

Iraq's weapons: the US fails to best UNMOVIC

In the four months that the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC) was allowed to conduct inspections in Iraq, little evidence of the country's alleged weapons of mass destruction (WMD) programmes was found. Besides a disturbing project aimed at illicitly extending the range of Iraq's permitted short-range missiles, a handful of empty chemical shells was about the only hard evidence uncovered. While UNMOVIC rightly worried about the implausibility of Iraq's repeated 'final and complete' declarations and about the multiplicity of 'unresolved issues', such as the fate of large amounts of biological growth media, the UK and the US repeatedly insisted that actual weapons and substantial related capabilities existed. Senior US officials hinted at UNMOVIC's incompetence and naivety, scorned its reluctance to countenance the removal of Iraqi scientists from the country to facilitate more productive questioning and berated Executive Chairman Hans Blix's attempts to act independently and impartially. Although conceding that Iraq probably did not have nuclear weapons, they portrayed its chemical and biological weapons, deliverable at 45 minutes notice, as constituting a 'clear and present danger'.

With the war over, UNMOVIC out of the way and the US able to conduct its own 'anytime anywhere' inspections, aided by its powerful national intelligence-gathering capabilities and the ability to interview freely captured Iraqi military and scientific personnel, damning revelations were expected. Yet verification is not proving so easy. Indeed, US inspectors have, with the exception of alleged mobile biological agent production facilities, turned up less than UNMOVIC did.

The US has employed resources from both the military and other agencies in the hunt. The first waves of investigation were launched even before the war ended, using combat troops armed with hand-held detectors. The use of soldiers untrained as inspectors and the tendency of the detectors to produce false positives resulted in an initial flurry of unsubstantiated 'finds'. The troops were also accused of inadvertently destroying evidence in their enthusiasm to find hidden WMD.

More professional searches have been carried out by four Mobile Exploitation Teams (METs), which visit sites showing initial positive readings to carry out more detailed inspection and analysis. Each is staffed by approximately a dozen specialists from several agencies, including the Central Intelligence Agency (CIA), the Federal Bureau of Investigation (FBI) and the Pentagon. The METs employ complex field equipment, such as gas chromatographs, mass spectrometers and portable isotopic neutron spectrometers.

In this issue . . .

Trevor Fidlay and Ben Mines assess the situation regarding Iraq's alleged weapons of mass destruction, while Molly Anderson looks at the problem of quantifying sustainable development. Plus all of the usual features: Verification Watch, Science and Technology Scan, Peace Missions Monitor, Verification Quotes and VERTIC News and Events.

Trust & Verify

May-June 2003 • Issue Number 108 • ISSN 0966-9221

The Verification Research, Training
and Information Centre (VERTIC)

Baird House
15-17 St. Cross Street
London EC1N 8JW
United Kingdom

tel +44 (0)20 7440 6960
fax +44 (0)20 7242 3266
e-mail info@vertic.org
website www.vertic.org

The METS and smaller Chemical Biological Intelligence Support Teams are supported by the 75th Exploitation Task Force, the main military unit charged with finding WMD in Iraq, and responsible to the Defense Intelligence Agency. The task force is equipped with two mobile laboratories for testing and analysing suspected biological and chemical weapons. Also in Iraq are teams from the Defense Threat Reduction Agency (DTRA), the US defence organisation charged with WMD arms control, which are responsible for the destruction of any WMD found. Along with producing and distributing 9,000 copies of a 'WMD Facility, Equipment and Munitions Identification Handbook' to troops, the DTRA has dispatched the little-known Direct Support Teams. These are small special operations units, comprising special forces and nuclear experts, which conducted the initial search and assessment of Iraq's nuclear sites. In total, in the initial investigation phase the US engaged about 600 specialists—150 responsible for finding WMD and the rest support staff. Meanwhile, it attempted to recruit former inspectors from UNMOVIC's predecessor, the United Nations Special Commission (UNSCOM), and to poach them from UNMOVIC itself.

By 12 May the US had searched about 75 of the 600 'suspect' sites identified before the war, as well as 40 subsequently identified as a result of new information. The sites were ranked in order of priority: 19 were labelled key WMD sites, of which 17 had been searched by 12 May. These included several named in the UK and US dossiers released in support of their case for a war against Iraq, such as the Amiriyah Serum and Vaccine Unit, the Iskanderiyah munitions assembly plant and the Salman Pak training camp. UNMOVIC had already inspected most of them without result. The US also listed 68 lower priority sites, ranked as 'non-WMD', of which 45 had been searched by 12 May.

The US has made its task more difficult by failing to provide for the protection of sensitive sites, despite the long lead-up to war. Consequently, many sites have been looted. Documentation, materials and other evidence, if not destroyed, has been tampered with, thus compromising its provenance and rendering it of questionable value for verification purposes. Most alarmingly from a nonproliferation perspective, weapons or weapons materials may have been released onto the black market, where the highest bidder, criminal or terrorist, can acquire them. The most scandalous example is the failure of US troops to guard the Tuwaitha nuclear facility, which the US had long suspected of being a nuclear weapons research and production facility. Equipment and materials have been removed from the site by looters and drums emptied of yellowcake

(processed uranium) by local residents so that they could be 'recycled' to hold water. Adding further to the proliferation risk, the US refused for several weeks to permit the International Atomic Energy Agency (IAEA) to inspect the site to account for nuclear material that had been under international nuclear safeguards.

Despite numerous false alarms reported in the media, the only success that US inspectors have had to date is the discovery of three mobile biological agent production facilities: two truck-mounted units in northern Iraq and a small trailer in Baghdad. Iraq claimed that they were for producing hydrogen for weather balloons, but US analysts have concluded that they could only have been used for the production of biological agents. However, as the units had been thoroughly decontaminated there is no evidence as to whether or not they had ever produced such agents.

Although the mobile laboratories violated United Nations (UN) Security Council resolutions, they do not by themselves represent the large-scale WMD capability that Iraq was alleged to possess. From this failure several different conclusions can be drawn. First, Iraq may have destroyed all of its presumed WMD

Verification Quotes

We have the right to inspect any sites at any time

Hiro Ueki, UNMOVIC spokesman, quoted in 'UN inspectors arrive in Iraq', BBC News, 25 November 2002, www.bbc.co.uk.

Unfortunately, the two governments were very impatient during the first days of March, and they didn't let us finish our job . . . A few more months would have been enough to affirm—as asserted by the Americans and British—whether Iraq really possessed the arms

UNMOVIC Executive Chairman Hans Blix quoted in Elizabeth Bryant, 'UN weapons chief criticizes US', United Press International, 9 April 2002, www.upi.com.

None of their hot tips were ever confirmed

Unnamed UN weapons inspector commenting on US allegations of Iraqi weapons of mass destruction. Owen Bowcott, 'Inspectors say US intelligence was wrong.' *The Guardian*, 20 March 2003, p. 9.

There's strong evidence and no question about the fact there are weapons of mass destruction. We will find weapons of mass destruction

US Secretary of State Colin Powell on the continuing hunt for WMD in Iraq, *Global Security Newswire*, 12 April 2003, www.nti.org.

So where are they, Mr Blair? Not one illegal warhead. Not one drum of chemicals. Not one incriminating document. Not one shred of evidence that Iraq has weapons of mass destruction in more than a month of war and occupation

The Independent on Sunday, 20 April 2003, p. 1.

They're going to blow it. That's the concern of a number of us

US civilian weapons inspector on US military attempts to find Iraq's WMD, *International Herald Tribune*, 17 April 2003, p. 2.

capability either before UNMOVIC arrived in December 2002 or just prior to the US-led attack. Alternatively, Iraq has hidden its WMD capability so well that, despite searches by UNMOVIC and the US, it has still to be found. A third possibility is that Iraq transferred its capabilities to another country either with or without its permission: given that Iraq is surrounded by hostile states and the danger that it could have been caught in the act by UNMOVIC or the US, this seems highly implausible. The most likely scenario would seem to be that, although retaining a small research and development capability and some remnants of its former arsenal (those discovered by UNMOVIC), Iraq did not have the substantial WMD arsenal identified by the coalition as the pretext for war. UNSCOM's discovery and destruction of major components of Iraq's WMD programmes between 1991 and 1998, 13 years of economic sanctions, the tightening noose of UNMOVIC inspections and the credible threat of force appear to have done the job well. This begs the further question of the extent to which the American and British governments knew this, but were prepared to exaggerate the threat and stretch intelligence findings to justify a predetermined course of action.

The shape of inspections to come

Affording themselves a luxury that they had denied UN inspectors, US officials now concede that it may take years before an 'accurate picture' of Iraq's WMD capabilities emerges. In stark contrast to dire warnings of the proliferation threat that Iraqi

WMD capabilities posed before the war, the US has, within a month of hostilities ending, reduced the number of its forces engaged in the search. Two METS have been downgraded and are instead investigating non-WMD sites, while the DTRA Direct Support Teams have been reduced by one-third. At the beginning of June, the task force will hand responsibility over to the Iraq Survey Group, comprising 1,000–2,000 personnel, mainly civilian experts and former weapons inspectors. While numerically larger, the continued search for WMD will be just part of the group's remit, along with identifying war criminals and dealing with prisoners of war. Although no time limit has been placed on the group's deployment, it is not clear whether the search for weapons will continue indefinitely.

In this situation it is imperative that UNMOVIC inspectors be allowed to return to Iraq to assess the situation. Only they can finally close the UN's file on Iraq's WMD programmes, which have been the subject of so much attention by the Security Council. They will also add sorely needed international credibility to any conclusions that the US may seek to draw unilaterally on the fate of Iraq's weapons of mass destruction. The possibility that the US will not agree to such a move until Blix retires at the end of June seems, given the importance of credible multilateral verification in the Iraq case, short-sighted and petty.

Trevor Findlay, Executive Director, VERTIC
Ben Mines, VERTIC Intern

Peace Missions Monitor

Security Council deploys Ivory Coast monitoring mission

The UN voted unanimously on 13 May to send a small force of up to 76 military observers to Ivory Coast for an initial six months to monitor implementation of the Linas-Marcoussis Agreement, which was signed on 24 January 2003 by the government and several rebel groups. The new mission, the United Nations Mission in Côte d'Ivoire (MINUCI), is mandated to monitor the military situation, liaise with the French intervention force, troops deployed by the Economic Community of West African States (ECOWAS), and government and rebel units, and to help plan disengagement, disarmament and demobilisation schemes.

Monitors withdraw from Aceh as fighting erupts

A unique experiment, in which a non-governmental organisation, the Geneva-based Henry Dunant Centre for Humanitarian Dialogue, not only helped to negotiate but was also involved in monitoring a peace accord, was derailed in April. Monitors' offices were attacked and burned and renewed fighting erupted between Indonesian forces and the rebel Free Aceh Movement (GAM). Some 50 international monitors, mostly from the Philippines and Thailand, were withdrawn to the Achinese capital of Banda Aceh in early April and then to the North Sumatran capital of Medan in mid-May. Both sides have failed to live up to their obligations under the 9 December 2002 peace agreement signed in Geneva. Indonesia launched a military offensive in the breakaway province in mid-May, scuttling last-minute efforts to negotiate a new ceasefire.

Source UN Security Council resolution 1479, 13 May 2003; 'UN approves Ivory Coast mission', BBC News, 14 May 2003, www.bbc.co.uk; 'Aceh monitors to withdraw', BBC News, 8 April 2003; 'Monitors pull out of Aceh', BBC News, 12 May 2003; Tim Johnston, 'Indonesia launches rocket strike as peace talks fail', *The Times*, 19 May 2003, p. 16.

The challenge of quantifying sustainable development

One of the principle frustrations of the sustainable development agenda is its lack of binding targets against which countries' efforts can be measured. This was apparent again at the World Summit on Sustainable Development (WSSD)—held in Johannesburg, South Africa, in August–September 2002—where world leaders agreed yet another list of 'soft' commitments for protecting the environment, reducing poverty and increasing access to clean water and energy in developing states. On the one hand, this problem is indicative of the conflicting interests of developed and developing nations. On the other, it reflects the intrinsic paradox of sustainable development: how does one meaningfully measure 'quality of life', especially when the goals of economic growth are often in direct conflict with those of environmental protection? Without a parallel means for reviewing implementation and assessing countries' compliance with their commitments, agreements like Agenda 21 lack the teeth to ensure real and substantial progress.

It is in this context that a great deal of research is being done on developing sustainable development indicators (SDIs). The objective is to establish a quantitative basis for predicting the ability of policies to meet sustainability goals, as well as to establish a basis for assessing their impact during the implementation process. At the most basic level, a number of independent variables can be chosen to indicate trends in social progress, economic growth and environmental protection, the three pillars of sustainability. For example, the UK uses 15 'headline' indicators (www.sustainable-development.gov.uk/indicators) to measure progress towards the objectives set out in its 1999 strategy on sustainable development: 'A Better Quality of Life'. One such objective, under the social progress pillar, is 'to equip people with the skills to fulfil their potential'. As it stands, this is clearly a qualitative aspiration. The SDI chosen to quantify it is 'the number of people possessing level 2 qualifications (e.g. five General Certificate of Secondary Education qualifications of grade C or above) at age 19'. Collecting and recording data on this and the other headline SDIs provides the government and other stakeholders with a quantitative means of assessing the success of the strategy over time. For this reason, SDIs are becoming a common tool in both national and local policy-

making, as politicians are increasingly required to demonstrate the tangible outcomes of their policies.

However, care needs to be taken in choosing indicators of economic, social and environmental trends. First, as the term implies, an indicator is an attempt to quantify progress towards a sustainable development objective that cannot itself be directly measured. Therefore, for the indicator to provide an accurate reflection of progress, it ideally needs to vary according to a known or predictable relationship with the objective. Using the UK example above, this would mean that there is evidence that better qualifications do indeed improve the population's skills and that these help people to fulfil their potential. However, as this case demonstrates, there is not necessarily a simple relationship between the objective and indicator, just a general assumption that improvements in exam results generally lead to a population being better able to exploit its potential. Often, the use of social research and modelling to analyse trends introduces a level of ambiguity and hence the potential for controversy and disagreement into the evaluation process. It is desirable to choose an indicator that is widely recognised as a reliable measure of sustainable development in the circumstances in which it is being used. This may require that peer-reviewed research, modelling and/or testing be undertaken before the indicator is adopted and used.

Second, indicators are not always independent of each other. Trends in one area of sustainable development may well influence trends in another area. For instance, increasing employment and wages can indicate a growing economy, but they are also likely to be linked to adverse environmental impacts, such as increased consumption, waste and pollution. This is the balancing act that policymakers in the field of sustainable development must perform. A number of SDI systems are available to help decision-makers understand the interdependence of sustainable development objectives. The most well-known is the Dashboard of Sustainability, which was created by the Consultative Group on Sustainable Development Indicators (CGSDI). This system, the result of six years of research, is designed to be user-friendly and freely available to decision-makers at all levels, as well as to the general public. First established in 2000, the system is

now constantly being refined. The latest version of the Dashboard was launched at the WSSD and now includes 14 economic, 20 environmental, eight institutional and 19 social indicators. The data used in this system were gathered from the Organisation of Economic Cooperation and Development (OECD), the UN's Statistics Division, the World Bank and other international agencies.

The system is so named because the computer software involved is designed in the style of an aircraft dashboard, including 'instruments' that guide the user towards sustainability, with colours beginning at green, moving through yellow and ending at red. The four clusters of indicators are interlinked, so that modifying the inputs of the economic indicators may, for example, affect the values of the environmental ones. This graphical representation makes it easier for users to juggle the relative risks and benefits of various policy options to optimise sustainable development overall. Once again, though, the results have to be treated with caution. In addition to the warnings noted above, the results of computer modelling are only ever as reliable as the data used as inputs. Vast geographical and regional differences and varying economies, markets and populations mean that indicators used in the UK may not be sufficient for a developing country, for instance. While the Dashboard can be a useful way of weighing up the impact of different policies on a particular region or country, it is still difficult to extract meaningful comparisons between states. This means that, for the time being, the 'Holy Grail' of a single set of SDIs, by which countries' compliance with international obligations can be assessed, remains a distant dream.

Nevertheless, a number of international initiatives have been designed to identify matrices of SDIs for use in assessing the effectiveness of regional and global agreements. The Commission on Sustainable Development (CSD), which is the UN body responsible for reviewing and supporting implementation of Agenda 21, has an ongoing work programme on SDIs. In 2001, it published a revised list of 58 indicators and accompanying methodology sheets (www.un.org/esa/sustdev/natlinfo/indicators) to help countries measure and report on progress towards achieving agreed objectives. The list improves on an initial set of indicators adopted in 1995 and is the result of a long period of testing and of a number of international workshops convened to share expert experience of indicator development.

The OECD is also undertaking work on SDIs. Each year, it produces sets of environmental indicators, divided into issue areas, to help OECD countries assess their progress towards national and international sustainable development goals. In

Verification Matters Now!

VERTIC's Verification Matters series provides in-depth analysis of current verification questions.

Chemical Industry Inspections under the Chemical Weapons Convention John Hart

The Biological Weapons Convention Protocol: Politics, Science and Industry Henrietta Wilson

Global Spending on Nuclear Disarmament Verification Work Tom Milne

New! *On-site Inspections in Arms Control and Disarmament Verification* John Hart

Available for £10 each.

Order at www.vertic.org or direct from VERTIC.

addition, in 2001 it released a report entitled 'Indicators to Measure Decoupling of Environmental Pressure from Economic Growth'. This seeks to establish an analytical basis for judging how far OECD countries are managing to lessen the environmental and social costs normally associated with economic growth. The objective of the report was to encourage OECD member countries to agree on a single list of indicators that could then be used to compare their performances.

While there is no single or simplistic way of measuring sustainable development, SDIs do offer a means for quantifying progress towards sustainable development goals at the local, regional and international levels. However, they are unlikely ever to provide the basis of a robust compliance mechanism within international agreements. This is because of the difficulty in developing a single set of indicators that apply equally to different countries and the uncertainties still inherent in the assessment process, including ambiguities emanating from the interpretation of data. Nevertheless, the ever-greater resources being invested in developing SDIs and new information datasets indicates how central monitoring and reporting are to the sustainable development agenda. Openness and transparency are key to developing trust between countries and to providing a forum for exchanging experience on implementation. If SDIs facilitate a meaningful dialogue, they are to be applauded.

Molly Anderson

Resource Coordinator, Climate Change, UK Environment Agency (former VERTIC Environmental Researcher)



Verification at the NPT PrepCom

Considerable attention was paid to verification issues at the Second Session of the Preparatory Committee (PrepCom) for the 2005 Review Conference of the 1968 Nuclear Non-Proliferation Treaty (NPT), which met in Geneva, Switzerland, from 28 April to 9 May. The PrepCom meeting occurred against the backdrop of a number of 'new proliferation challenges', including those posed by concerns stemming from Iran's efforts to develop a complete indigenous nuclear fuel cycle and North Korea's revived nuclear programme and withdrawal from the NPT.

As expected, the PrepCom did not witness the unveiling of any new verification initiatives, but it did provide a valuable platform for states parties to the NPT to call attention to the importance of verification and to highlight deficiencies in verification in the nuclear field. A number of states voiced their support for the IAEA as the body responsible for verifying compliance with the NPT. Many states affirmed the importance of comprehensive safeguards and the Additional Protocol and called on all states parties to sign and ratify them. Statements in support of more comprehensive verification in the nuclear field included calls for the application of verification measures to all nuclear arms control agreements, as requested in the 2000 NPT Review Conference Final Document, including for the 2002 Strategic Offensive Reductions Treaty (SORT). In addition, several states used the occasion of the PrepCom to release useful verification-related working papers, such as the UK's 'Verification of Nuclear Disarmament: First Interim Report on Studies into the Verification of Nuclear Warheads and their Components', and Canada's 'Reporting by States Parties'. The 'Chairman's Factual Summary', released on the final day of the PrepCom, voiced strong support for safeguards and noted the importance of verification.

The PrepCom provided a valuable forum for discussing critical issues of nuclear arms control, disarmament and verification, which need to be addressed if the global nonproliferation regime is to maintain its integrity in the changing international environment. It is in the nature of these meetings, however, that there were no concrete recommendations on how to tackle the most pressing verification issues: those relating to North Korean and Iranian non-compliance with their NPT obligations. It is to be hoped that the PrepCom will at least have helped to pave

the way for concrete recommendations to enhance the NPT's verification regime at the 2005 Review Conference.

Source Rebecca Johnson, 'The NPT PrepCom 2003: Acronym special coverage', Acronym, 4 May 2003, www.acronym.org.uk; Jim Wurst, 'NPT: commitments against the use of nuclear weapons still a distant goal', *Global Security Newswire*, 13 May 2003, www.nti.org; Fiona Simpson, 'NPT 2003 PrepCom report', British American Security Information Council, 21 May 2003, www.basicint.org/nuclear/NPT/2003prepcom/NPT_Report.htm.

IPCC gives special attention to climate technologies

The Intergovernmental Panel on Climate Change (IPCC), which met in Paris, France, from 19–21 February 2003, decided to prepare a special report on carbon dioxide storage and capture. This follows a technical workshop on the subject held in Regina, Canada, in November 2002, at which many industrialised countries indicated their intention to invest in these emerging technologies as part of their national climate change strategies. Providing the Conference of the Parties to the 1992 United Nations Framework Convention on Climate Change (UNFCCC) approves the IPCC decision, the report will be available in the first half of 2005.

The capture of greenhouse gas (GHG) emissions from the energy and industrial sectors and their storage in the deep ocean or underground potentially offers high mitigation options for climate change policymakers. Some suggest that half of the world's cumulative emissions up to 2050 could be stored at costs comparable to other mitigation options. However, there are fears that, over time, stored carbon dioxide could leak, with implications for health and safety and the local environment. Furthermore, critics are concerned that investment in these technologies will detract from longer-term strategies to reduce GHG emissions. The IPCC special report will review available literature on carbon dioxide sequestration with a view to assessing its potential contribution to climate change mitigation, including consideration of possible health and safety issues, risks to the local environment, and methods for monitoring and verifying stored emissions.

Like the sequestration of carbon in vegetation and forestry, geological and ocean storage of carbon dioxide presents a number of monitoring and verification problems. Storage sites will need

to be monitored over their lifetimes—perhaps forever—to account for any leakage. In addition, monitoring methodologies need to factor in efficiencies in the capture of gases, their transport from where they are emitted to the storage site and the accuracy of monitoring methods. These problems are likely to be substantial and could seriously affect the reliability of accounting and the accuracy of emissions inventories submitted by parties under the UNFCCC and the 1997 Kyoto Protocol.

Source United Nations Foundation, 'Climate change: IPCC prepares 2007 report at Paris meeting', *UNWire*, 20 February 2003, www.unfoundation.org/unwire; Intergovernmental Panel on Climate Change, 'Proposals for special reports, methodology reports and technical papers: proposal for a special report on carbon capture and storage', twentieth session, Paris, France, 19–21 February 2003.

Cleaning up the 'dirty bomb' problem

The IAEA-organised International Conference on the Security of Radioactive Sources, held from 10–13 March in Vienna, Austria, examined the threat posed by radiological dispersal devices (RDDs), formerly known as radiological weapons and popularly known as 'dirty bombs'. Participants noted the complex challenge these devices pose for arms control. IAEA Director General Mohamed ElBaradei revealed that there have been more than 280 confirmed cases of criminal trafficking in radioactive materials, and noted that, while some states 'are stepping up relevant security measures, many others lack the resources . . . to effectively control radioactive sources'.

The IAEA used the conference to call for more stringent security measures for radiological materials. There was extensive discussion of enhancing monitoring of radiological materials, particularly in countries that were formerly part of the Soviet Union and in developing countries. US Energy Secretary Spencer Abraham unveiled the Radiological Security Partnership project, under which the US will provide assistance for the acceleration and expansion of national initiatives for monitoring and securing high-risk radioactive sources. This builds on the 'Tripartite' model, under which the IAEA, Russia and the US have been cooperating to identify and secure such materials in the territory of the former Soviet Union.

Source Louis Charbonneau, 'UN issues "dirty bomb" warning', *Reuters*, 11 March 2003, www.reuters.co.uk; 'Radiological weapons: IAEA calls for increased radioactive material safeguards', *Global Security Newswire*, 11 March 2003, www.nti.org; 'Energy Secretary Abraham warns of "terrible threat" from radiological weapons', US Department of State News Release, 13 March 2003.

SORT enters into force

The US–Russia Strategic Offensive Reductions Treaty entered into force on 1 June when Russian President Vladimir Putin

and US President George W. Bush exchanged instruments of ratification during a meeting in St. Petersburg. Under the agreement, Russia and the US are required to reduce their deployed strategic nuclear weapons to between 1,700 and 2,200 over the next ten years. (For background information see *Trust & Verify*, July–August 2002.) Entry into force had been held up by the Russian Duma's delay in passing the necessary legislation in order to highlight its objections to the war in Iraq.

While the Moscow Treaty itself has no verification or monitoring provisions, the two countries have agreed to adapt the verification system of the 1991 Strategic Arms Reduction Treaty (START) I. However, START is set to expire in 2009, three years before SORT's earliest possible expiration date. Russia has signalled its interest in developing new verification measures and procedures that go beyond those provided for under START and it has confirmed that discussions with the US are already underway. The two countries have established a high-level consulting group, which includes the US secretaries of state and defence and the Russian foreign and defence ministers, but no progress has yet been made on deciding what verification measures should be put in place for SORT. Now that SORT has entered into force, the Bilateral Implementation Commission will be established and begin work on determining the procedures for the treaty's implementation. Heading its agenda should be efforts to agree on verification, monitoring and inspection provisions for the accord.

Source Joseph Cirincione and Jon Wolfsthal, 'SORT of a treaty', *Carnegie Analysis*, 14 May 2003, www.ceip.org; 'US–Russia: Moscow Treaty enters into force', *Global Security Newswire*, 2 June 2003, www.nti.org; 'US–Russia I: Moscow Treaty might enter into force in two weeks', *Global Security Newswire*, 20 May 2003; Ministry of Foreign Affairs of the Russian Federation, Information and Press Department, 'Transcript of the Russian Deputy Minister of Foreign Affairs Gregory Mamedov remarks to Russian and foreign media', Moscow, 15 May 2003, www.mid.ru.

Protecting global fish stocks: a role for CITES?

In light of a recent study reporting the dramatic decline of commercial fish stocks, the 1973 Convention on International Trade in Endangered Species (CITES) has been called on to take a more prominent role in compelling governments to limit catches. Analysis of long-line catches since the 1950s reveals that fish biomass has declined by as much as 90 percent, highlighting the urgent need for the sustainable management and effective safeguarding of fish stocks. One method of curbing over-fishing is to eco-label products from sustainable fisheries. The Marine Stewardship Council (MSC) awards certificates to

fisheries that meet the required environmental standard, but it has faced criticism for failing to police adequately the certification process. Environmental groups claim that the MSC has certified some fisheries that have not met the necessary criteria. Although the fisheries face regular surveillance to monitor standards, continued non-compliance has not resulted in the imposition of punitive measures, and as yet no certificate has been revoked or rejected.

This has raised questions about eco-labelling as an effective tool in protecting fish stocks. An alternative method is for CITES

to 'list' the species threatened by over-fishing and to force governments to limit catches. Although CITES has traditionally avoided listing commercial fish, the addition of two shark species to Appendix II in 2002 hints at a change in policy. The trade in Appendix II species is heavily regulated and such a move by CITES would allow more effective monitoring of threatened fish stocks, which is urgently needed to stem their decline.

Source 'In deep trouble', *New Scientist*, 17 May 2003, p. 3; 'Rapid worldwide depletion of predatory fish communities', *Nature*, vol. 423, 15 May 2003, pp. 280–283.

Book Review

Commercial Observation Satellites: At the Leading Edge of Global Transparency

John C. Baker, Kevin M. O'Connell and Ray A. Williamson (eds), RAND and the American Society for Photogrammetry and Remote Sensing (ASPRS), Santa Monica, California, and Bethesda, Maryland, 2001, pp. 643, US\$80 (soft cover), ISBN 0-8330-2951-7

Commercial Satellite Imagery: A Tactic in Nuclear Weapon Deterrence

Bhupendra Jasani and Gotthard Stein (eds), Springer-Verlag and Praxis Publishing, Berlin and Chichester, 2002, pp. 336, £83.50 (hardcover), ISBN 3-54042-643-4

The development of commercial observation satellite technology is occurring at an ever-increasing rate, while the cost of images is steadily falling. Commercial observation satellites are having a growing impact on arms control and nonproliferation efforts and in an expanding range of new fields. Technology that, until recently, was the preserve of a few is now widely available and is being utilised by multilateral organisations, NGOs and the media.

The two volumes reviewed here testify to the potential role of commercial observation satellites in meeting many monitoring and verification challenges. Both volumes contribute to our understanding of recent trends and developments and will help to inform efforts to exploit these information sources effectively.

Commercial Observation Satellites focuses on the interplay between technology and politics in order to comprehend the broader political and security implications of the increasing use of commercial observation satellites. It offers a balanced and considered set of opinions, with four sections covering the policymaking context, national programmes and policies, case studies of applications, and emerging international policy issues. The book is aimed at a general audience but it will also be of interest to the specialist.

The breadth of *Commercial Observation Satellites* is both a strength and a weakness. With 26 chapters covering topics ranging from the use of satellite data in support of the 1995 Dayton Peace Accord negotiations to non-governmental employment of commercial satellite imagery, it offers something for anyone interested in the role of commercial observation satellites, but at some cost in terms of depth. The book would have benefited from selected topics being examined in greater detail. *Commercial Observation Satellites* contains a number of useful appendices and is comprehensively referenced, providing a valuable resource for further research in this field.

Commercial Satellite Imagery takes a very different approach. Adopting a much narrower focus, it concentrates on the role of commercial satellite imagery in monitoring nuclear weapons nonproliferation, particularly in the context of the IAEA safeguards system used to verify the NPT. However, it also covers topics like the general role of satellites in monitoring international treaties, as well as legal issues surrounding the IAEA's use of satellite data. This volume is aimed at a more knowledgeable readership, although the authors have sought to ensure that it is of relevance to a wider audience.

This is a timely and important work. It offers very thorough coverage of the subject, successfully links technological and policy issues and provides a wealth of relevant data and many useful recommendations. The price, however, may render it prohibitively expensive for many potential readers. And on a technical note, some of the page numbering provided in the table of contents is inaccurate.

Commercial Observation Satellites and *Commercial Satellite Imagery* are invaluable resources for the study of the potential and practicalities of using commercial observation satellites. Both will help readers to keep abreast of developments in this rapidly changing field, and are highly recommended for specialists and generalists alike.

John Russell, Arms Control and Disarmament Research Assistant, VERTIC



Cosmic ray-based verification

Scientists working at the Los Alamos National Laboratory in the US have found a means of detecting concealed nuclear materials using particles called muons, generated by cosmic rays that are constantly bombarding the Earth's atmosphere. Objects can be detected in this way because dense matter deflects the particles and this deflection can be mapped. Currently x-rays are used to search containers for materials like plutonium and uranium. But the effectiveness of x-rays is limited by the fact that they cannot penetrate dense objects, and by the need for multiple scans to generate a three-dimensional image of the object being scanned.

The new detection system works by tracking the path of the muons as they pass through the container being inspected. Passing through matter causes the muons to be scattered by the atomic nuclei. The amount of deflection depends on the mass of the nucleus of the object being inspected: the higher the mass, the greater the deflection. By using detectors it is possible to map the deflections and build up a three-dimensional image.

In a recent experiment scientists have shown that muons are capable of detecting a small block of uranium, even when concealed inside a truck full of sheep. With mounting international concern over the possibility that terrorists might transport radioactive materials in shipping containers, there has been growing urgency to find a faster and more effective means of scanning cargo containers.

The advantages of using muons over x-rays are that they are naturally occurring and are not harmful. While the muon detector is likely to be slower per image, only one muon image is needed instead of numerous x-ray images to confirm the presence of an object. The scientists have concluded from their initial experiments that muons show promise as an inexpensive, harmless probe for radiation of medium-to-large objects, such as commercial trucks and shipping containers. Their experiments have also demonstrated successfully that the system can detect uranium and plutonium, even when concealed by other materials. The Los Alamos team is now working with an industrial partner and estimates that it will have a device large enough to scan a car within two-to-three years.

Source 'Radiographic imaging with cosmic-ray muons', *Nature*, vol. 422, 20 March 2003, p. 277; Jenny Hogan, 'Cosmic rays could catch nuclear smugglers', *New Scientist*, vol. 178, 19 March 2003, www.newscientist.com; 'Cosmic rays find uranium', BBC News, 20 March 2003, www.news.bbc.co.uk.

Sniffing out chemical weapons components

The US Department of Homeland Security has revealed that, since October 2002, it has been running a secret programme that has determined, for the first time, that dogs can be trained to sniff out trace amounts of the non-lethal components of chemical weapons, including those contained in sarin and cyanide. The department's Bureau of Customs and Border Protection has begun training dogs for this role, and is planning to deploy them in government buildings and at public spaces, such as airports.

Dogs have a number of advantages over electronic sensors employed to detect chemical agents. They are far cheaper, even considering training costs, and are easily transportable. Once the programme has been fully developed these dogs could provide a very useful means of supporting on-site inspections under the 1993 Chemical Weapons Convention (CWC).

Source Phil Shenon, 'Dogs take part in arsenal against chemical attack', *The New York Times*, 13 May 2003, www.nytimes.com.

Sub to monitor fish stocks

A robotic submarine that can learn to differentiate between fish species could soon be used to gauge population levels. As stocks of an ever-increasing number of fish species fall to dangerous levels, there is an urgent need to develop an accurate picture of population statistics. With this kind of data scientists and conservationists will be better able to construct predictive models to form the basis of fish management policy.

Fish stocks are currently estimated by measuring the size of sample catches, but this method can be misleading if the samples are taken from points that are too far apart. To overcome this limitation, a team at the Virginia Institute of Marine Sciences in the US has developed an autonomous underwater vehicle to take more continuous and informative measurements. The submarine takes pictures of passing fish and uses an artificial intelligence system that compares details of their shape and movements with those in a database in order to distinguish between different species. Images of the fish are taken using a sonar camera, since the underwater environment is often too dark and murky for photographs. Also, light would tend to frighten the fish away. This neural network can currently distinguish four different species, but it is being developed to 'learn' to recognise more.

Source Michelle Knott, 'Subs eavesdrop on crashing fish stocks', *New Scientist*, 15 February 2003, vol. 177, p. 16.

Ploughshares grant for BW projects

VERTIC has been awarded a new grant of US\$50,000 by the Ploughshares Fund of San Francisco for two projects. The first is a continuation of an existing Ploughshares-funded project that is surveying national implementation legislation for the 1972 Biological Weapons Convention (BWC). The additional funding will permit VERTIC to extend the project to enable an up-to-date report to be made to the first BWC Experts Meeting to be held in Geneva in August 2003. The first agenda item for that meeting will be national implementation legislation. The second project is a new one which will examine the political and legal viability of existing mechanisms for verifying compliance with the BWC. The study will focus in particular on the Article V mechanism in the treaty itself and on the ad hoc mechanisms set up as a result of UN General Assembly and Security Council resolutions in the 1980s. The resolutions authorised the UN Secretary-General to undertake, on request,

fact-finding investigations into alleged use of chemical or biological weapons.

Handbook on Verification and Compliance published

VERTIC and the United Nations Institute for Disarmament Research (UNIDIR) are publishing their *Handbook on Verification and Compliance*, in English and Arabic, in June. *The Handbook*, which was written with the Middle East context in mind, is a compendium of verification concepts, methods, modalities and technologies. It also details the verification arrangements of the major arms control and disarmament agreements and provides a lexicon of terms. For further information or to order contact UNIDIR (Steve Tulliu at stulliu@unog.org) or VERTIC (Jane Awford at jane.awford@vertic.org).

VERTIC Brief: new series launched

VERTIC has launched a redesigned and renamed briefing paper series. To be known as VERTIC Brief, each number in the series will succinctly introduce a topical new verification issue, provide an update on a longstanding verification subject or give an overview of the points likely to be considered at treaty conferences or other verification-related meetings. VERTIC Briefs may be downloaded at www.vertic.org or paper copies may be obtained free from VERTIC. The first number in the series is an update on the verification of nuclear disarmament by VERTIC Executive Director, Trevor Findlay, entitled 'Verification of a nuclear weapon-free world'.

Staff changes

VERTIC regrets to announce that Molly Anderson, its Environment Researcher for the past two years, has resigned to take up an appointment with the UK Environment Agency in Bristol. VERTIC greatly appreciates the fine work that Molly has done in advancing the organisation's profile and impact in the climate change community and wishes her well in her new position. Fundraising efforts are underway to enable a replacement to be recruited.

VERTIC is pleased to announce the appointment of a new Information Officer/Networker. Jane Awford, who has had extensive international experience in public affairs diplomacy, including with the US Information Agency (USIA), started work on 6 May

Verification Yearbook 2002

VERTIC's annual survey of global verification developments, featuring:

- arms control and disarmament
- the environment
- election monitoring
- generic verification & compliance issues

With a preface by Joke Waller-Hunter, Executive Secretary of the UN Framework Convention on Climate Change.

Also contributing to this year's volume:

- Nikolai Sokov Verifying nuclear arms control
 Leon Sigal North Korea: verifying a possible missile accord
 Hartwig Spitzer and Ernst Britting The Open Skies Treaty
 Molly Anderson Verifying the Kyoto Protocol
 Bill Gray and Therese Laneela Election monitoring
 David Kelly The Trilateral Initiative on Biological Weapons

'An essential resource'

Michael Krepon, President Emeritus
 Henry L. Stimson Center, Washington, DC

on a part-time basis. She recently completed an MA in US studies at the University of London. Jane will be responsible for VERTIC's media contacts, networking, publications distribution and promotion, website management and outreach programme.

Interns

Patricia Watt joined VERTIC on 21 May to assist with the BWC national implementation measures project. Patricia recently completed an MA in international conflict analysis at the University of Kent and holds BA (Politics) and LLB degrees from the Victoria University of Wellington, New Zealand. She previously worked at law firms Lawrence Graham, in London, and Morrison Kent, in Wellington, New Zealand.

Staff news

TREVOR FINDLAY participated in a planning meeting with fellow NGOs collaborating in the Enhancing Multilateralism project at Saferworld on 24 March. From 25–26 March he was involved in the NGO Strategy Consultation organised by the Oxford Research Group (ORG) at Charney Manor in Oxford. At the Palais des Nations in Geneva on 28 March, he gave the opening address on 'Generic lessons from existing regimes' to a seminar on a future fissile materials treaty organised by the Australian and Japanese governments and UNIDIR. It was attended by delegations to the Conference on Disarmament, NGOs, representatives of the multilateral verification organisations and UN personnel.

Also in Geneva, on 29 March, he attended a board meeting of the BioWeapons Prevention Project (BWPP). From 31 March to 2 April he participated in a Regional Safeguards Seminar in Kuala Lumpur organised by the IAEA and the Malaysian government, designed to promote the Additional Protocol among Southeast Asian states. Trevor gave a presentation on 'Verification of a nuclear weapon-free world' to the conference on 2 April. The following day he participated in a one-day seminar organised by the US Department of Energy, the US National Nuclear Security Administration and the Australian and Malaysian governments on 'Export controls and the Additional Protocol'.

In preparation for the First Review Conference for the CWC, Trevor attended a meeting of the Pugwash Working Group on Implementation of the Chemical and Biological Weapons Conventions at Oegstrgeest, Netherlands, from 25–27 April. He then attended the Review Conference in The Hague from 28 April to 1 May, including the NGO Open Forum held at the Palais de Justice on 1 May. On 8 May he appeared on a panel on the future of arms control, as part of a seminar on 'Coping

with the weapons of tomorrow: ethics and rules', at the London School of Economics and Political Science (LSE), organised jointly by the Centre for the Study of Human Rights and the International Committee of the Red Cross (ICRC). Moderated by Sheena McDonald, the debate was taped by the BBC for broadcast on Radio 4.

MOLLY ANDERSON participated in a workshop on inventory adjustment methodologies organised by the Secretariat of the UNFCCC from 7–9 April in Lisbon, Portugal. On 15 April, she attended a workshop on the UK Energy White Paper at the Department of Trade and Industry, London, as well as the Institute of Electrical Engineers' annual Maxwell Lecture entitled 'The energy policy Britain needs' on 28 April. On 8 May, Molly was invited to the launch of the in-depth review report on the UK's third National Communication under the UNFCCC.

KENNETH BOUTIN attended the Harvard Sussex Program on CBW Armament and Arms Limitation's London Seminar on 'The 1975 VX patent episode', held at the Foreign and Commonwealth Office (FCO) on 19 March. With Angela Woodward, he attended a seminar on 'A history of South Africa's chemical and biological warfare programme: lessons to be Learnt' by Chandre Gould, researcher at the Centre for Conflict Resolution in Cape Town, South Africa, at the International Institute for Strategic Studies (IISS) on 1 April. From 28–30 April, Kenneth represented VERTIC at the Second Session of the Preparatory Committee for the 2005 Review Conference of the NPT in Geneva. He has been involved in preparations for the *Verification Yearbook 2003* and is writing a VERTIC Brief on the Additional Protocol to IAEA nuclear safeguards agreements.

BEN HANDLEY continues to handle VERTIC's administration. On 7 April he attended a 'Writing at Work' course at the Centre for Strategy and Communication. On 1 May he attended a Microsoft Window Server Roadshow in preparation for VERTIC's software upgrade, which will take place in June and which he is responsible for managing.

BEN MINES continued updating the UNMOVIC inspections database and has expanded it with a view to including a searchable version on the VERTIC website. Along with Angela Woodward, he attended a presentation on 'The Future of the NPT' by John Simpson of the Mountbatten Centre for International Studies (MCIS) at Imperial College, London on 3 April. Also with Angela Woodward, he attended the LSE/ICRC seminar

on 'Coping with the weapons of tomorrow: ethics and rules' on 8 May.

JOHN RUSSELL continued to conduct research on verification and monitoring in the Middle East, designing a monitoring and verification 'toolbox' as part of VERTIC's involvement in the Israel–Palestine Center for Research and Information (IPCRI) Verification Working Group. The toolbox will be presented to the next Working Group meeting in July. Along with Trevor Findlay, he attended seminars at the IISS on 15 and 19 May given, respectively, by Professor Shlomo Avineri, on 'Democracy and security in the Middle East in the wake of the Iraq War', and by Michael Krepon of the Henry L. Stimson Center in Washington, DC, on 'The nuclear future'.

ANGELA WOODWARD participated in International Alert's Weapons Awareness Project at the Royal Military Academy in Brussels, Belgium, on 27–28 March. On 2 April she met with Sue Wixley of the International Campaign to Ban Landmines (ICBL) to discuss their respective landmine work. Angela and Ben Mines met with Richard Lloyd of Landmine Action and Andrew Purkiss of the Diana, Princess of Wales Memorial Fund on 9 April to discuss possible future cooperation on the explosive remnants of war issue.

On 15 and 16 May, Angela participated in the Ottawa Convention's Intersessional Standing Committee meetings in Geneva. Angela continued her research on BWC national implementation measures and on verification of multilateral arms embargoes.

building trust through verification

VERTIC is the Verification Research, Training and Information Centre, an independent, non-profit making, non-governmental organisation. 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.

PERSONNEL Dr Trevor Findlay, *Executive Director*; Jane Awford, *Information Officer/Networker*; Dr Kenneth Boutin, *Senior Arms Control & Disarmament Researcher*; Ben Handley, *Administrator*; Ben Mines, *Intern*; John Russell, *MSC ECON, Arms Control & Disarmament Research Assistant*; Patricia Watt, *Intern*; Angela Woodward BA (Hons), LL.B., *Legal Researcher*.

BOARD OF DIRECTORS Susan Willett BA (Hons), MPhil (Chair); Gen. Sir Hugh Beach GBE KCB MC; Lee Chadwick MA; Dr Owen Greene; Joy Hyvarinen, LLM, LLM; Dr Bhupendra Jasani.

INTERNATIONAL VERIFICATION CONSULTANTS NETWORK Richard Butler AO (*arms control and disarmament verification*); Dr Roger Clark (*seismic verification*); John Gee, (*chemical verification*); Dr Jozef Goldblat (*arms control and disarmament agreements*); Dr Edward Ifft (*arms control and disarmament agreements*); Dr Patricia Lewis (*arms control and disarmament agreements*); Peter

Marshall CMG OBE (*seismic verification*); Robert Mathews (*chemical and biological disarmament*); Dr Colin McInnes (*Northern Ireland decommissioning*); Dr Graham Pearson (*chemical and biological disarmament*); Dr Arian Pregonzer (*co-operative monitoring*); Dr Rosalind Reeve (*environmental law*).

CURRENT FUNDERS Diana, Princess of Wales Memorial Fund, Ford Foundation, Joseph Rowntree Charitable Trust, UK Foreign and Commonwealth Office, UK Ministry of Defence, W. Alton Jones Foundation and Ploughshares Fund.

TRUST & VERIFY is published six times per year. Unless otherwise stated, views expressed herein are the responsibility of the author and do not necessarily reflect those of VERTIC and/or its staff. Material from *Trust & Verify* may be reproduced, although acknowledgement is requested where appropriate.

EDITOR Kenneth Boutin

DESIGN, PRODUCTION & SUB-EDITING Richard Jones.

ANNUAL SUBSCRIPTION RATES £20 (individual); £25 (organisation). To subscribe or to obtain a free e-mail copy, complete the coupon located on VERTIC's website. To subscribe to the electronic version of *Trust & Verify*, contact t&v-subscribe@vertic.org

PRINTED IN THE UK by Corporate and Commercial Printing Limited, 5–8 Helmet Row, London EC1V 3QJ.

© VERTIC 2003

VERTIC
Baird House
15–17 St. Cross Street
London EC1N 8UW
United Kingdom

tel +44.(0)20.7440.6960
fax +44.(0)20.7242.3266
e-mail info@vertic.org
website www.vertic.org