 states elected by ECOSOC. It is mandated to examine, monitor and publicly report on human rights situations in specific countries or on thematic human rights issues worldwide. See www.unhcr.ch/html/menu2/2/chr.htm.
13 Article 17, 1979 Convention on the Elimination of All Forms of Discrimination Against Women.
14 For a discussion of this see Joan Fitzpatrick, 'Human rights fact-finding', in Anne F. Bayefsky (ed), *The UN Human Rights Treaty System in the 21st Century,* Kluwer Law International, The Hague and Boston, 2000, p. 72.
15 Fitzpatrick, pp. 92–93.
16 Jane Connors, 'An analysis and evaluation of the system of state reporting', in Bayefsky (ed), p. 7.
17 Connors, p. 4.
18 UN, *Report of the Committee on the Elimination of Racial Discrimination,* A/51/18 (1996), para. 22.
19 UN, Human Rights Committee, *Guidelines regarding the form and contents of periodic reports from state parties,* CCPR/C/20/Rev.2, 28 April 1995, www.unhchr.ch/tbs/doc.nsf/(Symbol)/01038df528e56e7280256612003 5cd69?Opendocument.
20 Robert Jackson, 'The Committee on the Elimination of Discrimination against Women', in Philip Alston (ed), *The United Nations and Human Rights: A Critical Appraisal,* Clarendon Press, Oxford, 1992, p. 461.
21 Roland Bank, 'Country-orientated procedures under the Convention against Torture: towards a new dynamism', in Philip Alston and James Crawford (eds), *The Future of UN Human Rights Treaty Monitoring,* Cambridge University Press, Cambridge, 2000, p. 151.
22 Scott Leckie, 'The Committee on Economic, Social and Cultural Rights: catalyst for change in a system needing reform', in Alston and Crawford (eds), p. 131.
23 Connors, p. 12.
24 Andrew Byrnes, 'An effective complaints procedure in the context of international human rights law', in Bayefsky (ed), p. 142.
25 See Bernhard Graefrath's comments in Byrnes, p. 143.
26 Article 45, 1989 Convention of the Rights of the Child.

27 UN, Human Rights Committee, 'Rules of procedure of the Human Rights Committee', CCPR/C/3/Rev.7, 4 August 2004, www.unhchr.ch/tbs/doc.nsf/(Symbol)/CCPR.C.S.Rev.7.En?Opendocument.
28 UN, 'Strengthening of the United Nations: an agenda for further change', A/57/387, 9 September 2002, http://ods-dds-ny.un.org/doc/UNDOC/GEN/N02/583/26/PDF/N0258326.pdf?OpenElement.
29 UN, OHCHR, 'Report of a brainstorming meeting on reform of the human rights treaty body system', HRI/ICM/2003/4, 10 June 2003, www.ohchr.org/english/bodies/icm-mc/documents.htm.
30 Elizabeth Evatt, 'The future of the human rights treaty system: forging recommendations', in Bayefsky (ed), p. 290.
31 James Crawford and Philip Alston, 'The UN human rights treaty system: a system in crisis?' in Alston and Crawford (eds), p. 6.
32 'Under the spotlight: monitoring implementation of small arms measures', *Small Arms Survey 2004: Rights at Risk,* Oxford University Press, Oxford, 2004, pp. 248–275.
33 Article 12(5), 1992 United Nations Framework Convention on Climate Change.
34 Crawford and Alston, p. 146.
35 See www.ohchr.org/english/about/publications/docs/fs7.htm.
36 For a discussion of this proposal see Craig Scott, 'Bodies of knowledge: a diversity promotion role for the UN High Commissioner for Human Rights', in Alston and Crawford (eds), pp. 423–426.