The Verification and Compliance Regime for a Nuclear Weapon-Free World

A Role for the UK

VERTIC Briefing Paper 99/5

Trevor Findlay

November 1999

INTRODUCTION

The verification and compliance regime for a nuclear weapon-free world will need to be more effective than any disarmament regime hitherto envisaged. One hundred per cent verification of compliance with any international arms agreement is highly improbable. However, in the case of nuclear disarmament the security stakes will be so high that states will not agree to disarm and disavow future acquisition of nuclear weapons unless verification reduces to a minimum the risk of non-compliance.

Similarly, the compliance mechanism must be as compelling as possible, providing a high degree of assurance that any violation will be dealt with firmly and effectively. Both the verification and compliance systems must be able to cope with the most feared threat to complete nuclear disarmament—breakout—where a state party is suddenly revealed to have a previously hidden nuclear arsenal or to have produced new weapons.

Meeting these requirements is a tall order, but not an inconceivable one. For a start, a verification and compliance regime for total nuclear disarmament will not be constructed from scratch. It will build on the practical experience of the disarmament process as it moves towards zero and draw on yet unforeseen developments in the information and technology revolutions. Moreover, the same conjunction of good relationships between major states that will permit the negotiation of a nuclear disarmament treaty will necessarily overcome many of the obstacles, which today seem insurmountable, to the construction of an appropriate verification and compliance system.

WHAT ARE VERIFICATION AND COMPLIANCE?

Verification is the process of gathering, analysing and using information to make a judgement about compliance or non-compliance with an agreement. A compliance mechanism is a process for taking action on the basis of a verification judgement. The aim of verification is to increase confidence that a treaty is being implemented fairly and effectively. It does this by:

• providing compliant parties with the opportunity to convincingly demonstrate their compliance;
• detecting non-compliance; and thereby
• deterring parties, which might be tempted not to comply.

The effectiveness of verification is a function of the scope of the treaty concerned, the monitoring mechanisms, techniques and technologies used, the credibility of the compliance arrangements and the political and strategic environment in which the treaty operates.
VERIFICATION PROCEDURES, TECHNIQUES AND TECHNOLOGIES

An array of procedures, techniques and technologies that will verify complete nuclear disarmament has already been identified, researched and evaluated. In some cases they have been already implemented, especially in relation to US/Russian bilateral nuclear arms limitations, the nuclear test ban and nuclear safeguards. Continuing research is needed to ensure that the latest technological advances are incorporated and promised avenues pursued. The long-term aim is that verification from becoming a negotiating obstacle once the political will to achieve nuclear disarmament emerges.

Dismantlement and Destruction of Declared Weapons

Presumably, by the time the transition to complete nuclear disarmament is imminent, the US and Russia will have reduced their arsenals below 1,000 warheads each through a continuing Strategic Arms Reduction Talks (START) process. Their remaining weapons are all likely to be considered strategic: tactical weapons, those for battlefield use, will have to be prohibited, verified and destroyed. This is a daunting challenge for verification (itself a highly daunting undertaking which will set precedents for intrusive verification) 1. Depending on the size of the remaining US and Russian arsenals, the issues that will need to be addressed (China, France, India, Israel, Pakistan and the UK), all of them by the stage declared, will either have joined in the process or be ready to. The remaining weapons, as zero is approached, will certainly no longer be on alert status or deployed on missiles or aircraft, but kept in secure storage.

The first task of an international verification organisation for a nuclear weapon-free world will be to verify the dismantlement and destruction of all remaining weapons. This would begin with each weapon arriving at the dismantlement location, and determine to the international verification organisation a detailed inventory of its remaining weapons and weapons-grade fissile material and their location. The weapons and materials would be placed, if they had not already been, in sealed containers with a unique tamper-proof tag and seal affixed to each warhead and container. Any untagged items subsequently discovered would be a treaty violation. The containers would be stored in secure, physically secure places. Safeguards would be agreed to as 'bonded store', well away from any potential delivery sites; to verify the dismantlement and destruction of weapon components; and to ensure that weapons-grade fissionable material is placed under international safeguards.

As Tom Milne and Henrietta Wilson note, it is conceptually simple to design a dismantling facility with one entrance and one exit. But, for public monitoring and to ensure that weapons-grade fissile material cannot be allowed to access the site, international on-site inspections will be necessary. 

Nuclear Weapons to a Nuclear Weapon-Free World', FERTIC Research Report, no. 2, June 1999, p. 17 F.


3 Milne and Wilson, p. 21.

1 For some states, such as Israel, India and Pakistan, whose likely intended targets are relatively close, their warheads designed for short-range systems would be considered 'strategic' for arms control purposes.

The following is adapted from Tom Milne and Henrietta Wilson, 'Verifying the Transition from Low Levels of nuclear weapons to a nuclear weapon-free world', VERTIC Briefing Paper 99/5, 3 April 1999.

Before destruction could begin, the contents of the bonded stores would require authentication to prove that they were not fake. This would have to be done without revealing sensitive design information, particularly that which is critical to the international verification organisation. Such a system would be the starting point for verifying the dismantlement and destruction of the weapons. (Some experts have suggested pooling all remaining weapons into a single site under international control, although this may be considered a step too far by some nuclear weapons states and too tempting a target for a state with a secret cache of remaining weapons).

Reverting to our example, the international verification organisation will be the starting point for verifying the dismantlement and destruction of all weapons and weapons-grade fissionable material and their location. The weapons and materials as they exit. The pits would be placed under international safeguards and removed to internationally monitored storage facilities to await final disposition.

Restrictions on delivery systems and command and control facilities

By the time the transition to zero occurs there will presumably be much more stringent limitations or even outright bans on different types of delivery systems—single or multiple, surface or submarine, intercontinental or medium range. Some systems would be permitted for conventional weapon delivery purposes, or in the case of ballistic missiles for space launch purposes, although such exceptions would make verification more difficult. However, since a great deal of experience has already been and will be further accumulated with regard to verifying numbers of deployed strategic bombers and ballistic missiles, universal restrictions or bans on these systems could be verifiable with a high degree of confidence. Immediate on-site inspections in port could ensure that submarines were no longer nuclear-armed.

Banning other delivery systems is more problematic. Non-strategic aircraft can be used to deliver nuclear weapons and short-range and any cruise missiles or short-range systems permitted for conventional purposes, but these would be easily converted for nuclear use. Similarly, non-conventional means of delivering nuclear weapons (such as in a suitcase or the hold of a ship) would be as difficult to control and verify as they are today. Dedicated nuclear command and control facilities will have to be verifiably dismantled and/or destroyed, while any dual-use command and control facilities would need to be made verifiably dismantled and/or destroyed. This will be one of the most difficult verification tasks.

Finally, the international verification organisation will need the right to conduct virtually no-notice 'anytime, anywhere' inspections of any suspect site, an even more intrusive system than that envisaged for the Organization for the Prohibition of Chemical Weapons (OPCW) under the Chemical Weapons Convention (CWC).

Timely detection of research, development and mass manufacturing of fissible materials 2

This will be one of the most difficult verification tasks in a nuclear weapon-free world, since the facilities required for these activities, unlike those for the illicit production or diversion of fissible material, are relatively small and may be relatively easily hidden. Ilicit new production is unlikely to be done at old production or diversion of fissile materials, are therefore increase substantially, compared with today.

Enriched Uranium (HEU) continued to be permitted for peaceful purposes, primarily in nuclear power and research reactors, the verification task would be much greater than if nuclear reactors were permitted to use only Low-Enriched Uranium (LEU).

In addition, if HEU continued to be used in naval propulsion, special arrangements would need to be made to bring such material under nuclear safeguards. Safeguards should also be extended to uranium mining and milling (currently they only begin when uranium is converted to yellowcake, a form suitable for fuel fabrication or enrichment) to ensure that all sources of new fissile material are accounted for.

Other ways in which safeguards would have to be further strengthened include increasing the intrusiveness of inspections, lowering the quantities and increasing the types of nuclear materials requiring declaration and inspection, and increasing the counting and data-handling capacities of the international verification organisation.


While random and challenge on-site inspections, aerial monitoring through a co-operative open skies initiative, and satellite imagery (from an internationally-controlled satellite system) may reduce the risks and increase the costs of such activities to an actual or potential violator, it is difficult to conceive of systematic verification techniques to completely guarantee the detection of such violations. Transparency at and monitoring of remaining national laboratories will be essential to ensure that they are not conducting nuclear weapons-related research and development.

The possibility of detection may however be enhanced through two means that are external to the formal verification system. One is so-called national technical means (NTM), which refers to verification and monitoring capabilities under individual state control and which include satellite monitoring, electronic eavesdropping, information-gathering and espionage. These will all continue and perhaps intensify in a nuclear weapon-free world. Many states will require the additional assurance that national systems can provide before ratifying a nuclear disarmament convention. While data from such systems may be manipulated and used in a self-serving fashion or be used politically within the state concerned, such possibilities would be attenuated in a nuclear weapon-free world by the existence of a central system within its own independent data collection and analysis capabilities.

The second complement to the official verification system is 'societal verification', which employs civil society, including non-governmental organisations (NGOs), professional organisations (such as academics, scientists and engineers) and individuals, to monitor the activities of governments and to effectively 'blow the whistle.' A nuclear weapons convention should make specific mention of and provision for societal verification. While one could not rely completely on such a system to meet the credibility of the task facing any would-be violator. Organised societal verification is most feasible in open societies, but even closed societies or open societies with secretive programmes have difficulty in preventing defectors and others from leaking national security information. The cases of Mordechai Vanunu in regard to the Israeli nuclear arsenal, Kamal Hussein in relation to Iraq's biological weapons programme and various Russian nuclear experts including 'Bunin' are illustrative. Cheap and ready access to satellite imagery and the instantaneous capabilities of modern communications greatly increase the possibilities for NGOs to participate in verification activities.

**COMPONENTS OF A VERIFICATION AND COMPLIANCE REGIME**

The official verification capabilities will be organised and managed by a dedicated verification and compliance regime established by and for a nuclear disarmament convention. The regime will be elaborate, intrusive and expensive (compared with current multilateral disarmament agreements, but not compared with the cost of maintaining nuclear arsenals). While the specifics of such a regime are necessarily speculative, standard verification and compliance models for international disarmament agreements are likely to be emulated. The following outline is based on an assumption that there would be a single, universal nuclear disarmament convention, which would supersede the Nuclear Non-Proliferation Treaty (NPT), the CTBT and other nuclear-related treaties. 

**A Conference of States Parties**

This would comprise representatives of all states parties. Given the importance of nuclear disarmament to all states and the breakout danger, membership would need to be universal. The conference would be the ultimate decision-making body for the treaty, responsible for its overall effectiveness, including compliance by all states parties. The conference would be able to recommend amendments to the treaty, which would have to be binding on all parties. It would be impossible to envisage a nuclear disarmament treaty with selective adherence by states parties to amendments.

**Executive Council**

This would be a standing body, comprising a representative selection of states parties, which would be responsible for day-to-day decision-making on the operation of the treaty, particularly its verification and compliance mechanisms. Constantly alert to potential non-compliance with the treaty, it would receive a continuous stream of warnings from the treaty secretariat based on information from the treaty verification and monitoring system. This would permit the Council to make judgements about compliance and non-compliance. It would also have the power to demand, sometimes to the censure of the treaty secretariat, that an immediate on-site inspection anywhere on the territory of any state party. The Council would ultimately have the power to recommend action in the case of non-compliance, up to and including referral to the UN Security Council. Finally, the Executive Council could order improvements or adjustments to be made to the verification system as necessary.

All the current nuclear weapon states (both declared and non-declared) would need to be permanent members of the Executive Council, as presumably would all states with a significant 'virtual' nuclear weapon capability (that is, the ability to manufacture a nuclear device within a short period by virtue of their industrial and non-military 'nuclear' capabilities and assets). All these states would need to be closely involved and have a strong sense of 'ownership' of the regime, since, unlike other disarmament agreements, the existence of only one treaty 'holdout' would completely defeat the treaty's purpose. Hence the Council would be a large body, perhaps needing a small executive sub-organ to make routine decision-making more efficient.

**An Organization for the Prohibition of Nuclear Weapons (OPNW)**

Some such body would be required to establish, administer and operate the international verification and monitoring system for the treaty. It would be staffed by international civil servants and scientific and technical experts and be headed by the equivalent of a Director-General. It would presumably include a large secretariat to oversee the implementation of the verification system, and an international inspectorate responsible for on-site inspections. A scientific advisory board would also be indispensable. As well as a high-level executive council, there would need to be regional offices and offices in all of the former nuclear weapon states and virtual nuclear weapon states in order to liaise closely with national authorities responsible for compliance with the treaty and to ensure peaceful nuclear activities permitted by the treaty. The organisation would likely supersede and subsume the IAEA and its safeguards system. It would also have absorbed the Comprehensive Nuclear Test Ban Treaty Organization (CTBTO), since the detection of clandestine nuclear tests would also be an integral part of the OPNW's verification task.

**Arrangements between former Nuclear Weapon States**

In addition to the international arrangements, there are also likely to be extraneous arrangements between pairs and groups of former nuclear weapon states, which were established to give them additional reassurance and help in the nuclear disarmament process.

---


6 This would not have to be done without damaging these existing treaties (as the CWC was negotiated without damaging the 1925 Geneva Protocol).

---

8 In addition to the current Permanent Five one could imagine adding, for instance, Brazil, Canada, Germany, Japan, India, Indonesia, Nigeria and South Africa.
could decrease the threat for states most concerned about breakout. Perhaps most important would be the residue of a nuclear device or arsenal in order to deter the violator. For the former nuclear weapon states, depending on how long a nuclear weapon-free world had existed, this might amount to only a month or two. The threat could then be countered, albeit at the risk of re-igniting a nuclear arms race. An alternative suggested by some observers is a small deterrent arsenal under international control, which would probably not be delivered by conventional means, and overt training for use would have been untested, could not be deployed until the last minute, and therefore well placed to take a number of initiatives that could develop innovative techniques and technologies themselves. The non-nuclear weapon states should also be encouraged to conduct such research, as they did in the case of the CWC and CTBT.

The UK’s Role Despite the fact that it is one of the smaller nuclear weapon states, the UK’s role in verifying complete nuclear disarmament is likely to be vital. It has long-standing experience in testing, developing and deploying nuclear weapons of various types, and also of all of the most powerful nuclear weapon state, it has played a disproportionately important role in negotiating, establishing and maintaining verification systems for a range of nuclear and non-nuclear arms control and disarmament regimes. The UK is therefore well placed to take a number of initiatives that in the long run will benefit the verification of complete nuclear disarmament.11

Further Transparency Initiatives While the UK has taken some admirable initiatives in increasing the transparency of its nuclear establishment and holdings, in particular its stocks of fissile materials, it still lags behind the US in some respects. It could lead the way, particularly by officially revealing the exact number and type of nuclear warheads it possesses, by publicly closing and dismantling its existing nuclear establishments and facilities for the CWC. The UK should continue to resist efforts by the US and others to dilute the projected verification system for the BWTC and the US efforts to weaken US implementation of the CWV verification provisions. The UK should continue to call for the UN Special Commission (UNSCOM) for Iraq, the UN Monitoring, Verification and Inspection Commission (UNMOVIC), which does not undermine the verification standards established by UNSCOM. The UK’s own seismic verification capability should not be permitted to atrophy but rather expanded as a significant contribution to the international system.

Increased Resources for Verification Research The UK should press for preliminary contacts between declared nuclear weapon states about the challenge of verifying nuclear disarmament, perhaps as part of a nuclear dialogue with the permanent five members of the Security Council (PS) that the UK has indicated it supports. Such exchanges could begin with the issue of how to verify a fissile material treaty, a crucial precursor to total nuclear disarmament. It is especially important that China be encouraged to begin considering and researching nuclear verification measures, since its exposure to verification has to date been limited. Such research could begin with the issue of whether China might consider deploying nuclear weapons as soon as possible. Exchanges on verification with India and Pakistan would not only be useful in themselves but would test their declared commitment to participate in nuclear disarmament at the appropriate time.

Strong Support for Verification Arrangements The UK should, wherever possible, support the most effective and efficient verification regimes possible. These should include funding of the IAEA Strengthened Safeguard System, the adequate funding of the International Monitoring System for the CTBT, the negotiation of a strong verification protocol for the BWTC and the proper implementation of the verification procedures for the CWC. The UK should continue to resist efforts by the US and others to dilute the projected verification system for the BWTC and the use of US legislation that has weakened US implementation of the CWV verification provisions. The UK should continue to call for the UN Special Commission (UNSCOM) for Iraq, the UN Monitoring, Verification and Inspection Commission (UNMOVIC), which does not undermine the verification standards established by UNSCOM. The UK’s own seismic verification capability should not be permitted to atrophy but rather expanded as a significant contribution to the international system.

CONCLUSION

An impressive and reliable verification system can, even on the basis of current knowledge, be constructed to verify with high, albeit unquantifiable, certainty that all parties to a universal nuclear disarmament treaty are complying with their obligations. Verification can increase the risks of detection and consequent political costs to any potential violator, extend the warning time to permit responses to be mounted, as well as fostering mutual trust and confidence among the parties.

The path to a nuclear weapon-free world, a world clearly different from our own, but not impractically idealistic, is an iterative one, through increasing transparency, confidence-building, an evolving attitude towards the utility of nuclear weapons, growing experience with verifiable interim steps towards nuclear disarmament and the gradual involvement of all the nuclear weapon states, both declared and undeclared.

Yet there can be no foolproof guarantee against unexpected 'breakout' through the retention of hidden stocks or the manufacture of new ones. This scenario must, however, be seen not just in the context of the verification and compliance systems established specifically for a nuclear disarmament treaty, but in the evolution of the international system between now and then. States will have to have made significant changes in their attitudes towards the limits of sovereignty, the rule of international law and the governance of the international system, particularly in regard to enforcement, for nuclear disarmament to be negotiated.

The attainment of a nuclear weapon-free world is so dependent on such changes that we will only be able to judge its verifiability as we become seriously engaged in moving towards that world. In doing so we need to ponder whether a world with seven declared, one undeclared and numerous potential nuclear weapon states is safer than a denuclearised world with a strong international verification system and the remote chance of nuclear 'breakout'.

Further Reading

VERTIC's four 'Getting to Zero' reports (1998-1999):
- Tom Milne and Henrietta Wilson, 'Verifying the Transition from Low Levels of Nuclear Weapons to a Nuclear Weapon-Free World', VERTIC Research Report, no. 2, June 1999

Background Papers, Canberra Commission on the Elimination of Nuclear Weapons, Commonwealth of Australia, Canberra, August 1996, especially papers 8, 11-14 and 17.


Dr Trevor Findlay is Executive Director of VERTIC. He is indebted for many of the ideas in this paper to the authors of the four reports produced by VERTIC's 'Getting to Zero' Project (see further reading). He is also grateful to Dr Oliver Meier, Arms Control and Disarmament Researcher at VERTIC, and Tom Milne of the London Pugwash Office, Steve Pullinger and John Ziman for commenting on drafts of this paper.

VERTIC's Getting to Zero Project was funded by the W. Alton Jones Foundation and the Ploughshares Fund. A version of this paper has been published by the International Security Information Service (ISIS) as 'The Verification and Compliance Regime for a Nuclear Weapon-Free World'; Nov. 1999.