«Challenges to Collective Security»
*Working Papers from NUPI's UN Programme*

# Nuclear Weapons and Materials into the 21st Century:

## Threats, Challenges, and Options for Change

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Paper No. 2 – 2004

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# Contents

# 1. Introduction*

In three sections, this working paper briefly outlines i) present-day nuclear threats, ii) associated challenges of multinational mechanisms to stem nuclear proliferation to state and non-state actors – and most importantly, iii) possible ways to advance sound nuclear non-proliferation and disarmament practices.

The range of persistent and new nuclear threats, as well as the state of nuclear disarmament and non-proliferation affairs warrant new, creative thinking. No attempt will, however, be made to assess the feasibility of the measures proposed. To be viable, they must be politically acceptable, thus requiring consensus on its nature, purpose and constraints. The most important consent, however, is on how non-proliferation and nuclear security goals relate to one another.

Simply because there exists no real substitute, the discussion herein focuses on the future of the international non-proliferation regime, as spelled out by the Nuclear Non-Proliferation Treaty (NPT). The International Atomic Energy Agency (IAEA) is the world's nuclear inspectorate, mandated i.a. to verify NPT compliance. No single state or even group of states could accomplish what the IAEA is doing. Much, however, remains to be improved.

# 2. Threats

The nuclear dangers did not vanish with the end of the Cold War. Rather, nuclear weapons still hold a position of prominence as the currency of ultimate power. Some progress on nuclear disarmament was made in the late 1980s and early 1990s, but at the end of the century some 30,000 warheads were still in existence. This figure roughly equals the number of nuclear weapons present when the NPT entered into force in 1970. Well-established nuclear weapon states still possess sizeable nuclear stockpiles, juvenile nuclear weapon states are boosting their arsenals, and a new set of aspiring states have revealed demonstrable nuclear weapon ambitions.[1] Hence, the risk of renewed horizontal and vertical nuclear weapon proliferation is alive and well.[2] This disquieting nuclear security picture is crested by the interest of some non-state groups in nuclear explosives.

* The author would like to thank Espen Bart Eide, Sverre Lodgaard, Kari Osland and Henrik Thune for useful comments during the preparation of the paper.

1 Two of the three countries (India and Pakistan) that remain outside the NPT have demonstrated their nuclear capabilities through testing. The third (Israel) has not officially confirmed its status as a nuclear weapon state. North Korea has decided to walk away from the NPT. For the time being, the legal status of North Korea's nuclear programme is ambiguous.

2 Vertical proliferation refers to qualitative and/or quantitative nuclear weapons development within existing nuclear weapon states. Horizontal proliferation is spreading of nuclear weapons to new, would-be-nuclear states – or sub-nationals.

While fissile material production has ceased in the older nuclear weapon states,[3] it continues in the pubescent ones. On a global scale, more than 3,000 metric tonnes of highly enriched uranium and plutonium have been produced since the dawn of the atomic age, 2/3 of the quantities for military purposes. The bulk of the material is situated in nuclear weapon states, and is thus outside international control. Accordingly, only some 1% of all highly enriched uranium globally is currently under IAEA safeguards. Persistent stocks of weapon usable material represent an inherent proliferation risk. The continuing development of nuclear technology, and the education and experience of scientists can only add to the nuclear security threats. Some forty to fifty countries could today obtain nuclear weapons from domestic resources, if they so wished.

Never before has the need for rigorous nuclear control been more prominent. And never before has the international non-proliferation regime faced stronger challenges.

# 3. Challenges

The Nuclear Non-Proliferation Treaty (NPT) has long been key in non-proliferation and disarmament activities. The treaty is the major international legal obstacle for states seeking nuclear weapon capabilities. In accordance with the treaty, nuclear weapons are temporarily legal in five countries (the five that had tested prior to January 1,1967);[4] not illegal in three others (Israel, India and Pakistan, which never joined the NPT); and forbidden everywhere else.

The asymmetry the treaty endorses was never intended to be permanent. As long as some states possess nuclear weapons (or are protected by them in alliances) and others do not, the asymmetry breeds chronic global insecurity. Hence, the mounting critique against existing nuclear weapon states for not adhering to their disarmament and weapon elimination obligations. For years, the non-universality of the treaty has caused an external pressure. But, the lack of progress in disarmament and the non-compliance and safeguards breaches by several NPT states (North Korea, Iran, Iraq) have now caused unprecedented stress from within the treaty.

In sum, while the overall impact of the NPT has been significant and gratifying, its achievements have been hard won, and increasingly contested. Its continued success is by no means guaranteed.

The central challenge for nuclear non-proliferation policies has for long been effectiveness. In principle, the problem could be approached technically (improved verification, fuel cycles with increased proliferation

[3] Possibly with the exception of China.
[4] The United States, Russia, China, France, and United Kingdom.

resistance etc.) or institutionally (rules and arrangements to reduce the risk associated with nuclear technologies).

Both approaches require political investments and genuine interests in multilateral arms control.

However, according to Ambassador Linton F. Brooks, Head of the U.S. National Nuclear Security Administration (NNSA), the one remaining superpower sees traditional arms control largely as an agenda of the past. Despite persistent nuclear proliferation dangers, strong unilateral currents may by this stand a risk of undermining the international nuclear non-proliferation regime. Lacking any real (global) opponents, the USA feels little need to limit its own power through bi- or multilateral arms control. Today's US policy – as spelled out in the January 2002 Nuclear Posture Review[5] – is viewed by many as a recipe for indefinite retention of nuclear arms. Seen this way, it is at odds with the fundamental commitments of the nuclear weapon states (NWSs), and all other NPT parties, assumed under Article VI of the Treaty, to work for the total elimination of nuclear weapons. The impact on the regime may be harsh.

After U.S. withdrawal from the Anti-Ballistic Missile Treaty – a move deemed necessary to allow for a national missile defence – the START process is dead.[6] Although START II had been negotiated and signed, and even though the U.S. and Russia had continued to reduce their forces in accordance with its terms, the treaty has been supplanted by the Strategic Offensive Reductions Treaty (SORT).[7] The so-called "Moscow Treaty" requires the U.S. and Russia to reduce their strategic delivery systems to 1,700-2,200 by December 31, 2012.

However, the new treaty is not permanent, it does not address non-operational warheads, and it contains no provisions for inspections or destruction of warheads, fissile material or delivery systems. As such, the treaty violates the essential principle of irreversibility (see below) and does very little in the direction of dealing with the nuclear terrorist threat. Opponents of the treaty claim that it is so flexible that it is hard to see how it possibly could be violated. SORT manifests the end of traditional strategic nuclear arms control.

The Comprehensive Nuclear Test-Ban Treaty (CTBT), sought for over four decades as an essential part of the arms control regime, was finally concluded in 1996. But the US Senate soon rejected its ratification, and seven years after being opened for signature, it still languishes unimplemented. The international community has not even been able to commence negotiations on a Fissile Material Cut-Off Treaty (FMCT). As the

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5 For declassified excerpts of the Nuclear Posture Review report, submitted to Congress on 31 December 2001, see http://www.globalsecurity.org/wmd/library/policy/dod/npr.htm .

6 The START process consisted of an envisioned set of subsequent nuclear disarmament treaties, of which only the first, the Treaty Between the United States and the Soviet Union on the Reduction and Limitation of Strategic Offensive Arms (START I), was implemented.

7 May 2002, Presidents Bush and Putin signed SORT. The new treaty entered into force June 1, 2003.

quantitative counterpart of the qualitative CTBT, the treaty effectively puts a ceiling on the potential number of nuclear warheads to be produced.

And, despite volumes of rhetoric on the topic, no progress has been made as to persuading India, Israel and Pakistan to abandon their nuclear weapon programmes.

# 4. Options for Change

In the following, a set of possible nuclear security-building steps is presented in a non-prioritised manner, under the three main headings of "Improving the International Non-Proliferation Regime", "Advancing International Verification and Control", and "Fostering Nuclear Weapon Reductions", respectively.

The measures proposed are likely to be self-reinforcing and eventually sufficient to establish the norms and standards needed to avoid further proliferation of nuclear weapons and fissile material – to state and non-state actors. IAEA verification plays – or could play – a key role in many of the measures. States recognising the importance of these issues should consider steps to encourage their implementation.

## 4.1 Improving the International Non-Proliferation Regime

- **Reinvest politically in the non-proliferation regime:** Facing prospects of a marginalised non-proliferation regime, urgent and substantial international political reinvestment in the regime is needed, in particular in the 13 steps from the 2000 Review Conference of the Nuclear Non-Proliferation Treaty. Nothing less than the viability of the NPT could rest upon the successful implementation of these steps. Among the key issues are the early entry into force of the Comprehensive Nuclear Test Ban Treaty and immediate commencement of negotiations on Fissile Material Cut-Off Treaty. Both a CTBT and an FMCT could, moreover, serve well in the direction of dealing with proliferation challenges associated with the nuclear weapon states outside the NPT.

- **Establish Proper Enforcement Procedures:** In the shadow of NPT non-compliance, a posture of (unilateral) counter-proliferation has evolved. The U.S. doctrine opens up for preventive strikes, possibly with nuclear arms. This nuclear renaissance may lower the thresholds for nuclear uses and would likely negatively impact the dynamics of global nuclear proliferation. To the U.S., nuclear non-proliferation activities are increasingly becoming a subordinate policy element to stem the spread of nuclear weapon. There is thus an urgent need to ensure effective and swift (peaceful) international enforcement in cases on non-compliance.

- **Follow up the Implementation of NPT Article VI:** The nuclear weapon states have agreed to move towards full nuclear disarmament – a commitment renewed *unequivocally* by all five states as recently as 2000 – although without a timetable. To avoid further marginalising of the NPT, advances in nuclear disarmament should be closely monitored and displayed. For this, a dedicated and permanent NPT secretariat could be envisioned, in addition to a further strengthening of the regular reporting requirements.

- **Define the Role of Ad Hoc Nuclear Security Cooperation:** After the end of the Cold War, the world has seen a range of bi- and multilateral ad hoc nuclear security efforts.[8] These have contributed significantly to global nuclear security. However, with its increasing propagation, there is a need to define the balance between ad hoc nuclear security cooperation and formalised arms control. Cooperative threat reduction programmes should be a supplement, rather than a substitute for arrangements like the NPT.

- **Improve Disarmament and Non-Proliferation Education:** A recent UN study concludes: "There has never been a greater need for education in the areas of disarmament and non-proliferation, especially with regard to weapons of mass destruction, but also in the field of small arms and international terrorism. Since the end of the cold war, changing concepts of security and threat have demanded new thinking. Such new thinking will arise from those who are educated and trained today" (United Nations Study on Disarmament and Non-Proliferation Education, 2002).[9] Future arms controllers hence need to start their education now, with specialised training.[10] Real progress in arms control may require skilled personnel with in-depth knowledge of political processes as well as technical know-how.

## 4.2 Advancing International Verification and Control

- **Implement Safeguards:** Effective safeguards remains the cornerstone of a nuclear non-proliferation regime aimed at stemming the spread of nuclear weapons and moving towards nuclear disarmament.[11] The NPT

[8] June 2002, the G8 countries for instance committed themselves to raise up to $20 billion over the next ten years for specific cooperation projects, initially in Russia, to address non-proliferation, disarmament, counter-terrorism and nuclear safety issues. Among the priority concerns are the destruction of chemical weapons, the dismantlement of decommissioned nuclear submarines, the disposition of fissile materials and the employment of former weapons scientists. For more on this, consult www.sgpproject.org .

[9] The study was submitted to the First Committee of the UN General Assembly at its 57th session on 9 October 2002. See http://disarmament.un.org:8080/education/study.html .

[10] One noteworthy example is the Center for Nonproliferation Studies, at the Monterey Institute of International Studies, www.cns.miis.edu .

[11] The objective of safeguards is to be able to draw the conclusion that "all nuclear material in the state has been put under safeguards and remains in peaceful nuclear activities or is otherwise adequately accounted for". Depending on scale of programme, the IAEA may need some 15 months to draw safeguards conclusions. This is probably insufficient to

requires non-nuclear weapon states to conclude comprehensive safeguards agreements with the IAEA within eight months of becoming party to the treaty. Still, some 45 states have yet to conclude safeguards agreements with the IAEA. As of January 2004, only 38 of the more than 185 NPT states had Additional Protocols in force.[12]

- **Ensure the Funding, Training and Recruitment Needed:** The gap of what is required and expected from the IAEA and the resources made available is steadily widening. Increasing responsibilities coupled with near 15 years of zero-growth budgets, carry with them an inherent risk of further erosion of the confidence in international nuclear verification. With the Additional Protocol, IAEA safeguards has undergone a revolution rather than an evolution. The range of inspectional means and opportunities not only calls for new approaches to verification inspection and analysis. It also puts novel demands on IAEA staff. Proper training and recruitment are essential. A future Fissile Material Cut-Off Treaty could, moreover, increase IAEA verification demands significantly. Preparations in all these directions need to start today.

- **Improve Nuclear Non-Proliferation R&D:** To meet international and domestic non-proliferation and disarmament demands, technical communities are now examining a variety of non-intrusive verification measurements on nuclear items with sensitive or classified properties. The underlying physics is well understood, but the need to protect and limit the data output while providing enough information to foster sufficient confidence in the results of the measurements raises technical challenges. Important progress has been made on joint plutonium verification. Similar efforts should be made for verification schemes for highly enriched uranium. Moreover, more research and development are urgently needed for the development of proliferation resistant nuclear fuel cycles, hereunder the conversion of research reactors and naval reactors to low-enriched uranium fuel. Likewise, the potential of new means of verification under the Additional Protocol, e.g. more elaborate environmental sampling, the use of satellite imagery, and tagging of sensitive nuclear material and technologies warrant in-depth international considerations.

- **Pursue Multinational Nuclear Arrangements:** Despite an abundance of fissile material, today also non-nuclear weapon states maintain

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deter potential nuclear terrorists, and the safeguards system should be accompanied with rigorous physical protection.

12 As a response to the Iraqi covert nuclear programme a strengthened safeguards system was adopted. The Additional Protocol will allow for a more holistic and focused monitoring of states' nuclear activities, with a new set of means. For a description of the Additional Protocol, see INFCIRC/540(Corrected) - Model Protocol Additional To The Agreement(S) Between State(S) and The International Atomic Energy Agency for The Application of Safeguards, http://www.iaea.org/Publications/Documents/Infcircs/1998/infcirc540corrected.pdf . Comprehensive safeguards agreements are described in INFCIRC/153 (Corrected) - The Structure and Content of Agreements Between The Agency and States Required In Connection With The Treaty on The Non-Proliferation of Nuclear Weapons, http://www.iaea.org/Publications/Documents/Infcircs/Others/inf153.shtml

domestic enrichment and reprocessing activities (for peaceful nuclear uses). This significantly increases proliferation dangers. It inevitably complicates international nuclear verification. To drastically advance nuclear security, denationalising sensitive fuel cycle activities by placing nuclear facilities and resulting products in the hands of collective rather than individual states could thus be contemplated.[13] To succeed, such efforts need to carry with them pronounced benefits in terms of (regional) stability and security, as well as economy.

- **Establish and Implement Mandatory International Standards of Physical Protection**: International safeguards offers no provisions for physical security. While safeguards aims at deterring nuclear proliferation by states, physical protection is the primary and possibly the only barrier against potential nuclear terrorists. Globally, domestic physical protection standards and practices differ widely. While sensitive information is protected, physical security experiences and best practices should be shared in international forums, to raise the general level and norms of nuclear security.[14] Despite recent updating, international standards for physical protection are non-mandatory and probably too weak to meet contemporary nuclear terrorist threats.

- **Review International Non-Proliferation Terminology:** Words and concepts may have remarkable power, not least in international matters where subtleties and ambiguities in meaning can have major implications for treaty interpretation and compliance. In the diplomatic and political sphere, ambiguity has its benefits, such as for attaining consensus or strategic gains. In consequence, hazy concepts may be purposefully embraced by international players to achieve policy goals. But the imprecise use of terms and concepts may also have significant detrimental effects, potentially causing misguided actions and lost opportunities for nuclear arms control. Key nuclear arms control concepts should thus be reviewed, with the goal of establishing consensus about its meanings, implications and uses.[15]

  Moreover, endlessly referring to the collective jargon of "weapons of mass destruction" can only blur the respective – and highly differing – threats posed by biological, chemical and nuclear weapons. Mixing the different weapons in a cocktail of terms may serve well as a rhetoric tool for political mobilising. It could, however, also easily prevent us from identifying the optimal measures to meet these (respective) threats.[16]

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13 Hence, time may be ripe to revisit the Baruch plan, proposing that rather than leaving potentially dangerous nuclear activities to national development, subject only to inspections to assure non-diversion of material and technology for military purposes, such activities should be placed under international ownership and control.

14 The IAEA initiative to organise country-wise physical protection peer reviews (International Physical Protection Advisory Service, IPPAS) should for instance be expanded.

15 Key concepts given different interpretations include for instance "Verification", "Transparency", and "Safeguards".

16 A more appropriate terminology may simply be "NBC weapons", or "CBNR weapons" if radiological devices are to be included, to describe and distinguish dissimilar nuclear, biological and chemical threats.

## 4.3 Fostering Nuclear Weapon Reductions

- **Increase Nuclear Transparency and Accountability:** Satisfactory accounting is a prerequisite for controlling nuclear weapons and material. Today more information is available than only a few years ago, but still – with some noteworthy exceptions – no official figures exist on nuclear weapons or the military inventories of fissile material in the nuclear weapon states.[17] Current uncertainties in fissile material holdings can only exacerbate the nuclear terrorist threat. An overall Russian stockpile inventory exercise should be launched, if need be, sponsored by international donors.[18]

- **Accelerate, Unblock, and Upgrade Bilateral Fissile Material Security Programmes:** A decade after the instigation of bilateral cooperative nuclear threat reduction programmes, the bulk of proliferation attractive and sensitive fissile material in Russia has not been subjected to international security upgrades. While unprecedented work has been done, much more should be done to accelerate, unblock, and upgrade the fissile material security programmes.[19] The cornucopia of experiences should be assessed and best practices identified. Particularly successful programmes could provide important inputs for fruitful working approaches and strategies in other ongoing and future cooperative nuclear security programmes.

- **Make All Nuclear Arms Reductions Truly Irreversible:** The principle of irreversibility – i.e. that material and weapons taken out from the arsenals of nuclear weapon states should be irrevocably rendered unusable for the purposes of nuclear explosives – is essential for reducing the threat of nuclear terrorism. If destruction of the fissile material is not an option, deals should be struck for international control and/or irrevocable disposition of fissile material. Options for further purchases and safe disposition of Russian excess fissile material should be explored, together with international efforts to put material declared excess to national needs under international (IAEA) control. Both the U.S. and Russia participates in the IAEA Trilateral Initiative. So far, however, very small quantities have been submitted. Nuclear weapon

17 Inventories of *all* nuclear material at hand have not been declared by any nuclear weapon state, except the United Kingdom.
18 Again the G8 Global Partnership may serve as a platform.
19 January 2001, a bipartisan panel mandated by the U.S. Secretary of Energy to assess the security of Russia's nuclear material concluded that "the most urgent unmet national security threat to the United States today is the danger that weapons of mass destruction or weapons usable material in Russia could be stolen and sold to terrorists or hostile nation states and used against American troops abroad or citizens at home" (Baker and Cutler, 2001). Among the key recommendations of the panel was a tripling of the current funding and establishing of a strategic plan to secure and /or neutralise in the next eight to ten years of all nuclear weapons usable material located in Russia. Agreements, moreover, should be reached with the Russian Federation at the highest level on acceptable measures for transparency and access.

states should review current stockpile inventories, with a view to significantly increase excess declarations and stocks under international control.

# 5. Summing up

At the dawn of the 21st century, the world is facing a range of nuclear threats and challenges. At the same time, there is also an assortment of options for change. The prospects of their successful implementation may be better than anticipated; whereas there is still disagreement on the means, the goals of nuclear non-proliferation are still vigorously promoted by the vast majority of states.

Many of the measures in need for implementation, however, call for a radical reconsideration of current nuclear postures, practices and priorities. Key issues, apart from the obvious need for drastically and urgently reduced arsenals of nuclear warheads and fissile material, include increased international cooperation and improved nuclear transparency and verification. Clearly, this will be challenging after decades of complete nuclear autonomy of the nuclear weapon states.

But, the world is at the crossroads. Either we could face the prospects of renewed nuclear proliferation and a further militarising of international security relations. Or we could start seriously contemplating the idea of global nuclear security. The latter would require a minimum level of mutually assured security for all parties – and hence a radically reduced political and military role of nuclear weapons. The multinational means to ensure this have been, or may be readily, put in place, ready to be applied – and improved – by those states desiring so.

As our collective memories of Hiroshima and Nagasaki may slowly be diminishing, it is as essential as ever to foster sound nuclear non-proliferation and disarmament policies for the new century. No need to say that exiting nuclear weapon states inside and outside of the NPT carry a special responsibility in this regard.

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