Dear VERTIC subscriber,

Welcome to the new *Trust & Verify*. In this and future issues we will bring you commentary on and analysis of key verification, monitoring and implementation issues, a Verification Watch section providing snippets on important verification developments and news of VERTIC’s activities and publications.

We apologise for the fact that due to the transition to new leadership and reorganisation of VERTIC, the last two issues of *Trust & Verify* for 1997 did not appear. Current paying subscribers will automatically have their subscriptions extended to entitle them to two additional issues. In future *Trust & Verify* will appear six times a year, at the end of January, March, May, July, September and November.

New subscribers are welcome now. Should you wish to receive *Trust & Verify* electronically it is FREE. If you wish to receive a paper copy the annual subscription is £15 per year for individuals and £20 for organisations. Fill in the form on the back of the VERTIC publications insert in this edition.

Due to rising production and mailing costs we will be forced to reduce our free-list significantly after this issue. If you currently receive a free printed copy of *Trust & Verify* you may wish to secure future issues by subscribing or requesting a free electronic copy.

VERTIC is grateful to the outgoing editor, Richard Guthrie, for his tireless efforts in producing an incredible 49 issues of *Trust & Verify* and wishes him well in his various endeavours.

Trevor Findlay
Editor

Northern Ireland: Verifying Decommissioning

The issue of the decommissioning of weapons, which at one time was a crucial stumbling block to the peace process in Northern Ireland, has largely disappeared from public view following the establishment of the Independent International Commission on Decommissioning. That Commission, headquartered in Belfast and Dublin, and led by Canadian General John de Chastelain, is tasked with observing and verifying the decommissioning process and ensuring that it is carried out to its ‘satisfaction’. Establishment of the Commission jointly by the British and Irish governments was recommended in 1996 by the so-called Mitchell Commission, the International Body on Arms Decommissioning led by former US Senator George Mitchell, which concluded that decommissioning was politically impossible before peace negotiations commenced. Mitchell’s compromise was that decommissioning should take place ‘during the process of all-party negotiations, rather than before or after’. To bolster confidence in the meantime, the Northern Ireland parties were, prior to being admitted to the peace talks, to be asked to subscribe to six principles committing them to using exclusively peaceful and democratic means to achieve their political ends.

While the all-party talks have now been underway since June 1996, no known decommissioning has yet occurred and the issue has not been central to progress in the talks. Attention has shifted instead to the draft peace plan tabled by the British and Irish governments in January of this year, especially its institutional proposals. There are those who argue that in any event decommissioning is more of symbolic than real importance and that any genuine peace agreement will obviate the need for anything but token decommissioning. They point out that Irish fields have for generations harboured secret caches of arms which are simply left to rust away when not required. There are several reasons why this approach is questionable.
First, the parties have committed themselves to decommissioning as part of a two-track approach to allow the all-party talks to proceed. To allow one half of the compromise to languish could call into question other compromises on which peace must necessarily be built.

Second, if and when a peace settlement edges closer, decommissioning is bound to re-emerge as an issue and may derailed the whole process unless satisfactorily attended to.

Third, effective and verified decommissioning will constrain (although not entirely remove) the possibility of one of the parties acting as a spoiler if the peace agreement, once in operation, turns out not to be to its liking.

Fourth, a step-by-step, verified decommissioning process will act as a confidence-building measure, contributing to and in turn benefitting from the ‘decommissioning of mind-sets’ which the Mitchell Commission identified as crucial to peace in Northern Ireland.

Finally, effective and verified decommissioning would help avoid paramilitary weaponry falling into or remaining in criminal hands after a peace settlement is concluded. By ending the long-standing tolerance of political violence in Northern Ireland a peace settlement should reinforce the criminalisation of illegal weapons possession and render both Northern Ireland and the Republic ‘normal’ in terms of accessibility to and use of weapons for criminal purposes.

If decommissioning is proceeded with, several outstanding issues need to be settled, mostly by the parties themselves, including timing, sequencing and supportive confidence-building measures. The Decommissioning Commission will have to establish detailed protocols, procedures and techniques for its own verification role. The Mitchell Commission set out helpful guidelines for the process, now enshrined in British and Irish legislation, which the Decommissioning Commission will undoubtedly follow.

Decommissioning, Mitchell held, should result in the complete destruction of armaments in a manner that contributes to public safety. The process could encompass a variety of methods, subject to negotiation, including:

- the transfer of armaments to the Decommissioning Commission or to designated representatives of the British or Irish governments for subsequent destruction
- the provision of information to the Commission or to designated representatives of either government, leading to recovery of armaments for subsequent destruction; and
- the depositing of armaments at some location for collection and subsequent destruction by the Commission or representatives of either government.

A further, trickier, possibility is that the parties have the option of destroying their weapons themselves. This too would have to be 'fully verifiable' and rule out subterfuge. However, while verified destruction of token amounts of weaponry by the parties themselves might be seen by them as useful for propaganda purposes, they are unlikely to feel comfortable with the intrusive, on-site monitoring and security required for destroying their entire stocks in such a fashion.

The Mitchell Commission stressed that the decommissioning process should be 'fully verifiable'. While a worthy goal, this is in practice unlikely, especially in the unique circumstances of Northern Ireland. One hundred percent verifiability is impossible in arms control or disarmament agreements. The aim is usually a verification system in which the political and military benefits to one party of retaining significant illicit holdings are outweighed by the political and military risks of being caught. Normally this is done by establishing declarations by the parties of their holdings so that baselines are established. Once these have been checked and verified and the decommissioning of declared stocks completed, any additional stocks discovered are deemed illicit, and both a criminal offence and a violation of the peace agreement.

A key, and probably unique feature of the Mitchell guidelines was the requirement that the decommissioning process not expose individuals to prosecution. Amnesties would be established in both the Republic and in Northern Ireland, armaments made available for decommissioning would be exempt under law from forensic examination and information obtained as a result of the process would be inadmissible as evidence in courts of law.

Despite these useful guidelines a number of challenges face the decommissioning process. The most obvious is the reliability of data on weapon holdings, both in the province and in the Republic. While Mitchell recommended that data from the Irish Garda Siochana, the Royal Ulster Constabulary and the parties themselves be used, other sources will clearly be important, including Interpol and the intelligence agencies of Ireland, Britain and the United States in particular. As in all cases of disarmament after armed conflict the actual number of weapons...
available to the parties is unlikely to be accurately known. This is especially so in the Northern Ireland case, as home-made as well as imported manufactured armaments have been commonly used. Nonetheless even decommissioning of an amount of weaponry for which there are credible estimates should significantly dent the armories of the parties.

Another difficult problem may be the sequencing of weapons hand-overs. Since the Loyalists are presumed to have fewer weapons than the Nationalists, there may be calls for sequencing to take this into account. A phased approach is in any case desirable in order to build confidence gradually in the process, although Mitchell recommended that it should not take longer than a year to complete. While presumably such a time-frame is intended to avoid holding up other aspects of implementation of the peace accord, it does appear remarkably brief in view of the scale of the problem. Sequencing may also be relevant to the British forces in Northern Ireland. While there can be no question of them being subject to decommissioning, their continuing phased withdrawal from the province, coinciding with growing confidence in decommissioning, would reinforce the entire process.

Other confidence-building measures could be considered to bolster decommissioning. One important measure would be a general gun amnesty throughout the whole of the island of Ireland, perhaps drawing on the experience of that recently carried out in Australia. A process of accounting for the victims of violence in Northern Ireland, including those who have simply disappeared, while painful, would also help bring about closure.

During decommissioning processes in other parts of the world demobilisation of armed forces was a key accompaniment. In the Northern Ireland case, while there are no standing armies to be decommissioned, there are individuals who would benefit from programmes to wean them from the culture of violence and help them resume normal civilian life. Such a programme would obviously have to be sensitively handled—publics tend to be critical of what they see as the ‘rewarding’ of former terrorists with special privileges—and form part of a broader package of rehabilitation aid to Northern Ireland.

No-one can be under any illusions that, like the peace process itself, the decommissioning of weapons in Northern Ireland will be easy or entirely satisfactory. However, while there are aspects of the situation that provoke pessimism, such as the ubiquity of weapons in the province, the proximity of caches in the Republic and the apparent case of manufacture of home-made munitions, other factors are favourable to successful decommissioning. Unlike decommissioning efforts in other parts of the world such as Africa and Central America, Northern Ireland does have a strong civil society, it is, for all its violence, essentially a society based on the rule of law, and its peace process is attended by three democratic states, Ireland, the UK and the USA, which are committed to seeing the peace process succeed.

Trevor Findlay

Coping With Uncertainty: Verifying the Kyoto Protocol

The Kyoto Protocol to the 1992 Framework Convention on Climate Change aims to mitigate climate change by requiring that its developed country parties reduce their human-induced greenhouse gas emissions from 1990 levels by an average of 5.2% between 2008 and 2010. The Protocol received much media attention both during and after its conclusion in December 1997. Little attention has, however, been given to how to verify compliance with the agreement or how to operate its various mechanisms that depend for their successful operation on accurate quantification and monitoring. Yet these topics obsessed the Protocol’s negotiators. Some of the more important verification-related issues are considered below.

The first and most basic problem arises from the fact that it is simply not practical to directly measure greenhouse gas emissions and removals by ‘sinks’ for the purposes of compiling national inventories and for reporting. (‘Sinks’ remove greenhouse gases from the atmosphere. Carbon dioxide is for example, taken up by green plants and the oceans. Because the Protocol covers only human induced emissions and sinks, oceans are not counted and neither are natural forests, but managed forests are—leading to disputes about what constitutes ‘management’.)

To directly measure emissions from power generation plants might be feasible, but directly measuring all emissions, especially from sources such as rice cultivation or removals from forests, is out of the question. Consequently, activities that give rise to emissions are monitored and multiplied by ‘emission factors’ that convert them into emissions. For example, in any particular country, numbers of different vehicle types are known and their fuel consumption figures can be
Table 1. Uncertainties due to emission factors and activity data

<table>
<thead>
<tr>
<th>Gas</th>
<th>Source category</th>
<th>Emission factor</th>
<th>Activity data</th>
<th>Overall uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide</td>
<td>Land use change and forestry</td>
<td>33%</td>
<td>50%</td>
<td>60%</td>
</tr>
<tr>
<td>Methane</td>
<td>Biomass burning</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>Methane</td>
<td>Rice cultivation</td>
<td>3/4*</td>
<td>1/4*</td>
<td>1*</td>
</tr>
<tr>
<td>Methane</td>
<td>Waste</td>
<td>2/3*</td>
<td>1/3*</td>
<td>1*</td>
</tr>
<tr>
<td>Methane</td>
<td>Animals</td>
<td>25%</td>
<td>10%</td>
<td>25%</td>
</tr>
<tr>
<td>Methane</td>
<td>Animal waste</td>
<td>20%</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>Nitrous oxide</td>
<td>Agricultural soils</td>
<td></td>
<td></td>
<td>2 orders of magnitude</td>
</tr>
<tr>
<td>Nitrous oxide</td>
<td>Biomass burning</td>
<td></td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

* Individual uncertainties that appear to be greater than ± 60% are not shown. Instead, judgement as to the relative importance of the emission factor and activity data uncertainties are shown as fractions which sum to one.

estimated. Hence carbon dioxide emissions from them can also be estimated.

Since 1992 the climate regime has evolved methodologies for estimating emissions and removals of greenhouse gases. Although the methodologies are now quite sophisticated they are, nevertheless, based on estimates and not direct measurements. Yet many categories of sources and sinks are very difficult to estimate. The uncertainty on some may improve significantly over time but for others this will not occur.

Many emissions and removals are inherently hard to estimate, especially those associated with biological processes. One example is nitrous oxide from agricultural soils. Nitrogen is essential to the life of green plants. Complex natural biological systems for processing nitrogen compounds provide for this need. Humans add nitrogen compounds to soils to encourage plant growth and these can give rise to nitrous oxide emissions. The extent to which they do so depends on the nature of the soil (including the plants and microbes present), the soil and atmospheric water contents, and many other factors such as temperature. For the same amount of nitrogen based fertiliser applied, nitrous oxide emissions can thus vary significantly even across a single field, depending on the soil conditions and microclimate, let alone worldwide. Yet the activity on which emissions estimates are based is fertiliser sales or, at best, application of fertilisers.

Uncertainties in emission estimates can vary considerably from source to source and from country to country. They range from about ± 5% for most energy-related (fossil fuel) sources in highly developed countries to more than ± 50% for many sources and sinks associated with forestry, land use change and agriculture. Indeed, uncertainties on some sources and in some countries are huge and simply not estimated. Examples of some of the worst cases are given in Table 1, taken from the agreed 1997 guidelines. Uncertainties could pose considerable difficulties in verifying compliance. The problem is that the extent to which they will do so is also uncertain. For example, many uncertainties are 'systematic'. They will be skewed in the same sense and by about the same magnitude in percentage terms in both the baseline and target years. It may thus be possible to largely ignore them when comparing target year emission estimates with baseline year estimates, which is what will be done in any assessment of compliance.

However, this is only true when sources of emissions are considered individually, or when many sources are considered altogether and the percentage emission reductions on each of them, individually, is the same. It does not necessarily apply, or will only partially apply, in situations where many different sources with different, often large, uncertainties on them are considered together, and where the percentage emission reduction on each of them is not the same.

In terms of monitoring compliance it therefore makes most sense to couch commitments in terms of particular sources of gas and not to combine different sources. (Indeed, this makes sense anyway because uncertainty is linked to the source of an emission, not to the type of gas it emits.) It would then be possible to, at first, have an agreement with commitments covering only sources that could be estimated accurately and...
They therefore favoured the so-called 'basket approach', in which target reductions or limitations cover all emissions of all gases and removals by sinks. The developing countries were firmly against a basket, mainly due to concerns about uncertainty. The Alliance of Small Island States (AOSIS) advocated a protocol for carbon dioxide only, not including sinks. The G77 and China, the umbrella developing country bloc, advocated individual target reductions for each gas. However, as the developing countries do not currently have target commitments, it was difficult for them to push their views on this subject to the limit and risk wrecking the agreement.

While it may be economically beneficial to reduce emission of one source of gas and costly or socially undesirable to reduce another, the 'basket approach' requires a means of measuring different types of greenhouse gas as though they are one. Different types of gas have different greenhouse effects and different 'residence times' in the atmosphere. To cope with this problem, the concept of Global Warming Potentials (GWPs) has long been used to, in effect, convert non-carbon dioxide emissions into 'carbon dioxide equivalent' emissions. The problem is that there is an uncertainty of more than 30% associated with GWPs. Adopting the basket approach thus compounds the uncertainty problem. Table 2 shows the possible effects on uncertainty of this approach for a highly developed country. Similar uncertainty arises in setting budgets for commitment periods and allocating emissions reduction units, and in the certified emission reductions for emissions trading and joint implementation (JI). Like the basket approach, trading and JI allow developed countries flexibility in meeting their targets. In trading emissions, for example, a country that envisaged that it would overspend its emission budget would buy excess emission reductions from another country.

Both trading and JI are viewed with considerable suspicion by developing countries and the draft emissions trading text was deleted by the G77 and China in the final night of the negotiations because of concerns over fair and equitable allocation of credits for trading. Limited trading was later agreed but the issue still rankles with developing countries, which generally take the view that developed countries should take the lead in reducing emissions domestically, and not focus on schemes that involve paying other countries to reduce emissions for them. Leaving this important and acrimonious debate aside, it is clearly not possible to trade in amounts of gas that are ill-defined or to claim credit for ill-defined JI projects, or well defined projects against uncertain baseline estimates.

Indeed, the question of how to ensure reasonably well quantified baseline emission estimates is perhaps the key technical question facing the Kyoto Protocol. The Parties to the Convention have already begun to address this issue by deciding that all new methodologies shall be applied retrospectively to inventories from all previous years. This should, at least ensure that any systematic uncertainties remain systematic. But some uncertainties are not systematic and, moreover, baseline estimates will tend to inflate as new sources of emissions or removals are found, as has occurred in the acid rain regime.

The negotiators in Kyoto were well aware of the uncertainty issue. The Kyoto Protocol is therefore liberally peppered with words such as 'verifiability' and phrases such as 'ensuring compliance'. But the protocol defers decisions on all verification-related issues because they were too hard to resolve at the time. If commitment period budgets are to be credible, compliance verified, emissions trading implemented effectively and JI projects operated successfully, the uncertainty problem must be solved or means of coping with it found.

**Table 2. Uncertainty estimates in a typical developed country**

<table>
<thead>
<tr>
<th></th>
<th>carbon dioxide</th>
<th>methane</th>
<th>nitrous oxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>emissions (arbitrary units)</td>
<td>1,000,000</td>
<td>10,000</td>
<td>100</td>
</tr>
<tr>
<td>typical measurement error</td>
<td>± 5%</td>
<td>± 25%</td>
<td>± 50%</td>
</tr>
<tr>
<td>emissions including measurement error</td>
<td>1,000,000 ± 50,000</td>
<td>10,000 ± 2,500</td>
<td>100 ± 50</td>
</tr>
<tr>
<td>GWP (100 year time horizon)</td>
<td>1</td>
<td>21</td>
<td>310</td>
</tr>
<tr>
<td>typical GWP error</td>
<td>0</td>
<td>± 35%</td>
<td>± 35%</td>
</tr>
<tr>
<td>CO₂-equivalent including all errors</td>
<td>1,000,000 ± 50,000</td>
<td>210,000 ± 126,000</td>
<td>31,000 ± 26,350</td>
</tr>
</tbody>
</table>
As a technical official at the climate negotiations once said ‘Diplomats have a habit of thinking of uncertainty as though it were a form of short sight. Find the right pair of spectacles and it will disappear.’ The search is now on for the right pair of spectacles.

John Lanchbery

Verification Watch

International Atomic Energy Agency (IAEA)
The IAEA Additional Protocol for strengthening nuclear safeguards has entered into force for Australia and is being applied there and also provisionally in Armenia. Georgia, the Philippines, Poland, Lithuania and Uruguay have signed it, while Namibia may be close to doing so. With agreement of a negotiating mandate within the EU reached, negotiations between the EU Commission (DGVI7) and the IAEA regarding the Protocol’s implementation within EURATOM begin 16 February. EU countries and Canada aim to submit their Protocols to the IAEA Board of Governor’s June 1998 meeting for approval.

China joined the NPT Exporters Committee (Zangger Committee), its first membership of a multilateral non-proliferation export control regime, in October 1997. The Committee was established to operationalise NPT commitments for export of source or special fissionable material, or equipment or material for processing, use or production of the latter. A revised list, published by the IAEA as INFCIRC/209/Rev.1, specifies items that trigger safeguards if exported.

Comprehensive Test Ban Treaty (CTBT)
The specific yields of eleven nuclear tests, conducted for peaceful purposes, have been released by the US Department of Energy as the agency finalises declassification of some details of its nuclear programmes. Such declassification is welcome because it helps scientists calibrate yields of past nuclear explosions and enables them to check equipment and methodology used to detect and measure such explosions.

The UK’s ability to monitor seismic activity for nuclear tests and to continue related research could be adversely affected by moves to close down UKNET (a nine-station network of broad-band seismometers run by Blacknest, Aldermaston Weapons Establishment) and to transfer responsibility for one remaining station (the Eskdalemuir array) to the Edinburgh-based British Geological Survey. Analysis of suspicious seismic events (such as the alleged August 1997 Novaya Zemlya clandestine explosion in Russia, now accepted to have been an earthquake) may still need the wider range of data, and the experienced specialists provided by Blacknest.

On 2 February, NSC Senior Director for Defense Policy and Arms Control, Robert Bell, told reporters that CTBT ratification by the US would, among other things, ‘improve America’s ability to detect and deter nuclear explosive testing. We’re going to have to monitor nuclear test activities and nuclear proliferation activities with or without the CTB. With the CTB, our intelligence community gets extra tools to do a job which, for them, is a priority assignment in the first place’.

Detection Technology
Imperial College London is developing a Neutron Beam Explosives Detector to detect plastic explosives hidden perhaps in airline luggage or encased in a vehicle, but wrapped too tightly for sniffer dogs to pick out. A sharp pulse of a tiny neutron source is beamed through a bag. John Hassard explained on Radio 4 on 27 January that ‘the neutrons excite the nuclei — that means they give them extra energy — and that energy is lost in photons, particles of light, and these photons pick out characteristic energies which tell us what nucleus it is and by figuring out what the explosive is made of, we can look for the tell-tale signs. The second ingredient is to combine that information with the way the neutrons themselves scatter.’ Imperial College is now working to speed up the extensive processing requirements to real-time.

Lawrence Livermore National Laboratory is developing a Wide-Area Tracking System (WATS) which aims to detect, in real-time, movement of nuclear or radiological sources in perhaps an airport or even a city. The key to the technology is an advanced data-fusion algorithm able to incorporate advances in radiation detection as they are developed. The potentially mobile system consists of commercial radiation detectors, vehicle detectors and communications. Its development has been funded by the US Departments of Energy and Defense.

UNSCOM
The immediate crisis between Iraq and the United Nations over inspections by the UN Special
Commission in Iraq (UNSCOM) ended on 24 February when Iraq signed an agreement negotiated by UN Secretary-General Kofi Annan which permits inspections to proceed unfettered. The only concession to Iraq appears to have been agreement that representatives of the permanent members of the UN Security Council (China, France, Russia, the United Kingdom and the United States) accompany UNSCOM inspection teams during their inspections of presidential palaces. Originally proposed by UNSCOM Executive Chairman Richard Butler, this is simply a face-saving device to preserve Iraq’s ‘dignity’ and should have no substantive effect on the rigour of the inspections. It remains to be seen whether Iraq will honour the terms of this latest agreement.

The current crisis began when Iraq attempted to prevent Americans from serving on UNSCOM inspection teams and sought to block inspections of presidential sites. This followed a long pattern of obstruction of UNSCOM’s activities by the Iraqis. UK Foreign Secretary Robin Cook said on 4 February that ‘[i]n the last nine months of last year, the UN inspectors tried to conduct inspections at 63 sites. At 38 of these sites the inspectors were subjected to delays. At 14 they were denied access completely’.

On the same day, a UK Foreign Office Press Release stated that UNSCOM:

- had so far destroyed 38,000 chemical weapons, six missile launchers, 30 special missile warheads for CBW, hundreds of items of CW production equipment, industrial scale VX nerve agent production capability and 4 tonnes produced, work on sarin, tabun and mustard gas, and the Al Hakam BW factory (3km x 6km) — able to produce 50,000 litres of anthrax and botulinum;
- had discovered that Iraq had produced 19,000 litres of botulinum, 8,400 litres of anthrax, 2,000 litres of aflatoxin (produces liver cancer) and clostridium (gas gangrene), and that Iraq had admitted filling ballistic missile warheads and bombs with botulinum, anthrax and aflatoxin;
- remained concerned that Iraq may still have operational SCUD missiles with CBW warheads, and that Iraq’s figures for production of BW agent remain too low; and
- was also concerned that missile components, warheads and propellant, 17 tonnes of growth media for BW agents, key items of CW production equipment, 4,000 tonnes of CW precursors; over 31,000 CW munitions and 600 tonnes of VX precursors were still unaccounted for.

**Landmines Convention**

The Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-personnel Mines and on their Destruction was signed in Ottawa on 3-4 December by 122 countries. Existing stockpiles must be destroyed within three years of the Convention’s entry into force and minefields cleared within 10, although extensions of up to 10 years are possible. The Convention contains no verification provisions and only minimal provisions to deal with non-compliance. The US, China and Russia have not signed.

Compiled by Suzanna van Moyland

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**VERTIC News**

**VERTIC Strategic Plan**

VERTIC has drafted a Strategic Plan setting out the aims and objectives of the Centre to 2000. It establishes VERTIC’s mission as being: to promote effective and efficient verification as a means of ensuring confidence in the implementation of treaties or other agreements which have international or national security implications. The draft plan envisages three potential new areas of research for VERTIC: verification of the decommissioning of armaments in Northern Ireland, the verifiability of the 1997 Anti-Personnel Land Mines Convention and the international monitoring of civilian police in post-conflict situations. The plan will be submitted to VERTIC’s Board of Directors for approval in March. Copies are available from VERTIC.

**Getting to Zero Project**

VERTIC’s project on verification of the transition to a nuclear weapon-free world ('getting to zero') is entering its final stages. Funded by the W. Alton Jones Foundation, the project is examining the steps that need to be taken both to achieve the verifiable abolition of nuclear weapons and to sustain the verification regime for an indefinite period. The project comprises four reports. The first, Verifying the Transition to Low Levels of Nuclear Weapons, by Patricia Lewis, covers the period in which the nuclear weapon states would be expected to cut their nuclear warheads to below Trust & Verify.
1000 each. A preliminary version of this report has been completed and is available from VERTIC. The second report, by Richard Guthrie, covers the period when complete nuclear disarmament—zero—is achieved and details the type of treaty and accompanying verification arrangements that are likely to be required. The third report, by George Paloczi-Horvath, concerns what has been called ‘virtual nuclear deterrence’. This refers to the existence of residual nuclear capabilities (such as skilled personnel, fissionable materials and general industrial capacity) which would give some states, especially former nuclear weapon states, the edge in any attempt to reconstitute nuclear weapons, thereby giving them a form of nuclear deterrence. The final report, by Suzanna van Moyland, concerns how to sustain the verification system for a nuclear weapon-free world into the indefinite future. Once completed in draft form the reports will be discussed at a workshop to be held in April, with a view to their publication by May. For further details contact Suzanna van Moyland at VERTIC.

**IAEA Safeguards Project**

In a project funded by the Ford Foundation, VERTIC continues to monitor the progress of the IAEA’s Programme to Strengthen the Effectiveness and Improve the Efficiency of Safeguards. Suzanna van Moyland gave presentations at the IAEA, Vienna, and at the International Network of Engineers and Scientists Against Proliferation (INESAP) Conference, Shanghai, resulting in publications by the host organisations: ‘The IAEA’s Additional Protocol: Some Connections Between Arms Control and Disarmament’; and ‘Human Factors’ relevant to the processing of open source data for nuclear safeguards. VERTIC is preparing Briefing Papers for the NPT PrepCom on the progress by states in implementing the Additional Protocol.

**New Grants**

VERTIC received two new general purpose grants in January: £32,500 from the Joseph Rowntree Charitable Trust and $US20,000 from the Rockefeller Family Philanthropic Offices. VERTIC is grateful for the generous support from both organisations.

**VERTIC Intern**

A new intern, Christine Schilke, joined VERTIC in February for two months’ work experience. Christine, a student at the School of Public Affairs at American University in Washington DC, will be assisting with research on the Northern Ireland decommissioning issue and general office work.