

WMD Verification and Compliance: Challenges and Responses

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WMDC

THE WEAPONS OF
MASS DESTRUCTION
COMMISSION

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**Weapons of Mass Destruction Verification and Compliance:
Challenges and Responses**

**A Research Report Prepared for the International Security Research
and Outreach Programme, Foreign Affairs Canada**

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PREFACE

This report is the second part of a two-part study commissioned from a wide range of Canadian and international experts by the International Security Research and Outreach Programme (ISROP) within Foreign Affairs Canada, as part of an ongoing integrated initiative in the field of verification and compliance, and also presented to the Weapons of Mass Destruction Commission at its third meeting. This study proceeds from the explicit assumption that the verification of and compliance with WMD prohibitions and restrictions matters a great deal to the dynamics of the current international security environment. Indeed, the role this cross-cutting set of issues has come to play in global politics suggests that the accurate and reliable determination of ‘who does or does not have weapons of mass destruction capabilities and programmes’, and what this means in terms of their international obligations and commitments, will be a subject of great importance and attention for the foreseeable future.

The first report in this study entitled *WMD Verification and Compliance: The State of Play* was completed for ISROP by the Verification Research, Training and Information Centre (VERTIC). It was designed to provide a baseline analysis of the principal WMD agreements and the mechanisms by which compliance with their obligations is verified and, when required, suspected and verified non-compliance issues are resolved.

Building on the analysis contained within the VERTIC report, this second report addresses two forward looking questions. What are the challenges currently facing our WMD verification and compliance mechanisms? What are some of the practical and potentially achievable responses to these challenges? To develop responses to these questions, ISROP utilized an integrated consultation process which combined an expert questionnaire, a series of conference calls and a two-day expert workshop. Details on the expert participants in this study and the methodology used to seek their views on these issues are provided in Annex A. A summary of the expert questionnaire results is provided in Annex B.

The ISROP would like to thank the many Canadian and international experts who contributed to this study, in particular, those who played a central role in the development and execution of this study and to the production of this report: **Dr. Jane Boulden**, Canada Research Chair in International Relations and Security Studies, Royal Military College of Canada; **Dr. Trevor Findlay**, Executive Director, Verification Research, Training and Information Centre; **Ms. Rita Grossman-Vermaas**, Research Associate, International Research and Security Outreach Programme, Non-Proliferation, Arms Control and Disarmament Division, Foreign Affairs Canada; and **Dr. James Keeley**, Associate Professor of Political Science, Centre for Military and Strategic Studies, University of Calgary.

The analysis and results of this two-part study represent the conclusions of the experts consulted and do not necessarily reflect the views of the Government of Canada or Foreign Affairs Canada.

Weapons of Mass Destruction Verification and Compliance: Challenges and Responses

EXECUTIVE SUMMARY

This summary provides the major conclusions and recommendations of the expert report, organized thematically rather than by weapons type.

Expanding the Scope of WMD Verification and Compliance Mechanisms

Well planned and fully resourced efforts should be undertaken to universalize existing WMD verification and compliance regimes. (Recommendations 1 and 11)

UN verification and compliance capabilities should be reinforced by creating a new independent WMD investigative unit designed to complement existing WMD verification and compliance mechanisms. (Recommendation 2)

The UN Security Council should ensure effective implementation of UN Security Council Resolution 1540, which mandates compliance with WMD obligations at the national level related to preventing the proliferation of WMD to non-state actors. (Recommendation 3)

Options for expanding the application of verification and compliance mechanisms to WMD related activities should be explored, including measures applying to cooperative threat reduction efforts, nuclear export control guidelines, the security of chemical and biological relevant facilities, the end-use of exported missiles and related technology, and the Hague Code of Conduct. (Recommendations 1, 14, 23, 32, 35, 36, and 37)

All states that have not yet signed and ratified the Comprehensive Test Ban Treaty (CTBT), a key element in the global nuclear verification and compliance regime, should do so immediately. This applies especially to states listed in the treaty's Annex II. Meanwhile, work should continue, with urgency, to prepare all elements of the CTBT's verification system. (Recommendation 11)

Nuclear weapons states should consider contributing to global nuclear verification and compliance efforts by submitting all of their civilian nuclear activities to International Atomic Energy Agency (IAEA) and extending their Additional Protocols to all domestic civilian activities. They should also move forward on the removal of fissile material from weapons programmes under IAEA verification (e.g., implementation of the trilateral initiative) and ensure that nuclear disarmament agreements/arrangements, including existing bilateral agreements, are subject to effective verification mechanisms, including multilateral involvement. (Recommendation 12)

Consideration should be given to encouraging states outside the Nuclear Non-Proliferation Treaty (NPT) to accept more comprehensive multilateral commitments and safeguards relating to their civilian nuclear cycles, including negotiation of a full-scope safeguards agreement and an Additional Protocol with the IAEA. (Recommendation 13)

To support UN Security Council Resolution 1540 and strengthen the Organization for the Prohibition of Chemical Weapons (OPCW) verification capabilities, Chemical Weapons Convention (CWC) states parties should be required to report to the OPCW on the measures they are taking to meet their 1540 obligations as they relate to chemical weapons. To the extent possible, the Secretariat of the OPCW should, in cooperation with the 1540 Committee, monitor compliance with Sections 2 and 3 of 1540 insofar as they are related to chemical weapons. (Recommendation 24)

Renewed efforts to develop an effective verification and compliance regime for biological weapons should be high priority. Support should be provided to proposals to strengthen the UN Secretary-General's power to verify alleged use of biological and toxin weapons as well as suspect biological facilities. States should release publicly their confidence building measures, and the establishment of a small secretariat to monitor BTWC confidence building measures should be considered. This secretariat could also monitor reports submitted by states in accordance with Security Council Resolution 1540, as they relate to biological weapons. States parties to the Biological and Toxin Weapons Convention (BTWC) should be encouraged to hold annual meetings between review conferences beyond the 2006 Review Conference to address 'compliance management' issues and important biological weapons-related developments. (Recommendations 29, 30, 31, and 33)

States should be urged to consider the negotiation of regional measures on missile-related non-proliferation, arms control and disarmament, focusing initially on confidence-building measures including transparency and voluntary mutual monitoring of commitments. (Recommendation 38)

The UN should be encouraged to continue its efforts in the missile field, with special attention to norm-building and confidence building measures, as a first step towards fully developed verification and compliance mechanisms. (Recommendation 39)

Addressing Emerging Verification Challenges

The IAEA Additional Protocol should become the new compulsory standard for nuclear safeguards. States should not receive nuclear technology or materials transfers unless they conclude such agreements. (Recommendation 15)

The adoption of higher standards for verifying nuclear accounting, safety and physical protection should be given a high priority. Negotiations on strengthening the Convention on Physical Protection should be concluded as soon as possible. The Code of Conduct on the Safety and Security of Radioactive Sources, including sections relating to the import and export guidelines, should be made obligatory and legally binding. The IAEA should

verify compliance with both the Physical Protection Convention and the Code of Conduct. (Recommendation 16)

The IAEA should commission an expert study to develop a standardized system of accounting for all fissile material for all states (Recommendation 17).

To enhance the verifiability of peaceful nuclear programmes, consideration should be given to the internationalization of all uranium reprocessing and enrichment capabilities, beginning with any new facilities and progressively encompassing all reprocessing and enrichment facilities. (Recommendation 18)

The Conference on Disarmament (CD) should re-start negotiations towards a fully verified Fissile Material Cut-off Treaty (FMCT) as soon as possible. In the meantime, the CD should establish a group of experts to review and develop mechanisms and procedures for effectively verifying compliance with such a treaty. (Recommendation 19)

The CWC Scientific Advisory Board should study the impact of recent scientific and technological developments in order to make recommendations to the Conference of States Parties on new chemicals that should be added to the schedules of chemicals subject to verification and compliance. (Recommendation 25)

The OPCW should explore new techniques to monitor CW stockpile destruction, such as non-human monitoring arrangements, freeing resources for verification of production of CWC Schedule 2 and 3 chemicals and discrete organic chemicals. (Recommendation 27)

An independent expert study should examine the implications of the development of new biochemical agents, including “non-lethal” biochemicals, for the effectiveness of verification and compliance measures under the CWC, including aspects related to the “law enforcement” exemption. (Recommendation 26)

An independent expert study should examine scientific and technological advances in the biological sciences and related fields and their implications for BTWC verification and compliance. (Recommendation 34)

Compliance Management

There is a need to develop “rules of the road” for dealing with difficult compliance issues at both treaty regime and UN Security Council levels, including greater commitment to verification assessments by independent professional bodies. (Recommendation 4)

Greater focus should be placed upon WMD compliance management issues, including the development of more nuanced assessments of compliance situations and efforts to explore a wider range of options to restore compliance, including greater utilization of existing compliance management mechanisms. (Recommendations 5 and 14)

The 2005 NPT Review Conference should mandate a standardized formal reporting, consultation and clarification mechanism for all states regarding their status of compliance with the NPT. (Recommendation 21)

Investing in Smart WMD Verification and Compliance Mechanisms

Periodic independent expert reviews of the performance of WMD verification and compliance implementation agencies should be undertaken, and recommendations for reforms prepared for the consideration of states parties. (Recommendation 6)

A world-class centre of excellence focused on the analysis of WMD verification and compliance issues should be established to encourage cross-fertilization of experience and expertise within and between existing and emerging WMD verification and compliance mechanisms. (Recommendations 10)

States, private donors and foundations should be called upon to invest more resources in WMD verification and compliance capacities, including UN and treaty implementing organizations, national programs and non-governmental organizations active on these issues. (Recommendation 8)

In cooperation with treaty implementing institutions, greater resources should be devoted to financial and technical assistance for capacity-building within selected states to assist them in fulfilling their WMD verification and compliance commitments and obligations. (Recommendations 10, 21, 28, and 35)

Non-governmental organizations should be actively encouraged, where appropriate, to assist in the development and implementation of WMD verification and compliance mechanisms, particularly through track II type contacts and initiatives. (Recommendation 9)

Weapons of Mass Destruction Verification and Compliance: Challenges and Responses

I. General WMD Verification and Compliance

Increased attention to verification and compliance as a cross-cutting issue reflected growing concerns about non-compliance with WMD prohibitions and obligations. A majority of experts consulted saw the overall WMD verification and compliance situation as degenerating. Greater ongoing research and deliberative reform efforts focused upon both the technical and political aspects of WMD verification and compliance were seen to be required. On the technical side, the nuclear weapons verification and compliance regime was seen as the having the strongest capabilities, the chemical weapons regime next and the biological weapons regime as the weakest. All regimes, however, were seen as vulnerable in terms of a lack of political will to accept intrusive measures and thus broadly subject to non-technical challenges.

The issue of non-state actor use of WMD also emerged as a major source of debate, revealing divisions over the likelihood, nature and scale of such use. Non-state actors were seen as more likely to use chemical weapons than other kinds of WMD. Complicating the response was the understanding that although the probability of nuclear weapons use by non-state actors might be low, the effects of such an incident would be catastrophic. It was noted that the large scale use of chemical or biological weapons/materials by a non-state actor would likely require some assistance from a national programme, which would make detection easier. This suggested to experts that measures to strengthen and expand the scope of WMD verification and compliance both horizontally and vertically (to more states and greater normative depth within states) will be essential to reducing the risks associated with the proliferation of WMD to non-state actors.

Expert consultations generated the following assessments of general WMD verification and compliance challenges and recommended responses.

Expanding the Scope of WMD Verification and Compliance Mechanisms

Challenge - *Universalizing WMD Verification and Compliance* - Non-participation by states in widely accepted WMD regimes and establishment of new regimes without verification and compliance mechanisms were seen to set a bad example for other states and to raise the risks associated with double standards. There are many lessons to be learned from deliberative efforts that have already been undertaken to universalize various regimes.

Recommendation 1 - Well planned and fully resourced efforts should be undertaken to universalize existing WMD verification and compliance regimes of all types. Options for expanding the application of verification and compliance

mechanisms to new WMD-related activities such as cooperative threat reduction initiatives should be explored.

Challenge - *Independent Multilateral WMD Verification Capabilities* - The maintenance and further development of independent multilateral WMD verification capabilities emerged as a significant concern. The preservation and exploitation of the lessons learned and capabilities of UNMOVIC within the UN system was strongly advocated, despite the political sensitivities of the issue and disagreements over how this might best be done.

Recommendation 2 - United Nations verification and compliance capabilities should be reinforced by creating a new independent WMD investigative unit designed to complement existing WMD verification and compliance mechanisms. This unit should have a broad mandate (i.e., no geographic or weapons-type limitations), and could begin by specializing in certain areas (e.g. biological weapons and missiles). It should co-operate with rather than compete with existing verification and compliance institutions (e.g. IAEA and OPCW). It will need flexibility in its initiating mechanisms as well as adequate resources.

Challenge - *UN Security Council Resolution 1540* - Interest was expressed in UN Security Council (UNSCR) 1540 as a potential response to the challenges associated with implementing WMD regimes at the national level, and the risks presented by the potential proliferation of WMD to non-state actors. Skepticism was, however, expressed about the ability and willingness of states to respond to 1540, as well as about the adequacy of the implementation mechanisms established under the Resolution. There was general agreement on the importance of the UNSC in WMD compliance matters, but also general concern about its ability to act.

Recommendation 3 - The UN Security Council should ensure effective implementation of UNSCR 1540, which mandates compliance with WMD obligations at the national level related to preventing the proliferation of WMD to non-state actors. The 1540 Committee should be provided with the necessary expert resources and funding for monitoring and analysis of compliance, perhaps along the lines of the Counter-Terrorism Committee (mandated by UNSCR 1374) Assistance in capacity-building for compliance should be offered to states where appropriate.

Compliance Management

Challenge - *General WMD Compliance Management* - WMD verification and compliance has long been viewed as a spectrum of activities and capabilities, within which the technical, operational and political dynamics of post-verification compliance management issues appear to be the least well developed. There was seen to be clear need for a more responsive and comprehensive range of compliance management options – linking compliance assessments to instruments for restoring compliance, including positive remedial approaches as well as punitive enforcement methods. Experts agreed

that sanctions could be one useful tool in certain circumstances as a way to support verification and achieve compliance, as long as they were carefully crafted and targeted to facilitate verification by limiting the universe of verifiable items, to induce the acceptance of verification measures and to encourage compliance.

Recommendation 4 - There is a need to develop “rules of the road” for dealing with difficult compliance issues at both treaty regime and UN Security Council levels, including greater commitment to verification assessments by independent professional bodies.

Recommendation 5 - Greater focus should be placed upon WMD compliance management issues, including the development of more nuanced assessments of compliance situations, efforts to explore a wider range of options to restore compliance, and greater utilization of existing compliance management mechanisms. This could include the development of a menu of remedial and probationary mechanisms and criteria for their application to states after a non-compliance finding. These could also include directed capacity-building and measures drawing on the concept of Ongoing Monitoring and Verification as well as consideration of targeted sanctions.

Investing in Smart WMD Verification and Compliance Mechanisms

Challenge - *More and Smarter WMD Verification and Compliance* - WMD verification and compliance mechanisms are clearly a bargain when compared to other similar forms of state security investments, but experts highlighted a number of governance challenges facing international WMD verification and compliance institutions which may be having a negative impact on their performance. A lack of capacity within states to implement WMD obligations was assessed to represent both a weakness in WMD verification and compliance systems and (in some cases) an excuse for perpetuating inaction. A lack of resources to support verification and compliance activities on the part of a range of actors within the system was also identified as a key challenge.

The role of non-governmental organizations (NGOs) in verification was also highlighted. NGO activism was seen to be especially useful as a means to reinforce WMD verification and compliance in areas, such as the chemical and biological research sectors, where compliance with voluntary codes of conduct was important. Experts noted that the NGO role has long been a specific theme in the verification literature (for example, “societal verification”).

Recommendation 6 - Periodic independent expert reviews of the performance of WMD verification and compliance implementation agencies should be undertaken, and recommendations for reforms prepared for the consideration of states parties, including:

- a. reviewing the advantages and disadvantages of consensus in decision-making;
- b. encouraging greater use of more advanced mechanisms for verification and compliance (e.g., challenge and special inspections);

- c. revisiting the issue of patterns of verification (i.e. who gets inspected and how often); and,
- d. an examination of the question of voting rights for states under investigation or under a finding of non-compliance.

Recommendation 7 - In cooperation with treaty implementing institutions, greater resources should be devoted to financial and technical assistance for capacity-building within selected states to assist them in fulfilling their WMD verification and compliance commitments and obligations.

Recommendation 8 - States, private donors and foundations should be called upon to invest more resources (money, personnel and/or technology) in WMD verification and compliance capacities, including UN and treaty implementing organizations, (through budget and voluntary funds), national programmes and non-governmental organizations active on these issues.

Recommendation 9 - Non-governmental organizations should be actively encouraged, where appropriate, to assist in the development and implementation of WMD verification and compliance mechanisms, particularly through track II type contacts and initiatives.

Challenge - Supporting Advanced WMD Verification and Compliance Research -

Experts concluded that there is currently insufficient applied advanced research being conducted on WMD verification and compliance issues. There is a need to draw more systematically and comprehensively on the specific technological, operational and political lessons learned from recent WMD verification and compliance experiences. There is also a need for forward looking research that identifies gaps in our capabilities as well as potential synergies of national, plurilateral, and multilateral approaches to WMD verification and compliance. Given the nascent state of work on missile issues, there is also clearly a need for some mechanism to encourage systematic analysis of emerging issues as well as to preserve expertise as it is developed.

Recommendation 10 - A world-class centre of excellence focused on the analysis of WMD verification and compliance issues should be established to encourage cross-fertilization of experience and expertise within and between existing and emerging WMD verification and compliance mechanisms.

II. Nuclear Weapons Verification and Compliance

It was generally agreed that the technical verification system is stronger within the nuclear weapons regime than elsewhere. This does not rule out making further improvements on the technical side, but the main area of concern was compliance, specifically its political aspects. Expert consultations generated the following assessments of nuclear weapons verification and compliance challenges and recommended responses.

Expanding the Scope of Verification and Compliance Mechanisms

Challenge - *The Comprehensive Test Ban Treaty* - The Comprehensive Test Ban Treaty remains a key element of the global nuclear verification and compliance effort and momentum needs to remain behind efforts to bring it into force, meanwhile completing the International Monitoring System and methodologies for on-site inspections.

Recommendation 11 - All states that have not yet signed and ratified the Comprehensive Test Ban Treaty, a key element in the global nuclear verification and compliance regime, should do so immediately. This applies especially to states listed in the treaty's Annex II. Meanwhile, work should continue with urgency to prepare all elements of the CTBT's verification system.

Challenge - *Nuclear Weapons States* - Verifying non-proliferation and peaceful uses of nuclear energy remains a challenge, especially with respect to enrichment and reprocessing. Nuclear weapons state (NWS) activity in this regard is important both in its own terms and as an example for others. Compliance issues also arise from NWS obligations under Article VI of the NPT and may suggest an area for enhanced multilateral verification activity.

Recommendation 12 - Nuclear weapons states (NWS) should consider contributing to global nuclear verification and compliance efforts by submitting all of their civilian nuclear activities to IAEA safeguards and extending their Additional Protocols to all domestic civilian activities. They should also move forward on the removal of fissile material from weapons programmes under IAEA verification (e.g., implementation of the trilateral initiative) and ensure that nuclear disarmament agreements/arrangements, including existing bilateral agreements, are subject to effective verification mechanisms, including multilateral involvement.

Challenge - *Non-Parties to the NPT* - The challenge to the NPT posed by non-states parties with nuclear weapons was recognized and it was recommended that options be explored to draw non-parties to the NPT more fully into some form of multilateral verification and compliance mechanism. This would likely require the separation of civilian and military fuel cycles, which does not currently exist in these states, and would have to be carried out in ways that did not imply acceptance of these countries as *de facto* nuclear weapons states.

Recommendation 13 – Consideration should be given to encouraging states outside the NPT to accept more comprehensive multilateral commitments and safeguards relating to their civilian nuclear cycles, including negotiation of a full-scope safeguards agreement and an Additional Protocol with the IAEA. This effort could be undertaken by the international community, led by the P-5 and the UN Secretary General.

Challenge – *Nuclear Export Control Guidelines* – Nuclear export controls are a significant aspect of the broad nuclear non-proliferation regime. Problems, however, arise in that they are voluntary, open to interpretation and lacking a specific and transparent mechanism to verify compliance. There is a need to strengthen export control guidelines, in terms of the obligations they place upon supplier states.

Recommendation 14 – Options for expanding the application of verification and compliance mechanisms to existing nuclear export control guidelines should be explored with a view to transforming them into legally binding international conventions in order to support widespread transparency, verifiability and compliance.

Addressing Emerging Verification Challenges

Challenge - *Verification and the IAEA Additional Protocol* - Experts broadly supported the Additional Protocol as a welcome strengthening of the Agency’s safeguards system, and argued that it should become the foundation requirement for nuclear safeguarding and supply activities under the NPT. This objective could be supported through the NPT review mechanism, UN General Assembly resolutions as well as through the co-operation of nuclear suppliers and supplier groups. IAEA resources would need to be increased to accommodate the additional burden this would generate. The early implementation of integrated safeguards would, over time, be way to allow resources to be reallocated to this end.

Recommendation 15 - The IAEA Additional Protocol should become the new compulsory standard for nuclear safeguards: states should not receive nuclear technology or materials transfers unless they conclude such agreements.

Challenge – *Nuclear Accounting and Control* – The threat from non-state actors arises primarily from the theft or other acquisition of nuclear material or radioactive sources, or attacks on nuclear facilities. Strengthening existing nuclear security measures, making them both binding and verifiable, and helping states to implement adequately, would strengthen nuclear safeguards and assist states in coping with the non-state actor threat in the nuclear area. Improvements in and standardization of fissile materials accounting systems should be of use as both a broad safeguards measure as well in coping with the non-state actor threat.

Recommendation 16 - The adoption of higher standards for verifying nuclear accounting, safety, and physical protection should be given a high priority. Negotiations on strengthening the Convention on Physical Protection should be concluded as soon as possible. The Code of Conduct on the Safety and Security of Radioactive Sources, including sections relating to the import and export guidelines, should be made obligatory and legally binding. The IAEA should verify compliance with both the Physical Protection Convention and the Code of Conduct.

Recommendation 17 - The IAEA should commission an expert study to develop a standardized system of accounting for all fissile material for all states.

Challenge - *Potential for Break-Out from the NPT* - It has long been recognized that the spread of national capabilities in nuclear fuel cycle facilities can create both a “latent proliferation” threat and a potential “break-out capability” for a party choosing to withdraw from the NPT.

Recommendation 18 - To enhance the verifiability of peaceful nuclear programmes, consideration should be given to the internationalization of all uranium reprocessing and enrichment capabilities, beginning with any new facilities and progressively encompassing all reprocessing and enrichment facilities.

Challenge - *Verification of a Fissile Material Cut-off Treaty (FMCT)* - Preventing the further production of fissile material for weapons use is a key element in a broader nuclear non-proliferation strategy, binding all states within the NPT and thus addressing concerns regarding imbalances in the treaty. It could also provide an additional means to address the problems posed by weapons-capable states outside of the NPT. In order to serve these functions well, however, a FMCT must be effectively verifiable.

Recommendation 19 - The Conference on Disarmament (CD) should re-start negotiations towards a fully verified FMCT as soon as possible. In the meantime, the CD should establish a group of experts to review and develop mechanisms and procedures for effectively verifying compliance with such a treaty.

Compliance Management

Challenge – *After Non-Compliance, What?* – As part of their discussion on the International Atomic Energy Agency (IAEA), experts noted that a good technical verification system needs to be complemented by adequate follow-up with respect to compliance assessment and effective enforcement after verification of non-compliance. Some problems in compliance management may arise from a lack of more varied choices in articulating the findings of compliance cases, and particularly through a lack of a sufficiently broad array of instruments for compliance management. It was concluded that the proposed Experts Group to advise the IAEA Board of Governors on verification policy issues could also usefully serve as a vehicle to develop new compliance management mechanisms, including proactive positive and remedial measures, as well as punitive measures.

Recommendation 20 - Further to recommendations 4 and 5 (see Section I above) the IAEA should contribute to the improvement of compliance management through:

- a. development of better diagnostic tools for more nuanced assessments of compliance situations to clarify the nature of the non-compliance, the motivation for it and the appropriate responses to it;

- b. better use of existing compliance management mechanisms, such as special inspections, complementary access, and suspensions of IAEA privileges;
- c. establishment of a “Verification Expert Group” by the Board of Governors to advise its verification policy (the Standing Advisory Group on Safeguards Implementation would continue dealing with technical issues); the Group should be supplemented with outside/independent expertise to assist delegations and the Group as a whole; and
- d. closer cooperation by the IAEA with national systems of nuclear accounting and control, and the development of bilateral and regional safeguard mechanisms.

Challenge - *NPT Reporting* - Standardized reporting on compliance with NPT obligations by all states, covering all aspects of the Treaty’s obligations (on disarmament, non-proliferation and peaceful use) was seen by experts as useful in helping to address concerns regarding non-compliance. This was seen as particularly useful with respect to perceived non-compliance with Article VI of the NPT; although some experts downplayed the significance of this problem, it was seen as an issue that should be addressed, particularly since it could provide excuses for some non-nuclear weapon states to resist improvements in their own performance and/or to the effectiveness of the regime.

Recommendation 21 - The 2005 NPT Review Conference should mandate a standardized formal reporting, consultation and clarification mechanism for all states regarding their status of compliance with the NPT.

Investing in Smart WMD Verification and Compliance Mechanisms

Challenges - *National Capacities and Non-State Actor Concerns* - Experts expressed concerns about the threat from non-state actors, which was assessed to arise primarily from theft or other acquisitions of nuclear material or radioactive sources, or attacks on nuclear facilities. They stressed the importance of building national regulatory and legislative capacity to deal with the non-state actor problem, and the development, monitoring and verification of state obligations in this area. More broadly, state capacity for effective implementation of WMD obligations was seen as needed to minimize risks. Improvements in and standardization of fissile materials accounting systems was flagged as a useful step forward, both as a broad safeguards measure and in coping with the non-state actor threat.

Recommendation 22 - In cooperation with treaty implementing institutions, greater resources should be devoted to technical assistance for capacity-building within selected states to assist them in fulfilling their nuclear weapons related verification and compliance commitments and obligations, and by extension to address non-state actor concerns.

III. Chemical Weapons Verification and Compliance

While the Chemical Weapons Convention (CWC) was assessed to be the most comprehensive WMD regime, many experts argued that there had been a weakening of the compliance aspects in recent years. In particular, experts cited the lack of full compliance with the CWC's national implementation requirements, the limited use of challenge inspection verification provisions, and the lack of political will to address non-compliance situations. Expert consultations generated the following assessments of chemical weapons verification and compliance challenges and recommended responses.

Expanding the Scope of Verification and Compliance Mechanisms

Challenge - *Non-State Actors and Chemical Weapons* - While there was a general concern about the risks of non-state actor use of toxic chemicals for hostile purposes, it was assessed that non-state actors' most probable access to toxic chemicals was through existing stocks and industrial facilities, which reinforced the need to ensure that existing state-based transfer control and physical security mechanisms were working properly and that potential gaps in the verification of measures in these areas were closed. Such an approach did not exclude the possibility of developing and using other mechanisms to counter non-state access to toxic chemicals, but it was held that priority should be given to ensuring that such controls were working adequately and that states were carrying out appropriate oversight and verification. Concerns were also expressed about the need to strengthen the implementation mechanisms established under UNSCR 1540.

Recommendation 23 - The application of verification and compliance mechanisms should be expanded to cover the security of chemical weapons facilities. CWC states parties should also accept an additional verification requirement relating to the security of facilities that produce, process or consume CWC-scheduled chemicals, for example by reporting to the OPCW on measures they have taken to secure such facilities in order to prevent their use for hostile purposes.

Recommendation 24 - To support UNSCR 1540 and strengthen the OPCW's verification capabilities, CWC states parties should be required to report to the OPCW on the measures they are taking to meet their 1540 obligations relating to chemical weapons. To the extent possible, the Secretariat of the OPCW should, in cooperation with the 1540 Committee, monitor compliance with Sections 2 and 3 insofar as they relate to chemical weapons.

Addressing emerging verification challenges

Challenge - *New Types of Chemical and Biochemical Agents* - The verification provisions of the CWC in regard to production apply only to the chemicals listed in the treaty's schedules. Since entry into force in April 1997, no new chemicals have been added to the schedules, despite advances in science and technology, and notwithstanding

concerns about the possible development of new types of chemical agents based on chemicals not included in the original schedules. Technological advance has also generated developments related to “non-lethal” biochemicals, and certain states have shown increased interest in the use of such agents in law enforcement and other types of operations falling under the “other than war” category. Some experts considered this new range of weapons to be particularly problematic for verification and compliance measures under the CWC.

Recommendation 25 - The CWC Scientific Advisory Board should study the impact of recent scientific and technological developments in order to make recommendations to the Conference of States Parties on new chemicals that should be added to the schedules of chemicals subject to verification and compliance. States parties should be encouraged to support the Scientific Advisory Board’s work, including by providing technical information on chemicals relevant to the Convention.

Recommendation 26 - An independent expert study should examine the implications of the development of new biochemical agents, including “non-lethal” biochemicals, for the effectiveness of verification and compliance measures under the CWC, including aspects related to the “law enforcement” exemption.

Challenge - *Monitoring Schedule 2 and 3 Chemicals* - At present, most of the verification resources of the OPCW are directed at monitoring existing stockpiles and their destruction, with relatively few verification resources focused on monitoring facilities for Schedule 2 and 3 and discrete organic chemicals. This is the area where the risk of treaty breakout is highest.

Recommendation 27 - The OPCW should explore new techniques to monitor CW stockpile destruction, such as non-human monitoring arrangements, freeing resources for verification of production of CWC Schedule 2 and 3 chemical and discrete organic chemicals. The use of external sources of funding (in addition to further contributions from member states) should be considered in order to make up any funding shortfall that may be generated by a greater emphasis in this area of activity.

Investing in smart WMD verification and compliance mechanisms

Challenge - *CWC Destruction Deadlines* - Some states parties to the CWC have indicated that they will be unable to meet the April 2007 deadline for the destruction of their entire chemical weapons stockpiles and have sought the extension provided for under the treaty. There is a serious risk, however, that even these extended deadlines will not be met. A failure to comply with treaty-mandated CW destruction deadlines could communicate a lack of commitment to CW disarmament.

Recommendation 28 - In cooperation with treaty implementing institutions, greater resources should be devoted to financial and technical assistance for capacity-building within selected states to assist them in fulfilling their CWC verification and compliance commitments and obligations in a timely fashion.

IV. Biological Weapons Verification and Compliance

Expert consultations generated the following assessments of biological weapons verification and compliance challenges and recommended responses.

Expanding the Scope of WMD Verification and Compliance Mechanisms

Challenges - *Absence of a BTWC Verification Regime* - The most significant challenge to the Biological and Toxin Weapons Convention (BTWC) was seen by experts to be the absence of an effective verification and compliance regime. While all involved in the questionnaire and workshop agreed that progress in this regard remained politically difficult, they stressed the importance of making every effort to work towards change in the current stasis and to be ready when change occurred. Pending the successful creation of an effective BTWC verification and compliance regime, experts explored various interim options, including expanding the schedule of inter-sessional meetings and more work on CBMs. Also discussed was the creation of a small secretariat within the BTWC process, under the UN Secretary-General, or as an independent group of experts funded by willing states. Its tasks could include collation, translation, and dissemination of CBM reports, follow-up with member states to ensure they submit them complete and on time, and, where necessary, provision of assistance to member states in completing their CBMs.

Recommendation 29 - Renewed efforts to develop an effective verification and compliance regime for biological weapons should be given high priority. In further support of verification of compliance, including the CBM process, states parties to the BTWC should continue to hold annual meetings between review conferences beyond the 2006 Review Conference to address 'compliance management' issues and important BW-related developments.

Recommendation 30 - States parties, not already doing so, should be encouraged to submit their BTWC CBM reports. Steps should be taken by other states parties to provide assistance to further this end. States should also release publicly their BTWC CBM declarations, as some state have, as transparency measure and to encourage independent expert analysis.

Recommendation 31 - The establishment of a small secretariat to monitor compliance with the BTWC confidence building measures should be considered. This secretariat could also monitor reports submitted by states in accordance with Security Council Resolution 1540, as they relate to BW.

Challenge - *Security of Biological Research* - National programmes could be the source of material for biological weapons or may lead to the development of new agents that could be used as weapons.

Recommendation 32 - Options for expanding the application of verification and compliance mechanisms to the security of biological weapons relevant facilities and related research should be explored. This could include calling for international harmonization of national rules and procedures governing the security of dangerous pathogens, as well as oversight of research involving such materials.

Challenge - *Role of the UN Secretary-General in Investigating BW Issues* - In addition to the BTWC, the Geneva Protocol of 1925 remains in effect and prohibits the use of biological (and chemical) weapons as a means of warfare. Like the BTWC, the Protocol does not have any verification provisions. During the 1980s, however, the United Nations General Assembly and the Security Council both requested that the Secretary-General undertake investigations into alleged use of these weapons. At a July 2004 meeting of BTWC states parties, the British government proposed enhancing the capabilities of the UN Secretary General in this regard.

Recommendation 33 - Proposals to strengthen the UN Secretary-General's power to verify alleged use of biological and toxin weapons, as well as suspect biological facilities, should be supported.

Addressing Emerging Verification Challenges

Challenge - *Advances in the Biological Sciences* - Given the rapid advance in technological developments and the scope and nature of changes in the biological field in the past few years, there is a need to keep these changes under continual assessment and determine their implications for verification of the prohibitions outlined in the BTWC. It should also be recognized that developments in the field of biochemicals have the potential to undermine compliance with the BTWC. As such, it should be underscored that all biological agents and toxins, whatever their origin and method of production, are covered by the BTWC as affirmed by the second and third Review Conferences.

Recommendation 34 - An independent expert study should examine scientific and technological advances in the biological sciences and related fields and their implications for BTWC verification and compliance, including new verification technologies that might be used to help ensure compliance.

Investing in Smart WMD Verification and Compliance Mechanisms

Challenge - *Building Capacities for BTWC Implementation* - Article IV of the BTWC requires states parties to undertake measures in accordance with their "constitutional processes" to implement the Convention within their territory. The effective

implementation and monitoring of national prohibitory measures is critical to BTWC compliance.

Recommendation 35 - In cooperation with treaty implementing institutions, greater resources should be devoted to financial and technical assistance for capacity-building to assist selected states in fulfilling their BTWC verification and compliance commitments and obligations. BTWC states parties which are in a position to do so should assist other states parties in preparing national measures to implement their obligations under Article IV.

V. Missile Verification and Compliance

Experts noted that missiles were unique among the categories of weapons addressed by this report in that they are a means of delivery rather than a weapon and, in addition they are not constrained by any multilateral legally binding control regime upon which verification and compliance mechanisms could be based. It was assessed that the early development of a more comprehensive and binding missile control regime would be difficult, given national sensitivities and a basic lack of essential groundwork. One of the difficulties was seen to be the fact that there are a significant range of missile types, including both ballistic and cruise missiles, with varying characteristics in each category, complicating verification efforts. While a verifiable multilateral agreement on missile controls was considered a valid long-term goal, less ambitious short term steps should be considered as “building blocks” toward the larger edifice. Experts noted that missiles were generally used for military action, influence and threat, and as such were primarily weapons of states. Given their expense, the difficulty of both operating and concealing them (especially those of medium and higher ranges) and the availability of easier delivery options, missiles were not seen as a major problem in terms of use by non-state actors. Expert consultations generated the following assessments of missile verification and compliance challenges and recommended responses.

Expanding the Scope of WMD Verification and Compliance Mechanisms

Challenge - *Moving Forward on Missile Verification and Compliance* - It was assessed that a good starting point for strengthening verification and compliance was to consider ways to strengthen existing approaches. In the area of missile non-proliferation, for example, it was noted that greater certainty on end-use compliance by receiving states would strengthen the utility of national export controls, while acting to build both norms and confidence. The missile field, with a reasonably circumscribed and tightly defined list of controlled items, could offer an initial self-contained pilot project for such an agreement, which could be expanded *mutatis mutandis* to other areas if successful. Given its export control mandate and established expertise, the Missile Technology Control Regime (MTCR) might form one useful pillar of such an approach, but in order to be accepted by the necessary range of countries, negotiations would need to include other suppliers and traditional recipient states as well.

Recommendation 36 - Options for expanding the application of verification and compliance mechanisms to WMD-related activities should be explored, such as the negotiation of a multilateral agreement on end-use verification, with missiles and related technology as a pilot case.

Challenge - *The Hague Code of Conduct* - The Hague Code of Conduct (HCOC), whose membership is both larger and more varied than that of the MTCR, could serve as the focus of action in the compliance and verification field. While focused on non-proliferation commitments, the HCOC contains the first multilaterally-agreed measures relating to missile disarmament, in terms of restraint and reduction in missile holdings. It also provides for certain basic transparency measures relating to ballistic missile and SLV activities, and mentions the possibility of voluntary development of additional transparency measures on a regional, bilateral or national basis (although such measures have yet to be carried out). Finally, it envisages the development of “appropriate mechanisms for the voluntary resolution of questions” relating to ballistic missile and SLV programmes.

While the Code’s current focus is on reaching agreement on implementation of its CBM provisions and on increasing its membership (currently at 117), it also contains provisions for amendment, which could include monitoring, verification and compliance measures as part of a broader package that included increase in scope (e.g. to cover cruise as well as ballistic missiles), a strong statement on disarmament, more specific language on transfers and a commitment on technical cooperation. Experts also explored the concept of incentives (including positive or negative security assurances and economic or technological benefits) under the Code and noted that these could logically be linked to verification measures.

Recommendation 37 - Options for expanding the application of verification and compliance mechanisms to WMD-related activities should be explored, such as encouraging the Hague Code of Conduct process to consider verified compliance/monitoring on implementation of its commitments (perhaps linked to incentives) as part of its first round of amendments, and explore the possibility of implementing voluntary verification procedures in the meantime.

Challenge – *Establishing New Missile Norms* - There was general agreement that new work should be focused towards establishing verifiable norms and commitments (the logical first states of a compliance regime), with accompanying monitoring and transparency measures. In particular, it was considered that there was scope for regionally-based agreements, particularly since many of the “drivers” for acquisition of missiles by most states are based in regional tensions and insecurity. Some experts considered that this factor meant that regional missile agreements (ranging from basic voluntary confidence-building measures of the type being explored by India and Pakistan to more complex possibilities such as negotiated bilateral limitation or reduction arrangements and regional missile-free zones), including appropriate compliance and verification measures, could have a greater chance of achievement than binding global efforts under current conditions, while also contributing to broader norm-building.

Recommendation 38 - States should be urged to consider the negotiation of regional measures on missile-related non-proliferation, arms control and disarmament, focusing initially on confidence-building measures including transparency and voluntary mutual monitoring of commitments.

Challenge – *The UN Role in Missile Verification and Compliance* - Some preliminary work on missiles has occurred at the UN through a UN panel of governmental experts on the issue of missiles in all its aspects. As the one body with universal membership, the United Nations by definition contains representatives of all factions in the consideration of missile questions, including compliance and verification aspects, and is the only place at present where they can meet on terms of equality. Although this has so far meant that the UN has been largely unable to reach a consensus on far-reaching practical measures in the field (aside, notably, from the missile aspects of UN Security Council resolution 1540), the UN remains an indispensable locus for seeking convergence on the key issues.

Recommendation 39 - The UN should be encouraged to continue its efforts in the missile field, with special attention to norm-building and confidence building measures, as a first step towards fully developed verification and compliance mechanisms.

Annex A: Study Methodology and Participation

This report draws upon the views of a range of Canadian and international experts (see below) provided through an integrated consultation process which included five distinct elements.

Study Methodology

I. Study Design (May 2004) - A Working Group on WMD Verification and Compliance was convened to develop and implement the study described in this report.

II. Baseline Study (Aug - Oct 2004) - A baseline study was completed by VERTIC reviewing the current status of WMD verification and compliance mechanisms and issues.

III. Expert Questionnaire (Sept 2004) – An on-line expert questionnaire, *Verification of and compliance with Weapons of Mass Destruction Regimes in the New Security Environment: Challenges and Responses* was completed by a group of 35 independent experts. The purpose of the questionnaire was to seek expert views on a number of proposals currently animating the international debate on WMD verification and compliance issues, within five thematic areas:

1. General WMD-related Verification and Compliance Issues;
2. Nuclear and Radiological Weapons Verification and Compliance: Challenges and Responses;
3. Chemical Weapons Verification and Compliance: Challenges and Responses;
4. Biological Weapons Verification and Compliance: Challenges and Responses;
5. Missile Verification and Compliance: Challenges and Responses.

IV. Expert Conference Calls (Oct 2004) - Those who completed the questionnaire were contacted for a 1-2 hour follow-up conference call moderated by one of the core working group members, to discuss in greater detail the issues/proposals worthy of further analysis. Five separate conference calls were held to address each of the five clusters of WMD verification and compliance.

V. Expert Workshop (Oct 14-15, 2004) – An Expert Workshop on WMD Verification and Compliance was held in Ottawa, including approximately 20 non-government and government participants acting in their expert capacity. The objective of the workshop was to complete a substantive review of WMD-related verification and compliance challenges and responses identified through the questionnaire and conference call consultations of the virtual expert group. A discussion of missile verification and compliance issues was not included in the workshop as these issues were addressed separately through a separate conference call on October 20, 2004.

Study Participants

Working Group on WMD Verification and Compliance

1. **Dr. Jane Boulden**, Canada Research Chair in International Relations and Security Studies, Royal Military College of Canada
2. **Dr. Trevor Findlay**, Executive Director, Verification Research, Training and Information Centre, London
3. **Ms. Rita Grossman-Vermaas**, Research Associate, International Research and Security Outreach Programme, Non-Proliferation, Arms Control and Disarmament Division, Foreign Affairs Canada
4. **Dr. Robert Lawson**, Senior Policy Advisor, Non-Proliferation, Arms Control and Disarmament Division, Foreign Affairs Canada
5. **Dr. James Keeley**, Associate Professor of Political Science, Centre for Military and Strategic Studies, University of Calgary

Expert Questionnaire Participants

1. **Dr. Michael Beck**, Assistant Director, Center for International Trade and Security, University of Georgia
2. **Dr. Marshall Beier**, Assistant Professor, Department of Political Science, McMaster University
3. **Dr. Michael Brzoska**, Head of Research Department, Bonn International Centre for Conversion
4. **Colonel (Ret.) Heinrich Buch**, Federal Armed Forces University, Munich
5. **Dr. Marie Isabelle Chevrier**, Associate Professor of Political Economy, University of Texas at Dallas
6. **Dr. Jonathan Dean**, Advisor on Global Security Issues, Union of Concerned Scientists
7. **Dr. Walter Dorn**, Associate Professor, Department of Politics and Economics, Royal Military College of Canada
8. **Dr. Gerald Epstein**, Senior Fellow, Science and Security, Center for Strategic and International Studies
9. **Mr. Daniel Feakes**, Research Fellow, Harvard Sussex Program
10. **Dr. Charles Ferguson**, Fellow, Science and Technology, Council on Foreign Relations
11. **Dr. Asha George**, Managing Director, ANSER Institute for Homeland Security
12. **Dr. Jozef Goldblat**, Geneva International Peace Research Institute
13. **Dr. Roger Hagengruber**, Director, University of New Mexico Office for Policy, Security and Technology
14. **Dr. Helmut Hoenig**, Professor, Graz University of Technology, Institute of Organic Chemistry; former UNSCOM Commissioner
15. **Dr. Iris Hunger**, Study Group on Biological Arms Control of the Research Center for Biotechnology, Society and the Environment, University of Hamburg; former biological weapons expert, German Foreign Ministry

16. **Dr. Edward Ifft**, Foreign Policy Officer, US Department of State and Adjunct Professor, Edmund A. Walsh School of Foreign Service, Georgetown University
17. **Mr. Ian Kenyon**, Visiting Senior Research Fellow, Mountbatten Centre for International Studies
18. **Dr. Igor Khripunov**, Associate Director of the Center for International Trade and Security, and Adjunct Professor of Political Science, University of Georgia,
19. **Mr. Milton Leitenberg**, Senior Research Scholar, University of Maryland School of Public Policy
20. **Dr. Jez Littlewood**, Research Fellow, Mountbatten Centre for International Studies
21. **Ms. Jennifer Mackby**, Fellow, International Security Program, Center for Strategic and International Studies
22. **Dr. George MacLean**, Associate Professor, Department of Political Studies, University of Manitoba
23. **Dr. David Mutimer**, Associate Professor, Department of Political Science, York University and Deputy Director, York Centre for International and Security Studies
24. **Dr. Freleigh J. F. Osborne**, Principal, F. J. F. Osborne & Associates
25. **Professor Graham S. Pearson**, Visiting Professor of International Security, Department of Peace Studies, University of Bradford
26. **Mr. John Pike**, Director, GlobalSecurity.org
27. **Dr. Richard Price**, Professor of Political Science, University of British Columbia
28. **Dr. Brad Roberts**, Institute for Defence Analysis
29. **Dr. Clifford Singer**, Professor of Nuclear Engineering, Director of the Program in Arms Control, Disarmament and International Security, University of Illinois at Urbana-Champaign
30. **Mr. James Sutterlin**, Distinguished Fellow in United Nations Studies, Yale University
31. **Mr. James Taylor**, UNMOVIC Weapons Inspector and Consultant
32. **Dr. Jonathan Tucker**, Senior Researcher, Center for NonProliferation Studies, Monterey Institute for International Studies
33. **Dr. Mark Wheelis**, Senior Lecturer in Microbiology, Section of Microbiology, University of California
34. **Ms. Angela Woodward**, Arms Control and Disarmament Researcher, Verification Research, Training and Information Centre
35. **Dr. Jean Pascal Zanders**, Director, Biological Weapons Prevention Project

Expert Conference Call participants

General WMD Verification and Compliance

1. Chair: Dr. James Keeley
2. Colonel Heinrich Buch
3. Dr. Jozef Goldblat
4. Ms. Rita Grossman-Vermaas

5. Mr. Maciek Hawrylak
6. Dr. George MacLean
7. Mr. James Sutterlin

Nuclear Weapons Verification and Compliance

1. Chair: Dr. James Keeley
2. Dr. Charles Ferguson
3. Ms. Rita Grossman-Vermaas
4. Dr. Roger Hagengruber
5. Ms. Jennifer Mackby

Chemical Weapons Verification and Compliance

1. Chair: Dr. Jane Boulden
2. Mr. Maciek Hawrylak
3. Ms. Rita Grossman-Vermaas
4. Dr. Igor Khripunov
5. Dr. Mark Wheelis

Biological Weapons Verification and Compliance

1. Chair: Ms. Rita Grossman-Vermaas
2. Mr. Maciek Hawrylak
3. Dr. Iris Hunger
4. Mr. Milton Leitenberg
5. Dr. Jez Littlewood
6. Professor Graham Pearson
7. Dr. Jonathan Tucker
8. Ms. Angela Woodward
9. Dr. Jean Pascal Zanders

Missile Verification and Compliance

1. Chair: Dr. Jane Boulden
2. Ms. Rita Grossman-Vermaas
3. Dr. Freleigh Osborne
4. Mr. James Taylor

Experts Workshop Participants

1. **Dr. Jane Boulden**, Canada Research Chair in International Relations and Security Studies, Royal Military College of Canada
2. **Dr. Frank Ronald Cleminson**, Rundle Virtual Research Group
3. **Mr. Simon Collard-Wexler**, Senior Research Officer, International Security Research and Outreach Programme, Non-Proliferation, Arms Control and Disarmament Division, Foreign Affairs Canada
4. **Dr. Trevor Findlay**, Executive Director, Verification Research, Training and Information Centre (London)

5. **Dr. Nancy Gallagher**, Associate Director for Research, Center for International and Security Studies at Maryland
6. **Major Donald A. Neill**, Analyst, Weapons of Mass Destruction Section Directorate of Arms and Proliferation Control Policy, Policy Planning Division, Policy Group National Defence Headquarters
7. **Ms. Rita Grossman-Vermaas**, Research Associate, Non-Proliferation, Arms Control and Disarmament Division, Foreign Affairs Canada
8. **Ms. Elisa Harris**, Senior Research Scholar, Center for International and Security Studies at Maryland
9. **Mr. Maciek Hawyrlak**, Norman Patterson School of International Affairs (NPSIA), Carleton University
10. **Mr. John Hay**, Senior Fellow, Norman Patterson School of International Affairs (NPSIA), Carleton University
11. **Dr. James Keeley**, Associate Professor of Political Science, Centre for Military and Strategic Studies, University of Calgary
12. **Dr. Robert Lawson**, Senior Policy Advisor, Non-Proliferation, Arms Control and Disarmament Division, Foreign Affairs Canada
13. **Ms. Peggy Mason**, Chair of the Group of 78
14. **Mr. Robert McDougall**, Director, Non-Proliferation, Arms Control and Disarmament Division, Foreign Affairs Canada
15. **Ms. Kim Rebenchuck**, Policy Officer, Directorate Arms Proliferation Control Policy, Department of National Defence, Canada
16. **Dr. Barbara Hatch Rosenberg**, Natural Science Division, State University of New York
17. **Mr. Douglas Scott**, President, The Markland Group
18. **Mr. Ron Stansfield**, Advisor, Nuclear Non-Proliferation, Non-Proliferation, Arms Control and Disarmament Division, Foreign Affairs Canada
19. **Mr. David Steuerman**, BTWC Treaty Implementation Officer, Non-Proliferation, Arms Control and Disarmament Division, Foreign Affairs Canada
20. **Major C. Victor Sattler**, Operations Officer, Treaty Operations, J3 Arms Control, Department of National Defence, Canada

Missile Experts Conference Call Participants (October 20, 2004)

1. **Dr. Jane Boulden**, Canada Research Chair in International Relations and Security Studies,, Royal Military College of Canada
2. **Mr. Dennis Gormley**, Senior Fellow, Center for NonProliferation Studies, Monterey Institute for International Affairs and Visiting Professor and Research Associate, Graduate School of Public and International Affairs, University of Pittsburgh
3. **Ms. Rita Grossman-Vermaas**, Research Associate, Non-Proliferation, Arms Control and Disarmament Division, Foreign Affairs Canada
4. **Mr. Robert McDougall**, Director, Non-Proliferation Arms Control and Disarmament Division, Foreign Affairs Canada
5. **Dr. Mark Smith**, Research Fellow, Mountbatten Centre for International Studies
6. **Dr. Jing-dong Yuan**, Senior Research Associate, Monterey Institute for International Studies

Annex B: Summary of Expert Questionnaire Results

Section One

General WMD-Related Verification and Compliance Issues

WMD and the International Security Environment

The following question assessed experts' views on the threats presented by weapons of mass destruction within the current international security environment.

1.1 *Please rank your assessment of the likelihood of the following events within the next 5 to 10 years.*

(Numbers assigned 1 through 8 from most to least likely. 1=most likely)

The use of nuclear weapons by a state actor

(34 respondents)

Rank 1: 3 responses (9%)

Rank 2: 1 response (3%)

Rank 3: 1 response (3%)

Rank 4: 1 response (3%)

Rank 5: 4 responses (12%)

Rank 6: 5 responses (15%)

Rank 7: 13 responses (38%)

Rank 8: 6 responses (18%)

The use of nuclear weapons by a non-state actor.

(33 respondents)

Rank 1 : 0 responses (0%)

Rank 2 : 0 responses (0%)

Rank 3 : 3 responses (9%)

Rank 4 : 4 responses (12%)

Rank 5 : 2 responses (6%)

Rank 6 : 8 responses (24%)

Rank 7 : 1 response (3%)

Rank 8 : 15 responses (45%)

The use of radiological weapons by a state actor.

(31 respondents)

Rank 1: 0 responses (0%)

Rank 2: 0 responses (0%)

Rank 3: 1 response (3%)

Rank 4: 2 responses (6%)

Rank 5: 4 responses (13%)

Rank 6: 9 responses (29%)

Rank 7: 8 responses (26%)

Rank 8: 7 responses (23%)

The use of radiological weapons by a non-state actor.

(33 respondents)

Rank 1 : 4 responses (12%)

Rank 2 : 10 responses (30%)

Rank 3 : 11 responses (33%)

Rank 4 : 4 responses (12%)

Rank 5 : 3 responses (9%)

Rank 6 : 1 response (3%)

Rank 7 : 0 responses (0%)

Rank 8 : 0 responses (0%).

The use of chemical weapons by a state actor.

(34 respondents)

Rank 1 : 4 responses (12%)

Rank 2 : 2 responses (6%)

Rank 3 : 6 responses (18%)

Rank 4 : 8 responses (24%)

Rank 5 : 6 responses (18%)

Rank 6 : 4 responses (12%)

Rank 7 : 2 responses (6%)

Rank 8 : 2 responses (6%).

The use of chemical weapons by a non-state actor.

(33 respondents)

Rank 1 : 20 responses (61%)

Rank 2 : 6 responses (18%)

Rank 3 : 6 responses (18%)

Rank 4 : 0 responses (0%)

Rank 5 : 0 responses (0%)

Rank 6 : 0 responses (0%)

Rank 7 : 1 response (3%)

Rank 8 : 0 responses (0%).

The use of biological weapons by a state actor.

(32 respondents)

Rank 1 : 0 responses (0%)

Rank 2 : 3 responses (9%)

Rank 3 : 1 response (3%)

Rank 4 : 8 responses (25%)

Rank 5 : 11 responses (34%)

Rank 6 : 3 responses (9%)

Rank 7 : 6 responses (19%)

Rank 8 : 0 responses (0%).

The use of biological weapons by a non-state actor.

(33 respondents)

Rank 1 : 3 responses (9%)

Rank 2 : 12 responses (36%)

Rank 3 : 5 responses (15%)

Rank 4 : 7 responses (21%)

Rank 5 : 2 responses (6%)

Rank 6 : 2 responses (6%)

Rank 7 : 0 responses (0%)

Rank 8 : 2 responses (6%).

Basic appreciation of the situation

The following two questions assessed experts' views on the general nature of current WMD-related verification and compliance issues

1.2 Broadly assessed, how would you categorize the current situation with respect to the verification of compliance with international WMD-related non-proliferation, arms control and verification regimes (more than one answer may be indicated):

(35 respondents)

- **Broadly adequate:**
10 responses (29%)
- **Adequate in some areas (e.g. types of weapons), inadequate in others:**
2 responses (6%)
- **Better in some types of agreements (e.g. bilateral/multilateral) than in others**
20 responses (57%)
- **Deteriorating overall**
21 responses (60%)
- **Improving overall**
16 responses (45%)
- **Stagnant overall**
1 response (3%)

1.3 To the extent that you see problems in the current situation, to which factors do you primarily ascribe them (more than one answer may be indicated):

(35 respondents)

- **Existing verification technology is inadequate to detect non-compliance:**
16 responses (46%)
- **Restrictions on inspections and limits on technology applied to verification:**
10 responses (29%)
- **Inadequate verification provisions in existing agreements:**
15 responses (43%)

- **Refusal of states to allow full verification of existing commitments:**
20 responses (57%)
- **Deliberate circumvention of verification measures and deception of verification agencies:**
17 responses (49%)
- **Increased non-state activity (eg transfers) outside verification regimes:**
20 responses (57%)
- **Inadequate resources (financial/personnel/equipment) devoted to verification (including agencies):**
18 responses (51%)
- **Unwillingness of states to accede to agreements requiring strict(er) verification:**
11 responses (31%)
- **Unwillingness of states to negotiate new agreements with strict verification provisions:**
20 responses (57%)
- **Under-development of international verification and compliance mechanisms for situations outside existing treaty regimes and commitments**
22 responses (63%)
- **Other (specified in comments section):**
20 responses (57%)

WMD-related verification and compliance and the United Nations

1.4 The possibility of a greater role of the UN Security Council in addressing WMD-related verification and compliance challenges should be the subject of a significant analysis.

Strongly agree: 14 responses (40%)
Agree: 18 responses (51%)
Disagree: 2 responses (6%)
Strongly disagree: 1 response (3%)
Don't know: 0 responses (0%).

Respondents: 35 **Mean response:** 1.71 **Variance:** 0.50

1.5 Which of the following should have primary responsibility for undertaking an analysis of the role of the UN Security Council in verification and compliance issues?

(33 respondents)

- **The UN Security Council:** 6 responses (18%)
- **The UN General Assembly:** 5 responses (15%)
- **UN member governments:** 6 responses (18%)

- **Non-government research institutes:** 16 responses (48%).

1.6 *In an effort to address the danger of the proliferation of WMD-related capabilities to non-state actors, UN Security Council Resolution 1540 (28 April 2004) requires states to adopt national legislation that would secure WMD-related materials within their borders, criminalize illicit exchanges of WMD-related materials, and strengthen WMD-related export controls. Please outline your views on how the UN Security Council should best monitor compliance with Resolution 1540.*

Note: Answers for this question were in comment-form and were incorporated into conference call and workshop discussions, and ultimately into “Weapons of Mass Destruction Verification and Compliance: Challenges and Responses.”

1.7 *A basic monitoring mechanism for Resolution 1540, mandated for an initial two years, has been established by the Council to monitor compliance. The effectiveness of this initiative should be the subject of significant analysis.*

Strongly agree: 17 responses (52%)
Agree: 12 responses (36%)
Disagree: 1 response (3%)
Strongly disagree: 1 response (3%)
Don’t know: 2 responses (6%).

Respondents: 33 **Mean response:** 1.76 **Variance:** 1.19

1.8 *UNMOVIC’s capabilities should be retained and institutionalized within the United Nations system in some form.*

Strongly agree: 13 responses (38%)
Agree: 15 responses (44%)
Disagree: 0 responses (0%)
Strongly disagree: 1 response (3%)
Don’t know: 5 responses (15%).

Respondents: 34 **Mean response:** 2.12 **Variance:** 1.86

1.9 *Please answer this question if you selected “Strongly Agree” or “Agree” in the above question. A variety of models for institutionalizing UNMOVIC’s capabilities within the United Nations have been proposed. Some have suggested placing such capabilities within the UN Department of Disarmament Affairs under the aegis of the UN Secretary-General, while others have suggested retaining them as an independent commission*

under the direct control of the UN Security Council. What are your views on these and other possible models designed to address the future of UNMOVIC's capabilities?

Note: *Answers for this question were in comment-form and were incorporated into conference call and workshop discussions, and ultimately into "Weapons of Mass Destruction Verification and Compliance: Challenges and Responses."*

WMD-Related Verification and compliance and national, plurilateral (i.e. coalitions of the willing) and multilateral WMD regimes.

1.10 *The potential complementarities of national (unilateral), plurilateral, and multilateral approaches to addressing WMD threats should be the subject of a significant study.*

Strongly agree: 17 responses (49%)
Agree: 16 responses (46%)
Disagree: 0 responses (0%)
Strongly disagree: 0 responses (0%)
Don't know: 2 responses (6%).

Respondents: 35 **Mean response:** 1.69 **Variance:** 0.93

1.11 *There should be a study of the comparative strengths, weaknesses and possible interactions of different organizational forms and levels of non-proliferation institutions (global, regional, interested party, national/unilateral, binding/voluntary, formal/informal) with regard to their implications for compliance and verification issues.*

Strongly agree: 16 responses (46%)
Agree: 12 responses (34%)
Disagree: 5 responses (14%)
Strongly disagree: 0 responses (0%)
Don't know: 2 responses (6%).

Respondents: 35 **Mean response:** 1.86 **Variance:** 1.13

1.12 *Are there other potential responses to the general challenges facing WMD verification and compliance that merit analysis?*

Note: *Answers for this question were in comment-form and were incorporated into conference call and workshop discussions, and ultimately into "Weapons of Mass Destruction Verification and Compliance: Challenges and Responses."*

Section Two

Nuclear and Radiological Weapons Verification and Compliance: Challenges and Responses

Challenges

The following questions assessed experts' views on the relative severity of 'internal' and 'external' challenges facing the verification and compliance arrangements for the nuclear non-proliferation regime – defined for this purpose as the Nuclear Non-Proliferation Treaty and the International Atomic Energy Agency (IAEA) and its nuclear safeguards system. Here 'internal' challenges refer to issues directly related to the nuclear verification and compliance mechanisms themselves. 'External' challenges refer to issues external to the nuclear verification and compliance mechanisms that have the potential to influence the effectiveness of the nuclear non-proliferation regime.

2.1 Please rank the following internal challenges that face the IAEA and its nuclear safeguards system. (Please assign numbers 1 through 9 to the following statements. 1= most significant challenge.)

Lack of universal adherence to and the implementation of the strengthened nuclear safeguards system, including the Additional Protocol.

(17 respondents)

Rank 1: 8 responses (47%)

Rank 2 : 5 responses (29%)

Rank 3 : 2 responses (12%)

Rank 4 : 1 response (6%)

Rank 5 : 1 response (6%)

Rank 6: 0 responses (0%)

Rank 7 : 0 responses (0%)

Rank 8 : 0 responses (0%)

Rank 9 : 0 responses (0%).

Tensions between the IAEA's mandate as both promoter of the peaceful uses of nuclear energy and verifier of nonproliferation commitments.

(16 respondents)

Rank 1 : 0 responses (0%)

Rank 2 : 1 response (6%)

Rank 3 : 4 responses (25%)

Rank 4 : 4 responses (25%)

Rank 5 : 2 responses (13%)

Rank 6 : 2 responses (13%)

Rank 7 : 0 responses (0%)

Rank 8, 1 response (6%)

Rank 9 : 2 responses (13%).

Managerial and administrative effectiveness of the IAEA.

(15 respondents)

Rank 1 : 1 response (7%)
Rank 2 : 0 responses (0%)
Rank 3 : 1 response (7%)
Rank 4 : 0 responses (0%)
Rank 5 : 1 response (7%)
Rank 6 : 2 responses (13%)
Rank 7 : 3 responses (20%)
Rank 8 : 2 responses (13%)
Rank 9 : 5 responses (33%).

Limitations on the IAEA's ability to allocate verification resources based on an assessment of proliferation risks.

(14 respondents)

Rank 1 : 1 response (7%)
Rank 2 : 1 response (7%)
Rank 3 : 3 responses (21%)
Rank 4 : 4 responses (29%)
Rank 5 : 0 responses (0%)
Rank 6 : 2 responses (14%)
Rank 7 : 0 responses (0%)
Rank 8 : 1 response (7%)
Rank 9 : 2 responses (14%).

Limitations on the IAEA's ability to de-link allocation of verification resources from allocation of resources to technical assistance to developing countries.

(14 respondents)

Rank 1 : 0 responses (0%)
Rank 2 : 1 response (7%)
Rank 3 : 2 responses (14%)
Rank 4 : 0 responses (0%)
Rank 5 : 5 responses (36%)
Rank 6 : 2 responses (14%)
Rank 7 : 2 responses (14%)
Rank 8 : 2 responses (14%)
Rank 9 : 0 responses (0%).

Inadequate financial resources to fully support mandated verification and compliance activities.

(16 respondents)

Rank 1 : 0 responses (0%)
Rank 2 : 4 responses (25%)
Rank 3 : 4 responses (25%)
Rank 4 : 1 response (6%)
Rank 5 : 1 response (6%)
Rank 6 : 4 responses (25%)

Rank 7 : 1 response (6%)
Rank 8 : 0 responses (0%)
Rank 9 : 1 responses (6%).

**Inadequate/insufficient uptake of new verification technology.
(14 respondents)**

Rank 1 : 0 responses (0%)
Rank 2 : 1 response (7%)
Rank 3 : 0 responses (0%)
Rank 4 : 0 responses (0%)
Rank 5 : 1 response (7%)
Rank 6 : 1 response (7%)
Rank 7 : 4 responses (29%)
Rank 8 : 6 responses (43%)
Rank 9 : 1 response (7%).

**Inappropriate balance between use of inspectors and on-site technology such
as remote cameras.**

(14 respondents)

Rank 1 : 0 responses (0%)
Rank 2 : 0 responses (0%)
Rank 3 : 0 responses (0%)
Rank 4 : 2 responses (14%)
Rank 5 : 2 responses (14%)
Rank 6 : 1 response (7%)
Rank 7 : 3 responses (21%)
Rank 8 : 2 responses (14%)
Rank 9 : 4 responses (29%).

**Lack of consensus amongst IAEA Member States on strengthened safeguards
measures.**

(16 respondents)

Rank 1 : 7 responses (44%)
Rank 2 : 4 responses (25%)
Rank 3 : 0 responses (0%)
Rank 4 : 3 responses (19%)
Rank 5 : 1 response (6%)
Rank 6 : 0 responses (0%)
Rank 7 : 1 response (6%)
Rank 8 : 0 responses (0%)
Rank 9 : 0 responses (0%).

2.2 Please rank the following internal challenges that face the enforcement of states' nuclear non-proliferation commitments. (Please assign numbers 1 through 5 following statements. 1= most significant challenge.)

Inadequate legal/political authority on the part of the IAEA to take effective steps to clarify suspicions of non-compliance.

(17 respondents)

Rank 1: 1 response (6%)

Rank 2: 3 responses (18%)

Rank 3: 5 responses (29%)

Rank 4: 6 responses (35%)

Rank 5: 2 responses (12%)

Lack of political will in the IAEA Board of Governors to fully address potential/actual non-compliance.

(17 respondents)

Rank 1: 3 responses (18%)

Rank 2: 4 responses (24%)

Rank 3: 4 responses (24%)

Rank 4: 2 responses (12%)

Rank 5: 4 responses (24%).

Lack of willingness by the UN Security Council to deal with cases of noncompliance.

(15 respondents)

Rank 1: 7 responses (47%)

Rank 2: 2 responses (13%)

Rank 3: 3 responses (20%)

Rank 4: 2 responses (13%)

Rank 5: 1 response (7%).

Lack of a robust compliance enforcement mechanism within the NPT review process.

(17 respondents)

Rank 1: 2 responses (12%)

Rank 2: 4 responses (24%)

Rank 3: 3 responses (18%)

Rank 4: 2 responses (12%)

Rank 5: 6 responses (35%).

Unwillingness by some states to sign comprehensive safeguards and/or additional protocols.

(16 respondents)

Rank 1: 5 responses (31%)

Rank 2: 3 responses (19%)

Rank 3: 1 response (6%)

Rank 4: 4 responses (25%)

Rank 5: 3 responses (19%).

2.3 Please rank the following external challenges that face the nuclear non-proliferation regime to the extent that they affect verification and compliance. (Please assign numbers 1 through 8 to the following statements. 1= most significant challenge.)

The existence of states outside the NPT regime.

(19 respondents)

Rank 1 : 7 responses (37%)

Rank 2 : 4 responses (21%)

Rank 3 : 2 responses (11%)

Rank 4 : 1 response (5%)

Rank 5 : 0 responses (0%)

Rank 6 : 1 response (5%)

Rank 7: 3 responses (16%)

Rank 8: 1 response (5%).

The existence of inadequately strict and specific safeguards, verification and compliance obligations in the Non-Proliferation Treaty (NPT).

(17 respondents)

Rank 1 : 1 response (6%)

Rank 2 : 1 response (6%)

Rank 3 : 4 responses (24%)

Rank 4 : 3 responses (18%)

Rank 5 : 2 responses (12%)

Rank 6 : 2 responses (12%)

Rank 7 : 2 responses (12%)

Rank 8 : 2 responses (12%).

The inherently discriminatory nature of the NPT which permits nuclear weapon states (NWS) to retain nuclear weapons.

(19 respondents)

Rank 1 : 6 responses (32%)

Rank 2 : 1 response (5%)

Rank 3 : 2 responses (11%)

Rank 4: 3 responses (16%)

Rank 5: 1 response (5%)

Rank 6: 2 responses (11%)

Rank 7: 1 response (5%)

Rank 8, 3 responses (16%).

Perceptions by non-nuclear weapon states (NNWS) parties to the NPT that there are no multilateral means for verifying NWS compliance with disarmament obligations under Article VI.

(16 respondents)

Rank 1 : 0 responses (0%)

Rank 2 : 1 response (6%)

Rank 3 : 4 responses (25%)
Rank 4 : 2 responses (13%)
Rank 5 : 2 responses (13%)
Rank 6 : 2 responses (13%)
Rank 7 : 2 responses (13%)
Rank 8 : 3 responses (19%).

NWS non-compliance with their disarmament obligations under Article VI of the NPT.

(19 respondents)

Rank 1 : 1 response (5%)
Rank 2 : 3 responses (16%)
Rank 3 : 3 responses (16%)
Rank 4 : 2 responses (11%)
Rank 5 : 4 responses (21%)
Rank 6 : 2 responses (11%)
Rank 7 : 2 responses (11%)
Rank 8 : 2 responses (11%).

Perceptions by the NWS that the NNWS are not complying sufficiently with their NPT obligations.

(18 respondents)

Rank 1 : 0 responses (0%)
Rank 2 : 3 responses (17%)
Rank 3 : 1 response (6%)
Rank 4 : 4 responses (22%)
Rank 5 : 2 responses (11%)
Rank 6 : 4 responses (22%)
Rank 7 : 3 responses (17%)
Rank 8 : 1 response (6%).

Difficulties of existing nuclear supply regimes in stopping covert nuclear supply networks for nuclear technology and materials.

(18 respondents)

Rank 1 : 3 responses (17%)
Rank 2 : 3 responses (17%)
Rank 3 : 2 responses (11%)
Rank 4 : 2 responses (11%)
Rank 5 : 4 responses (22%)
Rank 6 : 2 responses (11%)
Rank 7: 0 responses (0%)
Rank 8: 2 responses (11%).

Increased capacities of non-state actors to engage in activities of nuclear proliferation concern.

(17 respondents)

Rank 1 : 3 responses (18%)
Rank 2 : 4 responses (24%)
Rank 3 : 1 response (6%)
Rank 4 : 1 response (6%)
Rank 5 : 1 response (6%)
Rank 6 : 1 response (6%)
Rank 7 : 3 responses (18%)
Rank 8 : 3 responses (18%).

Responses: Improving the Regime

2.4 Strengthened nuclear safeguards, including measures that the IAEA is able to take under its existing legal authority and the implementation of the Additional Protocol, are sufficient to ensure that a state subject to these measures will be unable to escape detection should it undertake undeclared illicit activities.

Strongly agree: 0 responses (0%)
Agree: 4 responses (19%)
Disagree: 11 responses (52%)
Strongly disagree: 2 responses (10%)
Don't know: 4 responses (19%)

Respondents: 21 **Mean response:** 3.29 **Variance:** 1.01

2.5 The Additional Protocol should be made mandatory for all NPT states parties in terms of fulfilling the safeguards commitments under Article III.1 of the NPT.

Strongly agree: 9 responses (45%)
Agree: 6 responses (30%)
Disagree: 1 response (5%)
Strongly disagree: 0 responses (0%)
Don't know: 4 responses (20%)

Respondents: 20 **Mean response:** 2.20 **Variance:** 2.38

2.6 The Additional Protocol should be made mandatory for all NPT states parties in terms of commitments to a condition of supply under Article III.2 of the NPT.

Strongly agree: 9 responses (41%)
Agree: 6 responses (27%)
Disagree: 1 response (5%)
Strongly disagree: 0 responses (0%)
Don't know: 6 responses (27%)

Respondents: 22 Mean response: 2.45 Variance: 2.83

2.7 Verified compliance with comprehensive safeguards agreements and the Additional Protocol should be mandatory 'as a condition of supply' (meaning the IAEA is able to declare the non-diversion of declared nuclear material and the absence of undeclared nuclear activities in a state) for civilian nuclear materials and equipment.

Strongly agree: 14 responses (64%)
Agree: 2 responses (9%)
Disagree: 1 response (5%)
Strongly disagree: 0 responses (0%)
Don't know: 5 responses (23%).

Respondents: 22 Mean response: 2.09 Variance: 2.85

2.8 If a state is under investigation by the IAEA for non-technical violations of the state's safeguards obligations, all nuclear cooperation with that state by NPT states parties and the IAEA itself should be suspended.

Strongly agree: 3 responses (14%)
Agree: 10 responses (45%)
Disagree: 3 responses (14%)
Strongly disagree: 0 responses (0%)
Don't know: 6 responses (27%).

Respondents: 22 Mean response: 2.82 Variance: 2

2.9 Non-governmental organizations can play a significant role with respect to the verification of NPT implementation.

Strongly agree: 4 responses (18%)
Agree: 12 responses (55%)
Disagree: 5 responses (23%)
Strongly disagree: 0 responses (0%)
Don't know: 1 response (5%).

Respondents: 22 Mean response: 2.18 Variance: 0.82

2.10 States in full compliance with their obligations under their comprehensive safeguards agreement and the Additional Protocol, and which forgo enrichment and reprocessing capabilities, should be guaranteed a supply, at reasonable market rates, of nuclear fuel for civilian applications.

Strongly agree: 10 responses (45%)
Agree: 7 responses (32%)
Disagree: 2 responses (9%)
Strongly disagree: 1 response (5%)
Don't know: 2 responses (9%)

Respondents: 22 **Mean response:** 2.00 **Variance:** 1.62

2.11 Nuclear enrichment and reprocessing capabilities should be limited by international agreement to those states that currently possess them, provided that supply of nuclear materials for peaceful purposes, under safeguards, is guaranteed by the possessor states.

Strongly agree: 4 responses (20%)
Agree: 6 responses (30%)
Disagree: 6 responses (30%)
Strongly disagree: 2 responses (10%)
Don't know: 2 responses (10%).

Respondents: 20 **Mean response:** 2.60 **Variance:** 1.52

2.12 States which withdraw from the NPT should be required to cease the use of any nuclear materials and equipment acquired from other NPT states parties prior to withdrawal and to return these materials to the supplier under international verification.

Strongly agree: 7 responses (35%)
Agree: 10 responses (50%)
Disagree: 1 response (5%)
Strongly disagree: 0 responses (0%)
Don't know: 2 responses (10%).

Respondents: 20 **Mean response:** 2.00 **Variance:** 1.37

2.13 Nuclear export control mechanisms such as the Zangger Committee and the Nuclear Suppliers Group are useful to nuclear verification and compliance objectives.

Strongly agree: 7 responses (32%)
Agree: 10 responses (45%)
Disagree: 1 response (5%)
Strongly disagree: 1 response (5%)
Don't know: 3 responses (14%).

Respondents: 22 **Mean response:** 2.23 **Variance:** 1.80

2.14 *The IAEA should pursue integrated safeguards as a means of increasing the effectiveness and efficiency of safeguards.*

Strongly agree: 6 responses (29%)
Agree: 9 responses (43%)
Disagree: 0 responses (0%)
Strongly disagree: 0 responses (0%)
Don't know: 6 responses (29%).

Respondents: 21 Mean response: 2.57 Variance: 2.66

2.15 *It has been suggested that the IAEA's Board of Governors needs a verification committee to continuously monitor the effectiveness of nuclear safeguards and suggest improvements. Is this a worthwhile idea?*

Strongly agree: 2 responses (9%)
Agree: 14 responses (64%)
Disagree: 0 responses (0%)
Strongly disagree: 0 responses (0%)
Don't know: 6 responses (27%).

Respondents: 22 Mean response: 2.73 Variance: 2.11

2.16 *It has been suggested that IAEA Member States under investigation should not be allowed to serve on the Board of Governors. Is this a worthwhile idea?*

Strongly agree: 1 response (5%)
Agree: 9 responses (43%)
Disagree: 5 responses (24%)
Strongly disagree: 0 responses (0%)
Don't know: 6 responses (29%).

Respondents: 21 Mean response: 3.05 Variance: 1.85

2.17 *The IAEA voluntary Code of Conduct on the Safety and Security of Radioactive Sources represents an effective response to the threat of radiological weapons.*

Strongly agree: 1 response (5%)
Agree: 2 responses (10%)
Disagree: 8 responses (38%)
Strongly disagree, 1 response (5%)

Don't know: 9 responses (43%)

Respondents: 21 **Mean response: 3.71** **Variance: 1.61**

2.18 *Negotiations on a Fissile Material Cut-off Treaty will need to include effective verification provisions to ensure compliance with any agreement that is reached.*

Strongly agree: 9 responses (41%)

Agree: 11 responses (50%)

Disagree: 0 responses (0%)

Strongly disagree: 0 responses (0%)

Don't know: 2 responses (9%).

Respondents: 22 **Mean response: 1.86** **Variance: 1.27**

2.19 *Despite the fact that the CTBT has not yet entered into force, possibilities and approaches for using the CTBT's verification and compliance mechanisms in informal modes should be studied.*

Strongly agree: 9 responses (41%)

Agree: 11 responses (50%)

Disagree: 0 responses (0%)

Strongly disagree: 0 responses (0%)

Don't know: 2 responses (9%).

Respondents: 22 **Mean response: 1.86** **Variance: 1.27**

2.20 *Are there other potential responses to the challenges facing the nuclear nonproliferation regime that merit detailed analysis?*

Note: *Answers for this question were in comment-form and were incorporated into conference call and workshop discussions, and ultimately into "Weapons of Mass Destruction Verification and Compliance: Challenges and Responses."*

Section Three

Chemical Weapons Verification and Compliance: Challenges and Responses

Challenges

The following questions assessed expert views on the relative severity of ‘internal’ and ‘external’ challenges facing the chemical weapons regime – defined for this purpose as the Chemical Weapons Convention (CWC) and the Organization for the Prohibition of Chemical Weapons (OPCW). Here ‘internal’ challenges refer to issues directly related to the CWC verification and compliance mechanisms themselves. ‘External’ challenges refer to issues external to the chemical weapons regime that have the potential to influence the effectiveness of the chemical weapons regime.

3.1 Please rank the following internal challenges that face the chemical weapons regime. (Please assign numbers 1 through 7 to the following statements. 1= most significant challenge.)

Organization, management and administration of the OPCW.

(14 respondents)

Rank 1 : 1 response (7%)

Rank 2 : 0 responses (0%)

Rank 3 : 2 responses (14%)

Rank 4 : 3 responses (21%)

Rank 5 : 1 response (7%)

Rank 6 : 5 responses (36%)

Rank 7 : 2 responses (14%)

Reforming the OPCW budget process and the underlying financial rules.

(14 respondents)

Rank 1 : 0 responses (0%)

Rank 2 : 0 responses (0%)

Rank 3 : 1 response (7%)

Rank 4 : 2 responses (13%)

Rank 5 : 5 responses (36%)

Rank 6 : 3 responses (21%)

Rank 7 : 3 responses (21%).

Inadequate/insufficient uptake of new verification technology.

(14 respondents)

Rank 1 : 0 responses (0%)

Rank 2 : 0 responses (0%)

Rank 3 : 2 responses (14%)

Rank 4 : 2 responses (14%)
Rank 5 : 2 responses (14%)
Rank 6 : 4 responses (29%)
Rank 7 : 4 responses (29%)

The need to develop an OPCW response to the threat of chemical terrorism.
(14 respondents)

Rank 1: 2 responses (14%)
Rank 2: 1 response (7%)
Rank 3: 1 response (7%)
Rank 4: 2 responses (14%)
Rank 5: 2 responses (14%)
Rank 6: 1 response (7%)
Rank 7: 5 responses (36%).

Lack of full adherence by all CWC states parties to CWC national legislative requirements.
(17 respondents)

Rank 1 : 4 responses (24%)
Rank 2 : 6 responses (35%)
Rank 3 : 4 responses (24%)
Rank 4 : 1 response (6%)
Rank 5 : 2 responses (12%)
Rank 6 : 0 responses (0%)
Rank 7 : 0 responses (0%)

Lack of political will to address alleged non-compliance by states parties.
(18 respondents)

Rank 1 : 9 responses (50%)
Rank 2 : 2 responses (11%)
Rank 3 : 4 responses (22%)
Rank 4 : 2 responses (11%)
Rank 5 : 0 responses (0%)
Rank 6 : 1 response (6%)
Rank 7 : 0 responses (0%).

Lack of invigorated Challenge Inspection provisions which would make them a normal part of the verification regime.

(18 respondents)
Rank 1 : 3 responses (17%)
Rank 2 : 9 responses (50%)
Rank 3 : 2 responses (11%)
Rank 4 : 2 responses (11%)
Rank 5 : 2 responses (11%)
Rank 6 : 0 responses (0%)
Rank 7 : 0 responses (0%).

3.2 Please rank the following external challenges that face the chemical weapons regime. (Please assign numbers 1 through 6 to the following statements. 1= most significant challenge.)

Development of new chemicals, not listed in the CWC's existing schedules, which can act as chemical weapons or precursors.

(18 respondents)

Rank 1 : 3 responses (17%)

Rank 2 : 7 responses (39%)

Rank 3 : 4 responses (22%)

Rank 4 : 2 responses (11%)

Rank 5 : 2 responses (11%)

Rank 6 : 0 responses (0%).

The development and use of non-lethal weapons (including riot control agents) and toxic chemicals used for law enforcement that may contravene the CWC's prohibitions.

(19 respondents)

Rank 1 : 5 responses (26%)

Rank 2 : 6 responses (32%)

Rank 3 : 2 responses (11%)

Rank 4 : 1 response (5%)

Rank 5 : 0 responses (0%)

Rank 6 : 5 responses (26%).

Increased accessibility of dual-use CW knowledge, technology, and materials.

(18 respondents)

Rank 1: 6 responses (33%)

Rank 2: 1 response (6%)

Rank 3: 3 responses (17%)

Rank 4: 1 response (6%)

Rank 5: 3 responses (17%)

Rank 6: 4 responses (22%).

The development of covert supply networks.

(17 respondents)

Rank 1 : 0 responses (0%)

Rank 2 : 0 responses (0%)

Rank 3 : 2 responses (12%)

Rank 4 : 8 responses (47%)

Rank 5 : 4 responses (24%)

Rank 6 : 3 responses (18%)

Lack of universal adherence to the CWC.

(20 respondents)

Rank 1 : 3 responses (15%)

Rank 2 : 2 responses (10%)

Rank 3 : 5 responses (25%)

Rank 4 : 5 responses (25%)

Rank 5 : 3 responses (15%)

Rank 6 : 2 responses (10%).

Increased capacities of non-state actors to acquire chemical weapons and/or related material.

(18 respondents)

Rank 1 : 3 responses (17%)

Rank 2 : 3 responses (17%)

Rank 3 : 3 responses (17%)

Rank 4 : 1 response (6%)

Rank 5 : 5 responses (28%)

Rank 6 : 3 responses (17%)

Responses: Improving the Regime

3.3 Significant efforts should be undertaken by the OPCW to address the challenges associated with the new and emerging chemical weapons relevant materials, inter alia by updating the CWC's existing schedules of controlled chemical weapons and precursors.

Strongly agree: 6 responses (27%)

Agree: 12 responses (55%)

Disagree: 2 responses (9%)

Strongly disagree: 0 responses (0%)

Don't know: 2 responses (9%).

Respondents: 22 Mean response: 2.09 Variance: 1.23

3.4 CWC states parties should address the challenges associated with the use of nonlethal weapons (including riot control agents) and toxic chemicals used for law enforcement.

Strongly agree: 12 responses (55%)

Agree: 3 responses (14%)

Disagree: 3 responses (14%)

Strongly disagree: 1 response (5%)

Don't know: 3 responses (14%)

Respondents: 22 Mean response: 2.09 Variance: 2.09

3.5 Greater use of new technology, such as remote monitoring techniques and other means, should be explored in order to reduce the human resource requirements for the verification of CW destruction.

Strongly agree: 9 responses (43%)
Agree: 11 responses (52%)
Disagree: 0 responses (0%)
Strongly disagree: 0 responses (0%)
Don't know: 1 response (5%).

Respondents: 21 **Mean response:** 1.71 **Variance:** 0.81

3.6 CWC challenge inspections should be mounted, if only on a trial basis, to ensure the credibility of this verification tool.

Strongly agree: 14 responses (64%)
Agree: 7 responses (32%)
Disagree: 1 response (5%)
Strongly disagree: 0 responses (0%)
Don't know: 0 responses (0%)

Respondents: 22 **Mean response:** 1.41 **Variance:** 0.35

3.7 Non-governmental organizations can play a significant role with respect to the verification of CWC implementation.

Strongly agree: 6 responses (27%)
Agree: 9 responses (41%)
Disagree: 3 responses (14%)
Strongly disagree: 1 response (5%)
Don't know: 3 responses (14%)

Respondents: 22 **Mean response:** 2.36 **Variance:** 1.77

3.8 Universal adherence to the CWC provisions (including national implementation legislation) would establish sufficient barriers to the non-state actor acquisition of chemical weapons.

Strongly agree: 4 responses (18%)
Agree: 6 responses (27%)
Disagree: 7 responses (32%)
Strongly disagree: 5 responses (23%)

Don't know: 0 responses (0%)

Respondents: 22 **Mean response:** 2.59 **Variance:** 1.11

3.9 *The OPCW should place a greater emphasis upon international responses to the threat of chemical terrorism.*

Strongly agree: 2 responses (10%)

Agree: 12 responses (57%)

Disagree: 4 responses (19%)

Strongly disagree: 1 response (5%)

Don't know: 2 responses (10%)

Respondents: 21 **Mean response:** 2.48 **Variance:** 1.16

3.10 *Are there other potential responses to the challenges facing the chemical weapons verification and compliance regime that merit detailed analysis?*

Note: Answers for this question were in comment-form and were incorporated into conference call and workshop discussions, and ultimately into “Weapons of Mass Destruction Verification and Compliance: Challenges and Responses.”

Section Four

Biological Weapons Verification and Compliance: Challenges and Responses

Challenges

The following questions assessed experts' views on the relative severity of 'internal' and 'external' challenges facing the biological weapons verification and compliance regime – defined for this purpose as the compliance provisions of the Biological and Toxin Weapons Convention (BTWC) and limited authorities within the United Nations to investigate instances of suspected non-compliance with the BTWC. Here 'internal' challenges refer to issues directly related to BTWC verification and compliance mechanisms themselves. 'External' challenges refer to issues external to the biological weapons regime that have the potential to influence the effectiveness of the regime.

4.1 Please rank the following internal challenges that face verification and compliance respect of the biological weapons regime. (Please assign numbers 1 through 5 to following statements. 1= most significant challenge.)

Absence of a BTWC verification mechanism

(26 respondents)

Rank 1: 13 responses (50%)

Rank 2: 9 responses (35%)

Rank 3: 3 responses (12%)

Rank 4: 0 responses (0%)

Rank 5: 1 response (4%)

Lack of universal adherence to the BTWC

(25 respondents)

Rank 1: 4 responses (16%)

Rank 2: 4 responses (16%)

Rank 3: 4 responses (16%)

Rank 4: 5 responses (20%)

Rank 5: 8 responses (32%)

Lack of political will to fully address allegations of non-compliance with the BTWC

(26 respondents)

Rank 1: 9 responses (35%)

Rank 2: 8 responses (31%)

Rank 3: 8 responses (31%)

Rank 4: 0 responses (0%)

Rank 5: 1 responses (4%)

Lack of compliance with voluntary confidence-building measures

(24 respondents)

Rank 1 : 0 responses (0%)

Rank 2 : 2 responses (8%)

Rank 3 : 5 responses (21%)

Rank 4 : 8 responses (33%)

Rank 5 : 9 responses (38%)

Lack of compliance by all BTWC states parties with the obligation to adopt national implementation measures.

(25 respondents)

Rank 1: 1 response (4%)

Rank 2: 3 responses (12%)

Rank 3: 5 responses (20%)

Rank 4: 11 responses (44%)

Rank 5: 5 responses (20%)

4.2 Please rank the following external challenges that face the verification and compliance aspects of the biological weapons regime. (Please assign numbers 1 through 4 to the following statements. 1= most significant challenge.)

Emerging BW threats, including those from non-state actors.

(25 respondents)

Rank 1: 7 responses (28%)

Rank 2: 6 responses (24%)

Rank 3: 7 responses (28%)

Rank 4: 5 responses (20%)

The potential for the abuse of legitimate biological research

(26 respondents)

Rank 1: 9 responses (35%)

Rank 2: 5 responses (19%)

Rank 3: 9 responses (35%)

Rank 4: 3 responses (12%)

The lack of internationally recognized codes of conduct for biological research

(24 respondents)

Rank 1: 1 response (4%)

Rank 2: 3 responses (13%)

Rank 3: 4 responses (17%)

Rank 4: 16 responses (67%)

Increased accessibility of dual-use BW knowledge, technologies, and materials

(26 respondents)

Rank 1: 9 responses (35%)

Rank 2: 12 responses (46%)

Rank 3: 5 responses (19%)

Rank 4: 0 responses (0%)

Responses: Improving the Regime

4.3 The current new process of Expert Group meetings and follow-up meetings of states parties is likely to result in improvements in verification and compliance.

Strongly agree: 0 responses (0%)

Agree: 9 responses (32%)

Disagree: 16 responses (57%)

Strongly disagree: 2 responses (7%)

Don't know: 1 response (4%)

Respondents: 28

Mean response: 2.82

Variance: 0.52

4.4 Efforts should continue to seek the establishment of a multilateral verification and compliance regime for the BTWC.

Strongly agree: 16 responses (57%)
Agree: 8 responses (29%)
Disagree: 1 response (4%)
Strongly disagree: 1 response (4%)
Don't know: 2 responses (7%)

Respondents: 28 **Mean response:** 1.74 **Variance:** 1.38

4.5 Efforts to establish a BW verification mechanism along the lines envisaged in the draft BTWC Protocol should be abandoned in favor of some other alternative.

Strongly agree: 3 responses (11%)
Agree: 6 responses (22%)
Disagree: 10 responses (37%)
Strongly disagree: 5 responses (19%)
Don't know: 3 responses (11%)

Respondents: 27 **Mean response:** 2.96 **Variance:** 1.34

4.6 Universal compliance with BTWC obligations (including national implementation legislation) would establish sufficient barriers to the non-state actor acquisition of BW knowledge, technologies and materials.

Strongly agree: 2 responses (7%)
Agree: 5 responses (18%)
Disagree: 14 responses (50%)
Strongly disagree: 7 responses (25%)
Don't know: 0 responses (0%)

Respondents: 28 **Mean response:** 2.93 **Variance:** 0.74

4.7 In order to increase transparency about BTWC-related activities, the BTWC confidence building measures (CBM's) should be made legally binding.

Strongly agree: 7 responses (25%)
Agree: 15 responses (54%)
Disagree: 1 response (4%)
Strongly disagree: 2 responses (7%)
Don't know: 3 responses (11%)

Respondents: 28 Mean response: 2.25 Variance: 1.53

4.8 *What other kinds of measures should be undertaken to strengthen voluntary CBM's and promote more substantive follow-up on requests for clarification of states' activities?*

Note: *Answers for this question were in comment-form and were incorporated into conference call and workshop discussions, and ultimately into "Weapons of Mass Destruction Verification and Compliance: Challenges and Responses."*

4.9 *States should be encouraged to fulfill their obligation to adopt national measures to implement the BWC.*

Strongly agree: 17 responses (%)
Agree: 10 responses (%)
Disagree: 0 responses (0%)
Strongly disagree: 0 responses (0%)
Don't know: 0 responses (0%)

Respondents: 27 Mean response: 1.37 Variance: 0.24

4.10 *States should be encouraged to establish national implementing authorities to encourage full compliance with their BTWC obligations.*

Strongly agree: 14 responses (52%)
Agree: 12 responses (44%)
Disagree: 1 response (4%)
Strongly disagree: 0 responses (0%)
Don't know: 0 responses (0%)

Respondents: 27 Mean response: 1.52 Variance: 0.34

4.11 *Non-governmental organizations can play a significant role with respect to the verification of BWC implementation.*

Strongly agree: 8 responses (30%)
Agree: 9 responses (33%)
Disagree: 5 responses (19%)
Strongly disagree: 1 response (4%)
Don't know: 4 responses (15%)

Respondents: 27 Mean response: 2.41 Variance: 1.87

4.12 *A permanent Group of Experts should be established to assess scientific and technological developments with the potential to affect the scope and effectiveness of the BWC.*

Strongly agree: 15 responses (54%)
Agree: 10 responses (36%)
Disagree: 2 responses (7%)
Strongly disagree: 0 responses (0%)
Don't know: 1 response (4%)

Respondents: 28 **Mean response:** 1.64 **Variance:** 0.83

4.13 *More effort is needed to highlight the verification and compliance challenges associated with emerging BW threats and the potential for the abuse of legitimate biological research.*

Strongly agree: 13 responses (46%)
Agree: 13 responses (46%)
Disagree: 0 responses (0%)
Strongly disagree: 0 responses (0%)
Don't know: 2 responses (7%)

Respondents: 28 **Mean response:** 1.75 **Variance:** 1.08

4.14 *Cooperative threat reduction initiatives, such as those detailed within the Global Partnership Against Weapons and Materials of Mass Destruction designed to increase biosafety and security at laboratories in Russia and the states of the Former Soviet Union should be expanded to include other states.*

Strongly agree: 11 responses (39%)
Agree: 14 responses (50%)
Disagree: 0 responses (0%)
Strongly disagree: 0 responses (0%)
Don't know: 3 responses (11%)

Respondents: 28 **Mean response:** 1.93 **Variance:** 1.40

4.15 *Means by which the UN Security Council (UNSC) could investigate alleged BW use, based on a request made under BTWC Article VI, should be strengthened by explicitly requiring states to accept investigations on their territory when requested by the UN Secretary-General, by updating the list of experts mandated by UNDDA, by providing*

training to a roster of inspectors, and by the acquisition of the necessary verification equipment.

Strongly agree: 16 responses (57%)
Agree: 9 responses (32%)
Disagree: 2 responses (7%)
Strongly disagree: 0 responses (0%)
Don't know: 1 response (4%)

Respondents: 28 **Mean response:** 1.61 **Variance:** 0.84

4.16 *Consideration should be given by the BTWC states parties as to the nature of consequences in cases where the UNSC finds non-compliance in response to a request made under BTWC Article VI.*

Strongly agree: 9 responses (33%)
Agree: 16 responses (59%)
Disagree: 0 responses (0%)
Strongly disagree: 1 response (4%)
Don't know: 1 response (4%)

Respondents: 27 **Mean response:** 1.85 **Variance:** 0.82

4.17 *The capabilities of UNMOVIC in regard to biological weapons verification should be preserved and enhanced in some form or other.*

Strongly agree: 11 responses (41%)
Agree: 10 responses (37%)
Disagree: 1 response (4%)
Strongly disagree: 1 response (4%)
Don't know: 4 responses (15%)

Respondents: 27 **Mean response:** 2.15 **Variance:** 1.98

4.18 *Are there other potential responses to the challenges facing the biological weapons verification and compliance regime that merit analysis?*

Note: *Answers for this question were in comment-form and were incorporated into conference call and workshop discussions, and ultimately into “Weapons of Mass Destruction Verification and Compliance: Challenges and Responses.”*

Section Five

Missile Verification and Compliance Issues

Although there are a number of bilateral (eg USA-USSR/Russia) agreements that deal with missile arms control and disarmament, including some with highly elaborated and intrusive verification provisions, there are no multilateral legal obligations prohibiting the acquisition, development or use of missiles or missile technology against which the compliance of states with such obligations can be measured, and no established multilateral mechanisms by which any such compliance could be verified. The Hague Code of Conduct (HCOC) on ballistic missiles and the Missile Technology Control Regime (MTCR) do provide elements of an emerging regime aimed at restraining the proliferation of various missile and related systems which can be used to deliver WMD.

Challenges

With this in mind, the following section sought experts' views on the challenges posed by missile-related verification and compliance *lacunae*, on proposals aimed at reinforcing the utility of existing verification and compliance measures and on means to ensure that effective verification and compliance concepts and capabilities are being considered as part of further development of non-proliferation, arms control and disarmament measures in this field.

5.1 Please rank the challenges that face the current or potential missile verification and compliance regime. (Please assign numbers 1 through 12 to the following statements. 1= most significant challenge)

Absence of a legally binding regime with universal obligations

(12 respondents)

Rank 1 : 5 responses (42%)

Rank 2 : 0 responses (0%)

Rank 3 : 2 responses (17%)

Rank 4 : 1 response (8%)

Rank 5 : 0 responses (0%)

Rank 6 : 2 responses (17%)

Rank 7 : 0 responses (0%)

Rank 8 : 0 responses (0%)

Rank 9 : 1 response (8%)

Rank 10 : 0 responses (0%)

Rank 11 : 0 responses (0%)

Rank 12 : 1 response (8%)

Absence of agreed verification and compliance mechanisms

(11 respondents)

Rank 1 : 0 responses (0%)

Rank 2 : 1 response (9%)

Rank 3 : 1 response (9%)

Rank 4 : 3 responses (27%)
Rank 5 : 2 responses (18%)
Rank 6 : 0 responses (0%)
Rank 7 : 1 response (9%)
Rank 8 : 1 response (9%)
Rank 9 : 0 responses (0%)
Rank 10 : 0 responses (0%)
Rank 11 : 2 responses (18%)
Rank 12 : 0 responses (0%)

Insufficient registry of verified/verifiable information on states' activities

(10 respondents)

Rank 1 : 0 responses (0%)
Rank 2 : 0 responses (0%)
Rank 3 : 0 responses (0%)
Rank 4 : 0 responses (0%)
Rank 5 : 3 responses (30%)
Rank 6 : 0 responses (0%)
Rank 7 : 2 responses (20%)
Rank 8 : 1 response (10%)
Rank 9 : 1 response (10%)
Rank 10 : 2 responses (20%)
Rank 11 : 0 responses (0%)
Rank 12 : 1 response (10%)

Unwillingness of some major missile-using states to accept (verified) constraints on further development, accumulation, transfer and other missile-related activities

(11 respondents)

Rank 1 : 4 responses (36%)
Rank 2 : 3 responses (27%)
Rank 3 : 1 response (9%)
Rank 4 : 0 responses (0%)
Rank 5 : 0 responses (0%)
Rank 6 : 0 responses (0%)
Rank 7 : 1 response (9%)
Rank 8 : 1 response (9%)
Rank 9, 0 responses (0%)
Rank 10 : 0 responses (0%)
Rank 11 : 1 response (9%)
Rank 12 : 0 responses (0%)

Desire on the part of some states to acquire missile capabilities and their unwillingness to accept (verified) restraints on such acquisition

(11 respondents)

Rank 1 : 2 responses (18%)
Rank 2 : 4 responses (36%)
Rank 3 : 0 responses (0%)
Rank 4 : 1 response (9%)
Rank 5 : 0 responses (0%)
Rank 6 : 2 responses (18%)
Rank 7 : 1 response (9%)
Rank 8 : 0 responses (0%)
Rank 9 : 0 responses (0%)
Rank 10 : 0 responses (0%)
Rank 11 : 1 response (9%)
Rank 12 : 0 responses (0%)

A perception by some that the major powers are focusing on controlling proliferation of ballistic missiles to other states, while paying insufficient attention to reducing their own existing missile holdings or to the issues raised by cruise missiles

(11 respondents)

Rank 1 : 0 responses (0%)
Rank 2 : 1 response (9%)
Rank 3 : 3 responses (27%)
Rank 4 : 0 responses (0%)
Rank 5 : 1 response (9%)
Rank 6 : 2 responses (18%)
Rank 7 : 0 responses (0%)
Rank 8 : 1 response (9%)
Rank 9 : 1 response (9%)
Rank 10 : 2 responses (18%)
Rank 11 : 0 responses (0%)
Rank 12 : 0 responses (0%)

Qualitative and quantitative improvement in missile arsenals

(11 respondents)

Rank 1 : 0 responses (0%)
Rank 2 : 0 responses (0%)
Rank 3 : 1 response (9%)
Rank 4 : 0 responses (0%)
Rank 5 : 1 response (9%)
Rank 6 : 0 responses (0%)
Rank 7 : 2 responses (18%)
Rank 8 : 1 response (9%)
Rank 9 : 2 responses (18%)
Rank 10 : 0 responses (0%)
Rank 11 : 2 responses (18%)
Rank 12 : 2 responses (18%)

**An increasing number of missile-holding, -producing and -exporting states
(11 respondents)**

Rank 1 : 1 response (9%)
Rank 2 : 1 response (9%)
Rank 3 : 1 response (9%)
Rank 4 : 1 response (9%)
Rank 5 : 0 responses (0%)
Rank 6 : 1 response (9%)
Rank 7 : 2 responses (18%)
Rank 8 : 1 response (9%)
Rank 9 : 1 response (9%)
Rank 10 : 0 responses (0%)
Rank 11 : 1 response (9%)
Rank 12 : 1 response (9%)

**The development of covert supply networks
(10 respondents)**

Rank 1 : 0 responses (0%)
Rank 2 : 1 response (10%);
Rank 3 : 2 responses (20%)
Rank 4 : 1 response (10%)
Rank 5 : 1 response (10%)
Rank 6 : 0 responses (0%)
Rank 7 : 0 responses (0%)
Rank 8 : 1 response (10%)
Rank 9 : 0 responses (0%)
Rank 10 : 4 responses (40%)
Rank 11 : 0 responses (0%)
Rank 12 : 0 responses (0%)

Increased capacities of non-state actors to acquire missile technology and materials

(11 respondents)
Rank 1 : 0 responses (0%)
Rank 2 : 1 response (9%)
Rank 3 : 1 response (9%)
Rank 4 : 0 responses (0%)
Rank 5 : 0 responses (0%)
Rank 6 : 1 response (9%)
Rank 7 : 0 responses (0%)
Rank 8 : 0 responses (0%)
Rank 9 : 1 response (9%)
Rank 10 : 1 response (9%)
Rank 11 : 2 responses (18%)
Rank 12 : 4 responses (36%)

Increased accessibility of dual-use missile technology and materials, inter alia those useful for peaceful space launch purposes

(10 respondents)

- Rank 1 : 0 responses (0%)**
- Rank 2 : 0 responses (0%)**
- Rank 3 : 0 responses (0%)**
- Rank 4 : 2 responses (20%)**
- Rank 5 : 1 response (10%)**
- Rank 6 : 1 response (10%)**
- Rank 7 : 1 response (10%)**
- Rank 8 : 3 responses (30%)**
- Rank 9 : 1 response (10%)**
- Rank 10 : 0 responses (0%)**
- Rank 11 : 1 response (10%)**
- Rank 12 : 0 responses (0%)**

The role of private industry and the importance of commercial exports in technology development

(10 respondents)

- Rank 1 : 1 response (10%)**
- Rank 2 : 0 responses (0%)**
- Rank 3 : 0 responses (0%)**
- Rank 4 : 1 response (10%)**
- Rank 5 : 1 response (10%)**
- Rank 6 : 1 response (10%)**
- Rank 7 : 0 responses (0%)**
- Rank 8 : 0 responses (0%)**
- Rank 9 : 2 responses (20%)**
- Rank 10 : 1 response (10%)**
- Rank 11 : 1 response (10%)**
- Rank 12 : 2 responses (20%)**

Responses: Improving Missile Verification and Compliance

5.2 Research should be undertaken to explore, and advocacy considered to promote verification and compliance concepts and capabilities applicable to missile nonproliferation, arms control and disarmament.

- Strongly agree: 5 responses (29%)**
- Agree: 10 responses (59%)**
- Disagree: 1 response (6%)**
- Strongly disagree: 0 responses (0%)**
- Don't know: 1 response (6%)**

Respondents: 17 Mean response: 1.94 Variance: 0.93

5.3 Research should be undertaken to explore, and advocacy considered to promote verification and compliance concepts and capabilities applicable to a possible comprehensive and binding multilateral ballistic missile control treaty regime.

Strongly agree: 5 responses (29%)
Agree: 10 responses (59%)
Disagree: 1 response (6%)
Strongly disagree: 0 responses (0%)
Don't know: 1 response (6%)

Respondents: 17 **Mean response:** 1.94 **Variance:** 0.93

5.4 Research should be undertaken to explore, and advocacy considered to promote verification and compliance concepts applicable to the existing missile control regime (eg MTCR and HCOC) and covering a wide range of unmanned delivery systems (eg ballistic and cruise missiles, UAVs) and functions (eg end-use monitoring on transfers, confirmation of testing-related and other CBMs).

Strongly agree: 7 responses (44%)
Agree: 8 responses (50%)
Disagree: 0 responses (0%)
Strongly disagree: 0 responses (0%)
Don't know: 1 response (6%)

Respondents: 16 **Mean response:** 1.75 **Variance:** 1.00

5.5 MTCR member states should be encouraged to play a more active role in the development of a multilateral regime on missile non-proliferation, arms control and disarmament, with verification and compliance provisions.

Strongly agree: 2 responses (12%)
Agree: 12 responses (71%)
Disagree: 1 response (6%)
Strongly disagree: 0 responses (0%)
Don't know: 2 responses (12%)

Respondents: 17 **Mean response:** 2.29 **Variance:** 1.22

5.6 The HCOC should be encouraged to play a more active role in the development of a multilateral regime on missile non-proliferation, arms control and disarmament, with verification and compliance provisions.

Strongly agree: 2 responses (13%)
Agree: 8 responses (50%)
Disagree: 1 response (6%)
Strongly disagree: 0 responses (0%)
Don't know: 5 responses (31%)

Respondents: 16 **Mean response:** 2.88 **Variance:** 2.38

5.7 The UN and/or Conference on Disarmament should be encouraged to play a more active role in the development of a multilateral regime on missile non-proliferation, arms control and disarmament, with verification and compliance provisions.

Strongly agree: 5 responses (29%)
Agree: 6 responses (35%)
Disagree: 2 responses (12%)
Strongly disagree: 0 responses (0%)
Don't know: 4 responses (24%)

Respondents: 17 **Mean response:** 2.53 **Variance:** 2.39

5.8 An effective response to non-compliance with the existing missile control regimes would be to impose UN sanctions.

Strongly agree: 2 responses (13%)
Agree: 3 responses (19%)
Disagree: 3 responses (19%)
Strongly disagree: 2 responses (13%)
Don't know: 6 responses (38%)

Respondents: 16 **Mean response:** 3.44 **Variance:** 2.26

5.9 The capabilities of UNMOVIC in regard to missile verification should be preserved and enhanced in some form or other.

Strongly agree: 6 responses (35%)
Agree: 8 responses (47%)
Disagree: 0 responses (0%)
Strongly disagree: 0 responses (0%)
Don't know: 3 responses (18%)

Respondents: 17 **Mean response:** 2.18 **Variance:** 2.03

5.10 *Non-governmental organizations can play a significant role with respect to developing a broader missile-related regime, including verification and compliance aspects.*

Strongly agree: 6 responses (38%)
Agree: 10 responses (63%)
Disagree: 0 responses (0%)
Strongly disagree: 0 responses (0%)
Don't know: 0 responses (0%)

Respondents: 16 **Mean response:** 1.62 **Variation:** 0.25

5.11 *Before any concrete steps can be taken to negotiate a broader legally-binding missile-related treaty regime, it will be necessary to develop a consensus (not yet present) among major missile-using states that such a regime is desirable and necessary in terms of national and international security.*

Strongly agree: 8 responses (47%)
Agree: 6 responses (35%)
Disagree: 2 responses (12%)
Strongly disagree: 0 responses (0%)
Don't know: 1 response (6%)

Respondents: 17 **Mean response:** 1.82 **Variance:** 1.15

5.12 *Are there other potential responses to the challenges facing the missile regime that merit detailed analysis?*

Note: *Answers for this question were in comment-form and were incorporated into conference call and workshop discussions, and ultimately into “Weapons of Mass Destruction Verification and Compliance: Challenges and Responses.”*

List of published studies and papers

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

No 20 "WMD Verification and Compliance: Challenges and Responses" submitted by Foreign Affairs Canada, October 2004

No 21 "Meeting Iran's Nuclear Challenge" by Gary Samore, October 2004

No 22 "Bioterrorism and Threat Assessment" by Gary A. Ackerman and Kevin S. Moran, November 2004

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