

# ABOLISHING Nuclear Weapons

## A DEBATE

**George Perkovich  
and James M. Acton**  
EDITORS

**Sameh Aboul-Enein  
James E. Doyle  
Lawrence Freedman  
Ian Hore-Lacy  
Patricia Lewis  
Zia Mian  
Frank Miller  
Harald Müller  
Pan Zhenqiang  
V. R. Raghavan  
Brad Roberts  
Scott D. Sagan  
Takaya Suto  
Jonathan Schell  
Bruno Tertrais  
Hirofumi Tosaki  
Achilles Zaluar  
Ernesto Zedillo**

**CARNEGIE ENDOWMENT**

FOR INTERNATIONAL PEACE

WASHINGTON DC • MOSCOW • BEIJING • BEIRUT • BRUSSELS



# **ABOLISHING NUCLEAR WEAPONS: A DEBATE**

GEORGE PERKOVICH AND JAMES M. ACTON, EDITORS

**CARNEGIE ENDOWMENT**

---

FOR INTERNATIONAL PEACE

WASHINGTON DC ■ MOSCOW ■ BEIJING ■ BEIRUT ■ BRUSSELS

© 2009 Carnegie Endowment for International Peace. All rights reserved.

*Abolishing Nuclear Weapons* by George Perkovich and James M. Acton, Adelphi Paper 396

© International Institute for Strategic Studies. Reprinted with permission.

No part of this publication may be reproduced or transmitted in any form or by any means without permission in writing from the Carnegie Endowment.

The Carnegie Endowment normally does not take institutional positions on public policy issues; the views represented here do not necessarily reflect the views of the Endowment, its staff, or its trustees.

For electronic copies of this report, visit [www.CarnegieEndowment.org/pubs](http://www.CarnegieEndowment.org/pubs).

Limited print copies are also available.

To request a copy, send an e-mail to [pubs@CarnegieEndowment.org](mailto:pubs@CarnegieEndowment.org).

Carnegie Endowment for International Peace

1779 Massachusetts Avenue, NW

Washington, DC 20036

Phone: 202-483-7600

Fax: 202-483-1840

[www.CarnegieEndowment.org](http://www.CarnegieEndowment.org)

Design by Cutting Edge.

Cover photo: Sovfoto/Eastfoto (A. Zhigailov, M-4 long-range strategic bombers being dismantled in compliance with the Strategic Arms Limitation Treaty [SALT II], August 1989).

Printed by VMW Printing Inc.

# Contents

	<b>Preface</b>	<b>7</b>
<b>SECTION 1</b>	<b>Abolishing Nuclear Weapons</b>	<b>9</b>
	<b>Adelphi Paper 396</b>	
	George Perkovich and James M. Acton	
	<b>Glossary</b>	<b>11</b>
	<b>Introduction</b>	<b>13</b>
Chapter One	<b>Establishing Political Conditions to Enhance the Feasibility of Abolishing Nuclear Weapons</b>	<b>21</b>
	Where Are We Now?	21
	The First Hurdles	30
	The Next Steps	40
Chapter Two	<b>Verifying the Transition to Zero</b>	<b>49</b>
	The Politics of Verifying Disarmament	49
	The Mechanics of Verification	52
	Transparency as a Sign of Good Faith?	69
	Civil-Society Monitoring	74
	Costs: How Much and Who Should Pay?	75
Chapter Three	<b>Managing the Nuclear Industry in a World Without Nuclear Weapons</b>	<b>83</b>
	Keeping the World Safe in the Nuclear-Energy Renaissance	83
	The Evolutionary Approach: Improving IAEA Safeguards	87
	The Radical Approach: Multinational or International Ownership of Fuel-Cycle Facilities	90
	Can the Most Sensitive Nuclear Activities Be Compatible With a Nuclear-Weapons-Free World?	93
Chapter Four	<b>Enforcement</b>	<b>99</b>
	Why Enforcing Compliance Might Be Contentious	100
	The UN Security Council in a Nuclear-Weapons-Free World: Relations Between China, Russia, and the United States	104
	Adding India, Israel, and Pakistan to the Mix	106
	Is Automatic Enforcement the Answer?	108
	Enforcement Mechanisms: Sanctions and Punishments After Break-Out	109
	Should States Be Permitted to Withdraw From an Agreement to Abolish Nuclear Weapons?	111
	Prospects for Enforcement	113
Chapter Five	<b>Hedging and Managing Nuclear Expertise in the Transition to Zero and After</b>	<b>117</b>
	An Internationally Controlled Nuclear Deterrent and/or Retaliation Force?	118
	Weapons Reconstitution: Virtual Arsenals and Surge Capabilities	120
	Managing Residual Know-How	123
	<b>Conclusions</b>	<b>127</b>
Appendix	<b>Key Suggestions and Questions</b>	<b>133</b>

<b>SECTION 2</b>	<b>Responses</b>	
L. Freedman	<b>Nuclear Disarmament: From a Popular Movement to an Elite Project, and Back Again?</b>	<b>141</b>
	The Need to Engage Public Opinion	142
	New Challenges at Low Numbers	144
F. Miller	<b>Disarmament and Deterrence: A Practitioner's View</b>	<b>149</b>
	A Rationale for Abolition?	150
	Nuclear Weapons Have Moderated Great Power Interactions	151
	Political Issues Are More Difficult to Resolve Than Technical Ones	152
	Two Warnings With Respect to De-alerting and to Mirror-imaging	153
	My Bottom Line	154
J. Schell	<b>The Power of Abolition</b>	<b>157</b>
	The Hows of Abolition	158
	The Whys of Abolition	159
	Harnessing the Power	161
B. Roberts	<b>On Order, Stability, and Nuclear Abolition</b>	<b>163</b>
	On Order and Abolition	163
	On Stability and the Movement Toward Abolition	166
H. Müller	<b>The Importance of Framework Conditions</b>	<b>171</b>
	The Need for Great-Power Concert	171
	The Disarmament Process and Path-Dependency	174
	Conclusion: What Next?	176
B. Tertrais	<b>Advancing the Disarmament Debate: Common Ground and Open Questions</b>	<b>179</b>
	A Refreshing Approach	179
	Is Nonproliferation Linked to Disarmament?	181
	Security, Influence, and Nuclear Weapons	182
	Some Open Questions	183
A. Zaluar	<b>A Realistic Approach to Nuclear Disarmament</b>	<b>187</b>
	Revisiting the NPT Bargain?	188
	Alternative Nuclear Futures	190
	Practical Steps Toward Abolition	192
	Verification Challenges	193
	Implications for the Civilian Nuclear Industry	195
	Enforcement Challenges	196
	Hedging	198
S. D. Sagan	<b>Good Faith and Nuclear Disarmament Negotiations</b>	<b>203</b>
	To Pursue Negotiations in Good Faith	204
	The 1995, 2000, and 2005 NPT Review Conferences	205
	Rethinking the Article IV–Article VI Link	208
	A Final Observation	210
T. Suto and H. Tosaki	<b>Abolishing Nuclear Weapons: A Japanese Perspective</b>	<b>213</b>
	Regional Concerns	214
	Balancing Order and Justice	215
	Practical Steps Toward Abolition	215
	Nonproliferation and the Civilian Nuclear Industry	216
J. E. Doyle	<b>Eyes on the Prize: A Strategy for Enhancing Global Security</b>	<b>221</b>
	Uncomfortable Assumptions	222
	The Increasing Risks of Nuclear Deterrence	223
	Denial Versus Deterrence	225
	Transforming Nuclear Strategy	226
	Specific Comments	229
	Conclusions	231

P. Lewis	<b>Verification, Compliance, and Enforcement</b>	<b>233</b>
	Verifying Zero	235
	Diversifying Intelligence	237
	Civil Society Monitoring	238
	How to Pay	238
	Consistent Enforcement	239
I. Hore-Lacy	<b>Nuclear Power and Proliferation: A Nuclear Industry Perspective</b>	<b>241</b>
	Proliferation and Safety Concerns in Context	241
	The Drivers of the Nuclear Renaissance	242
	The Practicalities of Reactor Fabrication	243
	The Evolving Nuclear Fuel Cycle	244
Pan Z.	<b>Abolishing Nuclear Weapons: Why Not Outlaw Them First?</b>	<b>249</b>
	The Nuclear-Armed States Must Go First	251
	First Among Unequals, the United States and Russia Must Lead	253
	More Than Numbers, Attitudes Toward Use and Salience of Nuclear Weapons Must Change	256
	Moral and Legal Pressure Needed	258
	China's Role	260
V. R. Raghavan	<b>Nuclear Abolition: Need for a Phased Plan</b>	<b>265</b>
	Establishing Political Conditions	265
	Verification and Enforcement	266
	Nuclear Industry	267
	An Indian Perspective	268
S. Aboul-Enein	<b>The Roadmap to Total Nuclear Disarmament</b>	<b>271</b>
	The First Challenge: Definitions	271
	The Non-Proliferation Treaty: The Foundation for a More Secure Future	272
	Restoring Confidence in the NPT: A Task for the Great Powers	275
	The Importance of Verification and Transparency	276
	Trust and the Way Forward	281
	Multilateral Cross Regional, Multicultural Dialogue	282
	Conclusion	283
E. Zedillo	<b>The Role of International Institutions in the Disarmament Process</b>	<b>287</b>
	The Value of Working Backward From the Solution	287
	Fulfilling the IAEA's Potential	289
	The Challenge of Security Council Reform	290
Z. Mian	<b>Beyond the Security Debate: The Moral and Legal Dimensions of Abolition</b>	<b>295</b>
	Nuclear Abolition as Policy and as Politics	296
	Abolition as a Management Strategy	299
	Power and Law	301
	What's the Big Secret?	303
G. Perkovich and J. M. Acton	<b>What's Next?</b>	<b>307</b>
	Nuclear Weapons as Valuable Sources of Deterrence and Stability, Versus the Risks of Nuclear Annihilation	307
	The Nature of Nuclear Disarmament Obligations and the Relative Responsibilities of Nuclear-Armed and Non-Nuclear-Weapon States	310
	Is Exploring Abolition a Distraction or a Necessity?	314
	The United States and Russia Must Lead From the Front	316
	Multilateral Reductions and the "Low Numbers" Problem	317
	Outlaw Use of Nuclear Weapons?	320
	Enforcement	321
	The Role of the Public	323
	Relative Silence on Verification	323
	Nuclear Industry and Strengthened Safeguards	324
	<b>Contributors</b>	<b>329</b>
	<b>Carnegie Endowment for International Peace</b>	<b>339</b>



## PREFACE

In the past few years, horizontal and vertical proliferation have collided. That is, the need for significant strengthening of the nonproliferation regime in the wake of nuclear developments in North Korea, Iran, Iraq, and Pakistan is now absolutely clear. So too, however, is growing unwillingness among non-nuclear-weapon states to even consider additional measures in what they see as the absence of serious progress by the nuclear-armed states toward disarmament.

The pathbreaking paper *Abolishing Nuclear Weapons* by George Perkovich and James Acton was first published by the International Institute for Strategic Studies as an Adelphi Paper in September 2008. One of the paper's major aims was to prompt serious international analysis, discussion, and debate, recognizing divergent views within and between nuclear-armed states and those that do not possess these weapons. The absence of such engagement in official forums such as Non-Proliferation Treaty Review Conferences and the Conference on Disarmament makes it vital for nongovernmental actors to take the lead in hopes that governments will see the value of such dialogue and follow.

The present volume takes the next step. To advance the sort of analysis and dialogue we call for, Perkovich and Acton have invited a distinguished group of experts—current and former officials, respected defense analysts—from thirteen countries, nuclear and non-nuclear, to critique the Adelphi Paper. Their diverse views explore pathways around obstacles to nuclear disarmament and sharpen questions requiring further official and

nongovernmental deliberation. We are grateful to the contributors for the thoroughly constructive character of their critiques.

The volume concludes with an essay by Perkovich and Acton that works through some of the key questions or paradoxes raised by the critiques. Their focus is on major issues and crucial differences. They do not defend their original text, rebut points, or cite passages to show where they may have been misunderstood. Rather, in the spirit of the commentators, they use the points raised from diverse international viewpoints to clarify and sharpen the big picture.

Few, if any, top-tier issues attract as much simplistic analysis, as many verbal red herrings, and as little serious work by governments as does the feasibility of nuclear disarmament. As was pointed out in *Abolishing Nuclear Weapons*, none of the nuclear-weapon states “has an employee, let alone an inter-agency group, tasked full time with figuring out what would be required to verifiably decommission all its nuclear weapons.”

Our endeavor, launched with *Abolishing Nuclear Weapons*, advanced in this volume, and continuing into the future, is to jump-start a broad and deep international debate, based on serious analysis, of what it would take to achieve the immensely important and equally difficult goal of nuclear disarmament. Like this volume, that debate will have to include active participation by all states—non-nuclear as well as nuclear armed.

Jessica T. Mathews

President, Carnegie Endowment for International Peace

---

**SECTION 1**

---

# Abolishing Nuclear Weapons

GEORGE PERKOVICH AND JAMES M. ACTON

**ADELPHI PAPER 396**



## GLOSSARY

CTBT	Comprehensive Test Ban Treaty
CWC	Chemical Weapons Convention
FMCT	Fissile Material Cut-Off Treaty
HEU	Highly enriched uranium
IAEA	International Atomic Energy Agency
INF	Intermediate Nuclear Forces (Treaty)
LEU	Low-enriched uranium
MOX	Mixed-oxide fuel
NPT	Nuclear Non-Proliferation Treaty
P5	The five permanent members of the United Nations Security Council
START	Strategic Arms Reduction Treaty



## INTRODUCTION

This paper aims to encourage a conversation about the abolition of nuclear weapons. How might the security conditions which would permit nuclear weapons to be safely prohibited be created, and how might measures to implement such a prohibition be verified and enforced?<sup>1</sup>

Over the past couple of years, there has been a growing awareness of the need to take nuclear disarmament seriously. In January 2007, and again in January 2008, the *Wall Street Journal* published articles by US statesmen George Shultz, William Perry, Henry Kissinger and Sam Nunn calling for invigorated movement towards the goal of a world free of nuclear weapons and urging other former high-level officials around the world to endorse this goal.<sup>2</sup> In recent months, four former defence and foreign ministers of the United Kingdom representing each of the country's leading political parties have joined their call,<sup>3</sup> which has also been echoed by governments. Most prominently, a number of senior UK cabinet ministers, including the prime minister, Gordon Brown, have proposed concrete steps that states could take jointly to help create the conditions necessary for the abolition of nuclear weapons,<sup>4</sup> as has Indian Prime Minister Manmohan Singh.<sup>5</sup>

What appears to have motivated much of this interest is the belief that it will be impossible to curtail nuclear-weapons proliferation without serious progress towards nuclear disarmament. In the absence of sufficient action on disarmament by the nuclear-weapons states, leaders of many non-nuclear-weapons states are increasingly resistant to efforts to strengthen the International Atomic Energy Agency (IAEA) system of

nuclear safeguards that is designed to ensure that civilian nuclear facilities are not used for military purposes. They also insist that they will not accept any new discriminatory constraints on their access to nuclear technology. Resistance to stronger non-proliferation measures is especially worrying given the expectation of a significant global expansion in nuclear-energy production. Ultimately, if it is to be sustainable and acceptable to the majority of states, any new nuclear order must be equitable and not perpetuate the disparity between the states that possess nuclear weapons and those that do not.

What is needed now is for a conversation about disarmament to take place between officials and experts from non-nuclear-weapons states and those from nuclear-weapons states. There has not been such a conversation for a long time. Diplomats gather every five years at conferences to review the Nuclear Non-Proliferation Treaty (NPT), but they do not seriously discuss the substantive conditions necessary to achieve the verifiable and enforceable elimination of all nuclear arsenals. These conferences, operating by consensus rules, have often been unproductive. The sixty-five-member Conference on Disarmament, established in 1979 as a result of a UN General Assembly special session on disarmament to serve a multilateral negotiating forum, is currently moribund. Representatives of nuclear-weapons states pay lip service to the principle of nuclear disarmament, but none of these states has an employee, let alone an inter-agency group, tasked full time with figuring out what would be required to verifiably decommission all its nuclear weapons. Non-nuclear-weapons states have not really engaged with the challenge either, in spite of their disarmament rhetoric. They have tended to view disarmament as something that the nuclear-weapons states should undertake and report back on when it is accomplished.

The need for non-nuclear-weapons states to join a debate over the details of nuclear disarmament is great. The global diffusion of the technology and know-how to produce fissile materials threatens to overwhelm the existing regime to prevent the 'diversion of nuclear energy from peaceful uses to nuclear weapons'.<sup>6</sup> Fear of nuclear proliferation is motivating some nuclear-weapons states to take nuclear disarmament more seriously;<sup>7</sup> but neither non-proliferation nor the abolition of nuclear weapons can be achieved without the active cooperation of non-nuclear-weapons states. Nuclear abolition would require much more than the dismantling of all nuclear weapons in the nine states that now possess them. To make abolition feasible and to enable the detection of rearmament, all states

that possess nuclear reactors, uranium-enrichment plants, plutonium-reprocessing facilities, uranium reserves or even transshipment ports would have to accept more intrusive control measures and inspection procedures than they do today. To build confidence that an agreement to prohibit nuclear weapons would be enforced, all states would need to demonstrate a willingness to enforce international rules with greater alacrity and robustness than has been historically normal.

Discussions of this paper's early drafts suggested that experts in non-nuclear-weapons states felt at times insufficiently informed on technical details and/or that these issues were too low among their national priorities for them to be able to fruitfully debate them with their counterparts in nuclear-weapons states. Some nuclear-weapons-state officials appear happy to reinforce such feelings. What ensues, then, is (often heated) debate between factions within states that possess nuclear weapons over what types of inspection protocol would be necessary to verify nuclear disarmament, or whether the permanent members of the UN Security Council would retain veto rights in a world without nuclear weapons. Frequently these debates are limited to the US, the UK and, to a lesser extent, India, as nuclear policy is not a major subject for discussion in France (where there is not much public interest in the subject), and information is tightly controlled in Russia, China, Israel, Pakistan and North Korea. There is little substantive give-and-take on disarmament issues between informed citizens and officials from nuclear-weapons states and many non-nuclear-weapons states, whether the topic is, for instance, how to guarantee the supply of nuclear fuel to actors that forgo indigenous uranium enrichment, or how to deter cheating in a nuclear-weapons-free world.

Theoretically, the eight states that have acquired nuclear weapons without violating international treaties (henceforth referred to as the 'nuclear-armed states' to distinguish them from the five states among them that are recognised by the NPT) could create a forum for negotiating an agreement to prohibit nuclear weapons. In today's world, however, states are more likely to proceed in an ad hoc, incremental manner. Aside from the Conference on Disarmament, there is currently no diplomatic structure pertaining to nuclear affairs that includes the five NPT-recognised nuclear-weapons states plus India, Pakistan and Israel. The latter three states are not party to the NPT, nor are they permanent members of the UN Security Council. While there is no legal reason why the nuclear-armed states could not create an informal process to pursue nuclear disarmament, they are too ambivalent about the objective to muster the collective energy and

resources to do so. Even if motivations were stronger, states would still be deterred by the expectation that some non-nuclear-weapons states would object to such a process on the grounds that it would grant unacceptable status to the three non-parties to the NPT.

We will suggest at the conclusion of this paper that internationally respected think tanks—including some affiliated with governments—could initiate a high-level unofficial panel in which experts and officials from non-nuclear-weapons states could join with those from nuclear-armed states to explore how the myriad challenges of verifiably and securely eliminating nuclear arsenals might be addressed. Such unofficial explorations could prepare the ground for official engagement with these issues when political conditions allow. Ideally, governments would augment these explorations by encouraging additional relevant nuclear-weapons experts, laboratory officials and military strategists to participate.

The debate that this paper seeks to facilitate is about how complete nuclear disarmament could be achieved safely and securely, not whether it should be tried. Some commentators on earlier drafts charged us with minimising the difficulties of nuclear abolition. They suggested that our belief in the desirability of abolition blinded us to its infeasibility. Others have said that we have identified too many obstacles, and that the paper should not be published in case it disappoints those who desire total nuclear disarmament, turning them further against initiatives to prevent proliferation, which they may see as merely advantaging the nuclear-armed states. To be clear, we believe that nuclear-weapons states have political and moral obligations to seek to eliminate all nuclear arsenals. These obligations stem from Article VI of the NPT, which specifies that parties should pursue negotiations leading to complete nuclear disarmament,<sup>8</sup> the 1995 negotiations over indefinite extension of the treaty, and the basic principle that a nuclear order cannot be maintained and strengthened over time on the basis of inequity. Double standards on matters as materially and psychologically important as nuclear weapons will produce instability and non-compliance, creating enforcement crises that increase the risk of conflict and nuclear anarchy.<sup>9</sup> Lawyers, diplomats and military commanders may debate the relevance and precise meaning of Article VI of the NPT. But it is clear that states would not have agreed to extend the treaty indefinitely, as they did in 1995, if the nuclear-weapons states had tried to claim that they were not obliged to pursue nuclear disarmament. In any case, the problem of states resisting strengthened non-proliferation rules because they say they are frustrated by the nuclear-weapons states' refusal to uphold their side of the NPT bargain must be addressed. More

generally, so long as large ready-to-launch nuclear arsenals exist (and especially if more states acquire nuclear weapons), the risk that these weapons will one day be detonated is not negligible. For these reasons, we do not argue why disarmament is desirable, except briefly in the conclusions.

None of this, of course, makes nuclear-weapons abolition feasible. Indeed, it is easy to say why it is not. Conversely, it is difficult to show how conditions could be created that would encourage states to make a nuclear-weapons prohibition verifiable and enforceable. This is the challenge that motivates us here. Our specific aims are twofold: first, to identify and explore the challenges to the complete abolition of nuclear weapons, and second, to discuss what states can start doing today to circumvent them. We do not claim to exhaust the range of issues that must be resolved, or to have optimally framed the subjects we do address. If there are places where we appear defeated by obstacles that could be dismissed or better navigated, we welcome other people's responses.

We do want to dispatch one objection at the outset. It is sometimes said that nuclear weapons 'cannot be disinvented'. We recognise this, but believe that the point is made to deflect careful thinking rather than encourage it. No human creation can be disinvented. Civilization has nevertheless prohibited and dismantled artefacts deemed too dangerous, damaging or morally objectionable to continue living with. Mass-scale gas chambers such as those used by Nazi Germany have not been disinvented, but they are not tolerated. The CFCs (chlorofluorocarbons) that created a hole in the ozone layer cannot be disinvented, but they have been prohibited with great benefit and other means have been found to perform their functions. The issue is rather whether means could exist to verify that a rejected technology—nuclear weapons in this theoretical case—had been dismantled everywhere, and to minimise the risk of cheating. Ultimately, the challenges of verification and enforcement could be so daunting that states would choose not to prohibit and dismantle all nuclear weapons, but the question of 'disinvention' should not deter us from this exploration.

Some readers may conclude that the difficulties and costs we identify of moving from the last few weapons to zero are so great that we should have focused more on the benefits and relative ease of earlier steps. One commentator on an early draft spoke for several when he said, 'Why don't you highlight the value of reducing nuclear arsenals to a few tens of nuclear weapons, and posturing them for no-first-use, and treating them as anathema, hidden-in-the-basement weapons of last resort? That world would be much less threatening than today's, and we shouldn't let the difficulties of getting to perfect zero keep us from it.'

We agree absolutely that the challenges of getting to zero do not and should not preclude many steps being taken in that direction. Mindful of this admonition, therefore, we address in the first chapter steps that nuclear-armed states could take in cooperation with others towards a world in which tackling the more difficult task of prohibiting nuclear weapons could be envisaged.

The remainder of the paper focuses on the more distant prospect of actually prohibiting nuclear weapons. It is tempting to avoid exploring some of the crucial difficulties involved in going to zero by saying, 'problems of enforcement and international politics would naturally be worked out on the way towards zero, or else states would not agree ultimately to create a nuclear-weapon-free world'. We believe this is inadequate. States will not begin to make the changes necessary for abolishing nuclear weapons if there is not a shared sense that the goal is realistic. And states cannot demonstrate their real commitment to this goal if they do not understand and accept the challenge of trying to implement the changes that must be made along the way.

Chapter 2 examines some of the greatest verification challenges of going from low numbers of nuclear weapons to zero. Although this chapter does discuss some essentially political questions, such as how good verification would need to be for states to feel enough confidence to eliminate their arsenals, it is largely technical. This cannot be avoided; nuclear abolition is an interdisciplinary problem that requires politicians, diplomats and non-governmental experts to engage with technical issues.

The third chapter explores the implications of nuclear-weapons abolition for the management of the forecast spread of nuclear energy to new markets. The risk of civilian-use fissile materials or expertise being diverted to make nuclear weapons is tolerated today in large part because major powers (and others) retain nuclear weapons that are felt to deter both proliferation and nuclear aggression from states cheating on their non-proliferation obligations. But tolerance of the risks associated with nuclear power would be much lower if all nuclear arsenals were eliminated. On the other hand, the equity of a world in which all states forswore nuclear weapons, and worked actively towards their elimination, could facilitate the establishment and enforcement of more robust rules to ensure that the growing number of states seeking nuclear-energy capabilities used them exclusively for peaceful purposes.

Chapter 4 imagines that the political and security conditions had been created to motivate negotiations on prohibiting nuclear weapons worldwide, and explores key practical questions that would need to be

resolved for states to have confidence that a prohibition would be enforced effectively. This discussion is necessarily speculative, and is intended to stimulate further international analysis and debate, rather than resolve the complex issues involved.

Chapter 5 examines the issue of hedging. Were all nuclear arsenals to be dismantled, the states that had possessed them would still retain know-how and probably some infrastructure that would enable them to reconstitute at least a small number of nuclear weapons rather quickly. This latency might represent an inescapable problem, or a desirable means of deterring or retaliating against cheating, or indeed both. In this chapter we explore some of the pros and cons of 'virtual' arsenals and international control of a minimal deterrent, and examine approaches to the management of nuclear-weapons know-how.

The conclusions come full circle by responding to the question, 'why bother with nuclear abolition?'. After citing five global security interests that would be served by fully fledged efforts to create a nuclear-weapons-free world, we suggest that the only way to resolve the 'who goes first?' problem among nuclear-weapons and non-nuclear-weapons states is to move on both the disarmament and non-proliferation fronts simultaneously. We recognise that governments could be informed and inspired to pursue reciprocating steps if unofficial advance work were done by international experts, a process to which this paper seeks to modestly contribute. The paper ends with an appendix summarising key questions and suggestions that it has outlined.

## Notes

- <sup>1</sup> The authors would like to thank the people who commented on earlier drafts of this paper for their extremely helpful comments.
- <sup>2</sup> George P. Shultz, William J. Perry, Henry A. Kissinger and Sam Nunn, 'A World Free of Nuclear Weapons', *Wall Street Journal*, 4 January 2007, p. A15; Shultz, Perry, Kissinger and Nunn, 'Toward a Nuclear-Free World', *Wall Street Journal*, 15 January 2008, <http://online.wsj.com/article/SB120036422673589947.html>.
- <sup>3</sup> Douglas Hurd, Malcolm Rifkind, David Owen and George Robertson, 'Start Worrying and Learn to Ditch the Bomb', *The Times*, 30 June 2008, [http://www.timesonline.co.uk/tol/comment/columnists/guest\\_contributors/article4237387.ece](http://www.timesonline.co.uk/tol/comment/columnists/guest_contributors/article4237387.ece).
- <sup>4</sup> Gordon Brown, speech to the Chamber of Commerce, New Delhi, 21 January 2008, <http://www.number10.gov.uk/output/Page14323.asp>; Margaret Beckett, 'Keynote Address: A World Free of Nuclear Weapons?', Carnegie International Non-Proliferation Conference, Washington DC, 25 June 2007, <http://www.carnegieendowment.org/events/index.cfm?fa=eventDetail&id=1004>; Des Browne, 'Laying the Foundations for Multilateral Disarmament', Conference on Disarmament, Geneva, 5 February 2008, <http://www.mod.uk/defenceinternet/aboutdefence/people/speeches/sofs/20080205layingthefoundationsformultilateraldisarmament.htm>.
- <sup>5</sup> Manmohan Singh, speech to 'Towards a World Free of Nuclear Weapons' conference, New Delhi, 9 June 2008, <http://pmindia.nic.in/lpspeech.asp?id=688>.
- <sup>6</sup> NPT (1968), Article III.
- <sup>7</sup> In June 2007, as she suggested steps that might be taken to create the conditions for nuclear disarmament, UK Foreign and Commonwealth Secretary Margaret Beckett remarked that 'the point of doing more on disarmament is this: because the moderate majority of states...want us to do more. And if we do not, we risk helping Iran and North Korea in their efforts to muddy the water, to turn the blame for their own nuclear intransigence back onto us. They can undermine our arguments for strong international action in support of the NPT by painting us as doing too little, too late to fulfil our own obligations.' Beckett, 'Keynote Address: A World Free of Nuclear Weapons?'.
- <sup>8</sup> Article VI states that 'Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.'
- <sup>9</sup> George Perkovich, Jessica T. Mathews, Joseph Cirincione, Rose Gottemoeller, Jon B. Wolfsthal, *Universal Compliance: A Strategy for Nuclear Security*, 2006 edition (Washington DC: Carnegie Endowment for International Peace, 2006); William Walker, 'Nuclear Enlightenment and Counter-Enlightenment', *International Affairs*, vol. 83, no. 3, May 2007, pp. 431–53.

## CHAPTER ONE

# Establishing Political Conditions to Enhance the Feasibility of Abolishing Nuclear Weapons

### **Where are we now?**

Some observers posit that none of today's nuclear-armed states would fall prey to major aggression if they all eliminated their nuclear arsenals. A proportion go further and argue that if all nuclear-armed states made a credible agreement to eliminate their arsenals, the rest of the world would pitch in by agreeing to support a much more robust collective security system that would act against any actor that newly sought to threaten others. In this sense, nuclear abolition could help cause a reduction in threats and a strengthening of security.

Others would say that this was nonsense. States possess nuclear weapons because they fear they might face threats of massive destruction. If they all got rid of nuclear weapons, major warfare might not break out immediately, but the chances of such conflict coming about would rise dramatically. The sense of threat felt by states can be reduced only over time, through former adversaries demonstrating that they recognise they have no interest in warring against each other — that doing so would cause the instigator more harm than good. Nuclear deterrence is one way to build cautious, war-avoiding interests. If it is to be traded away, some other reliable means must substitute for it.

Whatever the merits of these arguments, reality has put the states that possess nuclear weapons in the driver's seat, albeit while travelling a road that may lead over a cliff. They cannot be forced to eliminate these weapons. They will choose to do so only if they judge that they will not

become more endangered as a result. They will insist that prohibition of nuclear weapons does not ‘make the world safe’ for conventional war among major powers.

This is not a fair demand. It is motivated by the assumption that nuclear weapons would never fail to deter major conventional war, and it neglects the consequences if deterrence fails and nuclear weapons are detonated. Demanding that a nuclear-weapons-free world provide as much deterrence as is now ascribed to the current nuclear order, but with less risk, underestimates the benefits of living without the threat of destruction that even modest-sized nuclear arsenals project. Nevertheless, as a political and psychological matter, people contemplating losing things they already have tend to place higher value on them than do people who have never possessed them. Then-UK Prime Minister Tony Blair reflected this psychology in December 2006, when he announced his government’s decision to build a replacement for the UK Navy’s *Vanguard*-class nuclear submarines: ‘There are perfectly respectable arguments against the judgement we have made’, Blair told Parliament:

It’s just that, in the final analysis, the risk of giving up something that has been one of the mainstays of our security since the war, and, moreover, doing so when the one certain thing about our world today is its uncertainty, is not a risk I feel we can responsibly take.<sup>1</sup>

This loss aversion among decision-makers—which should also be assumed to be influenced by concern about the loss aversion of the voting public—is a political reality that efforts to prohibit nuclear weapons will need to confront.

Perhaps the best that can be practically expected of the nuclear-armed states is that they agree to work incrementally, in reciprocating steps, towards nuclear disarmament. These states make it clear that they will not eliminate their nuclear arsenals unilaterally; indeed, many officials and observers in nuclear-armed states mistakenly fear that this is what disarmament advocates demand of them. The new commander of US strategic forces, General Kevin Chilton, recently illustrated this misunderstanding when he was asked at a US Senate hearing what he thought of Shultz et al’s calls for states to pursue nuclear disarmament: ‘As a father... I would... love to envision a world someday free of nuclear weapons; but I also envision... a world that is free for my children and grandchildren to grow up in’, Chilton said. ‘I’m not for unilateral disarmament... Unilateral disarmament will not preserve that [freedom] in a world where other countries

possess nuclear weapons, particularly in quantities enough that could destroy our way of life if they should decide to use them against us.<sup>2</sup> But neither the NPT nor most calls for a nuclear-weapons-free world envisage that the US, Russia, China and other nuclear-armed states would eliminate all their nuclear weapons unilaterally; rather, the objective is for all states to create the conditions that would enable the mutual, verifiable and enforceable elimination of all nuclear arsenals. Chilton's formulation was in fact more promising for nuclear disarmament than is commonly thought, as he conditioned his advocacy for retaining US nuclear weapons only on the existence of nuclear weapons elsewhere in quantities sufficient to 'destroy' the US 'way of life'. Unlike officials in other nuclear-armed states, for example France and Russia, he did not suggest that the US needed to keep nuclear weapons to deal with non-nuclear threats.

Global nuclear disarmament is too far beyond the horizon for leaders of the US, Russia, China, France, the UK, Israel, India and Pakistan to form a consensus now on how and when it would be achieved. There are too many actors, too many unforeseeable possible technological innovations, and too many political and security-related events that could intervene for today's possessors of nuclear weapons to be able to codify in the near future all the political steps and the verification and enforcement procedures that would be required to prohibit nuclear weapons. Individuals and think tanks can be more venturesome, and offer policies and procedures for verifying and enforcing a global prohibition on nuclear weapons, as we do in this paper. However, current leaders can and should be expected to identify practical, concrete steps they can take in the near term to advance towards a horizon from which their successors could visualise achieving a prohibition on nuclear weapons. Moreover, as we argue in subsequent chapters, there is much that states can do today, short of formal negotiations, to begin the process of solving the problems which would threaten to become major obstacles as numbers approached zero.

William Walker urges that nuclear abolition be approached as a 'co-evolutionary' process of reciprocal step-by-step progress, in which non-proliferation and arms-reduction measures emerge from changed political and security environments and vice versa.<sup>3</sup> Different sets of states will need to take different steps, but all must move gradually in the same direction. Ultimately, in order for a secure, verifiable prohibition to be established, many bodies will need to walk in step; but in the early years of the process, different pairs or small groups of states would focus on each other. Some will move faster and more smoothly than others to ameliorate political and security tensions and implement nuclear reductions and controls. Deadlines

could speed the process, but the political will to establish them has not yet been generated in any of the nuclear-armed states, with the exception of India.<sup>4</sup> Moreover, as emphasised throughout this paper, for a prohibition to be feasible, non-nuclear-weapons states too would need to change their policies and practices. Their willingness to negotiate and implement the steps that would be needed to make the world safe for disarmament should not be taken for granted.

To examine current and possible future conditions in more detail, we begin at the 'top', with the two states which today have nuclear arsenals that clearly exceed their minimal security requirements, the US and Russia. We then briefly discuss the current disposition of France and the UK, before turning to China. In many ways, China is pivotal. Its political and security concerns are based substantially on its assessments of US and Russian strategic intentions and capabilities (which are affected by China in turn), while China's intentions and capabilities affect the calculations of India and, therefore, Pakistan. (China also affects Japan and South Korea, which have capabilities and interests that could lead them to produce nuclear weapons quickly, and who currently shelter under the US nuclear 'umbrella'). After discussing Chinese considerations, we turn to the regional political and security dynamics that most immediately concern India, Pakistan and Israel. We examine too the unresolved sovereignty issues in Northeast Asia, South Asia and the Middle East that have a major bearing on the retention and possible proliferation of nuclear weapons. The US also affects the proliferation potential of each of these regions, as do China, Russia, the UK and France to varying degrees.

In each of these contexts, conventional military dynamics cannot be ignored. In addition to exploring these dynamics, we also address the challenge of maintaining extended deterrence in the years leading up to disarmament. We consider too the role of ballistic-missile defence and concerns about the threat of nuclear terrorism, before concluding this chapter with near-term steps that states could take to demonstrate resolve to improve the feasibility of prohibiting nuclear weapons.

#### *US and Russian early steps*

The US currently possesses an estimated 5,400 operational nuclear warheads, of which 1,260 are held in reserve in an inactive stockpile. An additional 5,000 are awaiting dismantlement. There are approximately 5,200 nuclear warheads in Russia's operational stockpile, and a further 8,800 in reserve or awaiting dismantlement.<sup>5</sup> Thousands of US and Russian weapons are deployed so that they could be launched within minutes.

Neither state forswears first use of nuclear weapons; both leave open the possibility of using nuclear weapons pre-emptively or in response to non-nuclear threats, and maintain the capability to do so. Many commentators have noted that these quick-use forces could exacerbate instability in crises, and are vulnerable to inadvertent use as a result of false warnings or system malfunction. Leaders of both countries insist that they do not foresee threats from each other that would warrant the mutual destructiveness of nuclear exchanges, but they have not brought their arsenals into quantitative or operational alignment with their political and security relationship.

This paper need not make the case for the well-known steps that the US and Russia could and should take now to reduce unnecessary dangers. Shultz, Perry, Kissinger and Nunn in their 2007 and 2008 *Wall Street Journal* articles urged Moscow and Washington to extend the verification provisions of their Strategic Arms Reduction Treaty (START I) and to undertake further rounds of nuclear-force reductions. They called for steps to be taken towards increasing the warning and decision times for the launch of all nuclear-armed ballistic missiles, and the discarding of any operational plans for massive attacks. They also asked the US to adopt a process for bringing the Comprehensive Test Ban Treaty (CTBT) into effect.<sup>6</sup> The Luxembourg Forum, a private initiative sponsored by a Russian foundation and run by independent Russian experts with governmental experience, endorsed the recommendations made by Shultz et al. in their January 2007 article, as well as additional steps, at a May 2007 conference of 57 leading international arms-control and disarmament experts.<sup>7</sup>

It is entirely fair to say that if the new leaders of the two states do not take initiatives to further reduce the size, roles and political-strategic prominence of their nuclear arsenals, the overall project of nuclear disarmament cannot proceed. This may suit Russian leaders: a Russian analyst who commented on early drafts of this paper remarked that it was 'not a good career move to talk about nuclear disarmament in Russia today'. Clearly, the attitudes and policies of the new US administration in 2009 will affect Russia's interests and political will regarding disarmament. Yet the rest of the international community should recognise that Russia's positions are not merely reactive to the US, and that Russia in its own right can facilitate or retard the evolution of a more secure global nuclear order. Those officials who want nuclear disarmament to progress will need to engage their Russian counterparts directly on this agenda.

*France*

France has signed and ratified the CTBT, and shut down and dismantled its facilities for the production of fissile materials for explosive purposes. It has also dismantled its nuclear-testing facility. In March 2008, President Sarkozy announced that France was further reducing its nuclear arsenal so that it would be left with 'fewer than 300 nuclear warheads'.<sup>8</sup>

While this record is laudable, in private conversations, French officials do not hide their distaste for the idea of totally eliminating nuclear arsenals. In the run-up to the 2005 NPT Review Conference, France joined the US Bush administration in refusing to reaffirm the 'unequivocal undertaking...to accomplish the total elimination of their nuclear arsenals' that the nuclear-weapons states had made at the 2000 conference.<sup>9</sup> French officials have exerted pressure on other countries to refrain from advocating visions of a world without nuclear weapons.<sup>10</sup> Most problematically, France's rationale for wielding nuclear weapons is open-ended and not based on the existence of nuclear threats against France. As Sarkozy has put it, 'our nuclear deterrence protects us from any aggression against our vital interests emanating from a state—wherever it may come from and whatever form it may take'.<sup>11</sup> By not tying its possession of nuclear weapons to the possession of them by others, France gives the impression that it seeks to keep nuclear weapons regardless of what others do. France's rationale is so broad that any aspiring proliferator could say that it wanted nuclear weapons for the same reasons. The only answer to this position would be that the aspiring proliferator had signed a treaty committing it to not acquiring nuclear weapons. But France's aversion to the idea of eliminating all nuclear arsenals undermines the core bargain of the NPT, which makes the treaty a weaker basis for insisting that others not acquire these weapons. Nevertheless, the US and Russia have much work to do to bring their nuclear forces and infrastructure down to a level where France (or the UK) could be expected to take further major disarmament initiatives.

In sum, while France has taken exemplary steps to reduce its nuclear arsenal, and has been a creative leader in trying to strengthen the nuclear non-proliferation regime, it does not place itself in the vanguard of efforts to establish the feasibility of abolishing nuclear weapons.

*The United Kingdom*

The United Kingdom has announced it will reduce its stockpile of operational nuclear warheads to 'no more than 160'.<sup>12</sup> Unlike all other nuclear-armed states, the UK bases its nuclear deterrent only at sea, and

has no land- or air-based nuclear weapons. The UK has ratified the CTBT and halted production of fissile materials for weapons purposes.

Though official discussions of the country's nuclear deterrent have tended to speak of deterring major nuclear threats, the UK has not excluded nuclear deterrence of other threats, such as from biological or chemical weapons, and has declined to give promises of no first use. However, UK officials have juxtaposed their current unwillingness to abandon nuclear weapons unilaterally with allusions to a 'global move' towards complete nuclear disarmament that would present the UK with a different decision-making calculus. The UK has in many ways taken the lead among recognised nuclear-weapons states in embracing the objective of a nuclear-weapons-free world. Unlike French officials, for example, UK leaders have made explicit statements in favour of multilateral nuclear disarmament. In February 2008, Defence Secretary Des Browne volunteered that:

The international community needs a transparent, sustainable and credible plan for multilateral nuclear disarmament... The UK has a vision of a world free of nuclear weapons and, in partnership with everyone who shares that ambition, we intend to make further progress towards this vision in the coming years.<sup>13</sup>

### *China*

China has exhibited exceptional restraint in the development of its nuclear weapons and the political-military prominence it gives to them. Its nuclear weapons are intended to provide deterrence through retaliation within days, rather than minutes or hours, of undergoing an attack.<sup>14</sup> It deploys approximately 130 nuclear warheads for delivery by land-based missiles, sea-based missiles and aircraft. Combined with additional warheads believed to be in storage, this makes for a total stockpile of fewer than 200.<sup>15</sup> China continues to insist that it will not use nuclear weapons first, and it has a bilateral agreement with Russia to this effect. The country is, however, modernising and increasing the number of its nuclear delivery systems and possibly warheads, with a clear intention of reducing its vulnerability to US or Russian attack. The pace and extent of this modernisation and expansion has consistently lagged behind US intelligence estimates, although this could change.<sup>16</sup> In the absence of assurances from Russia and—especially—the US about the future quantity and quality of their nuclear forces, and their plans for ballistic missile defences, China has not indicated what, if any, limits it envisages for its future nuclear arsenal.

Chinese officials insist that they favour nuclear disarmament and would be prepared to join an arms-reduction process once states with larger nuclear arsenals, particularly the US and Russia, had significantly reduced these arsenals. However, private discussions with strategic analysts affiliated with the People's Liberation Army and the Chinese nuclear-weapons establishment indicate that there are grave doubts in China that the US and Russia could pursue nuclear disarmament in ways that would alleviate China's insecurities to the point where it would feel secure without a small survivable nuclear armoury (i.e., one that could survive an adversary's first strike and deliver a retaliatory attack). We discuss below several key strategic issues related to offensive nuclear forces, ballistic-missile defences and non-nuclear strike capabilities that China would want to have addressed before it would consider joining a nuclear-arms-reduction process. Still, Chinese authorities and analysts would be making a contribution to global security if they began internal deliberations now to specify what level of US and Russian reductions would be sufficient to induce China to join an arms-reduction process. This would give the international community a better sense of how and when a global move towards nuclear disarmament could be envisaged.

### *India*

India is estimated to possess between 50 and 60 nuclear warheads.<sup>17</sup> It could deliver these weapons with aircraft or land-based missiles, and is developing a seaborne capability, including plans for nuclear-powered submarines that could deploy ballistic missiles. India continues to modernise and expand its nuclear-weapons-production infrastructure, its fissile-material and weapons stockpiles, and its delivery systems. Yet India does not evince an arms-race mentality. Its leadership generally shows restraint, and gives the sense that nuclear weapons are regrettable political weapons of last resort, not militarily useful instruments. India does not deploy nuclear weapons on alert; it maintains its nuclear warheads apart from delivery systems. It insists that it would never use nuclear weapons first, though it qualifies this commitment in the case of responses to chemical- or biological-weapons attack.

Most importantly for the theme of this paper, India has not abandoned its long tradition of advocating complete nuclear disarmament. It insists that the objective be pursued globally and without discrimination. Only in this way, it believes, would Indian security interests be served and its political concerns put to rest. In particular, Pakistan and China would have to shed their nuclear weapons, and India would need to have confidence

in its conventional military balance in relation to both. The disarmament of all other current nuclear-armed states, particularly the US and the UK, would symbolise the equity India has sought in international politics since independence. India could, however, make demands that would complicate a disarmament process, some of which are discussed further in Chapter 4. The former Indian foreign secretary, Shyam Saran, now the prime minister's nuclear envoy, has criticised the approach of Shultz et al. by suggesting that their real priority might be to tighten a discriminatory technology-denial regime and coerce 'rogue' states.<sup>18</sup> India might test the other nuclear-armed states' seriousness by proposing timebound steps toward nuclear disarmament, including no-first-use commitments. Most, if not all, other nuclear-armed states are highly resistant to the idea of committing to the elimination of their nuclear arsenals by a specified date, because of the impossibility of knowing whether security and other conditions will be satisfactory at a particular point in the future. But as a general matter, India seems the most willing of all nuclear-armed states to participate in the global elimination of nuclear arsenals.

#### *Pakistan*

Pakistan is estimated to possess roughly 60 nuclear weapons.<sup>19</sup> It continues to expand its capacity to produce fissile material for weapons and to improve its land-based ballistic missiles, its favoured means of delivery. Like India, Pakistan is expected to develop the capability to deploy cruise missiles. Pakistan explicitly allows the possibility of using nuclear weapons first in a conflict. This reflects the basic fact that Pakistan acquired and maintains nuclear weapons to compensate for India's overall strategic advantages. While Pakistan's leaders have sought and won domestic popularity through the prowess symbolised by nuclear weapons, they would find it difficult to resist a global movement to abolish nuclear weapons if India were similarly committed, and if China and the US—Pakistan's most important backers—were too. Pakistan's abiding interest in protecting its territorial integrity and political autonomy from Indian coercion would, however, require that India agree to conventional arms-control and confidence-building measures. As discussed below, these would not be easy measures to design.

#### *Israel*

Israel has long said that it 'would not be the first to introduce nuclear weapons to the Middle East', a formulation interpreted to mean that it would only contemplate using nuclear weapons after an adversary had

'introduced' them by posing an imminent nuclear threat to Israel. Israeli leaders from all the major political parties have been remarkably restrained and consistent in their treatment of the nuclear issue, not brandishing the country's nuclear weapons for political gain or to intimidate adversaries. Nuclear weapons are kept in the background of both domestic and regional politics. Estimates of Israel's actual holdings vary widely, primarily because the state does not acknowledge possession of nuclear weapons and retains exceptionally tight secrecy over this domain. The country is believed to possess sophisticated nuclear warheads with a range of yields, and it has aircraft, land-based missiles and, most importantly, submarines with which it could deliver nuclear weapons to any of its likely adversaries.

Israel has signed the CTBT and has advocated an open-ended verifiable moratorium on testing, pending entry into force of the treaty. It has said that it will join a weapons-of-mass-destruction-free zone in the Middle East once all regional states, including Iran, establish a durable peace with it and are sufficiently transparent to accept and implement a regionally controlled verification regime that includes mutual verification. Israel does not have confidence that a globally agreed verification regime with an international organisation such as the IAEA as its inspectorate would ensure that all nuclear, biological and chemical weapons had been eliminated from the Middle East, nor that rearmament would be detected in a timely enough fashion to enable Israel to respond effectively. Even if all other nuclear-armed states agreed to eliminate their nuclear arsenals, Israel would not join them unless political, security, verification and transparency conditions specific to the Middle East were to its satisfaction. Conversely, however, this does mean that Israel might conceivably eliminate its nuclear arsenal independently of the full disarmament of the other nuclear-armed states, if its security requirements in the Middle East were met (which would include a ban on indigenous nuclear-fuel-cycle facilities in the region).

### **The first hurdles**

#### *Conventional-force balances*

Early on in an arms-reduction process, Russia and China would want to be persuaded that the relative power of the US would not increase under a prohibition of nuclear weapons. Many other states would share their concern. There is tension between the US interest in and obligation to use its power to defend international norms and its allies and friends, and the concerns that other states have about US military power projection and interventionism. Reassurance from the US that a world without nuclear weapons would not increase the threat of US interventions need not be

a precondition for taking many steps towards nuclear disarmament, but Russia and China would be more halting participants to the degree that such reassurance was not provided.

Former US Secretary of Defense Harold Brown has written recently that 'US conventional power-projection capability and the concern that it may be used to intimidate, attack, or overthrow regimes' elevates interest in nuclear weapons as equalisers and deterrents of US conventional power.<sup>20</sup> The goal and project of prohibiting nuclear weapons cannot eliminate or sublimate power balancing, which is an enduring feature of international relations. An eventual nuclear-abolition project could only succeed if it were accompanied by changes in broader military relations that convinced states that now rely on nuclear deterrence that nuclear weapons would not be necessary to deter large-scale military interventions. For such changes to occur in the foreseeable future, the US would probably need to reassure others that it would abide by international law as understood by other major powers in determining whether, when and how to use military force. It would be unnecessary, unrealistic and unfair to expect the US and its supporters to forsake moral purpose in their foreign policies; military intervention can be necessary to prevent or end egregious violations of international laws and norms. But in order to persuade others to put down their nuclear arms and enforce a prohibition on nuclear weapons, the US would have to display a willingness to eschew unilateral or small-coalition military intervention for these purposes. Otherwise, an interest in balancing and deterring overall US military power would make retention of nuclear weapons feel imperative, especially to Russia and China.

Conventional arms-control and confidence-building measures would probably need to be implemented in the regions abutting Russia and China, and in South Asia. Russia and NATO have negotiated such arrangements in the past, and China and Russia have undertaken military confidence-building in the context of establishing the Shanghai Cooperation Organisation. These arrangements would need to be built upon and extended, especially as China's overall power grows, thereby heightening the security concerns of Japan, Russia and China's other neighbours. Japan, Russia and others would need to be reassured that China's power-projection capabilities would not lead to coercion, and that the US would retain the means and will to help them balance China. Russia and China might need to buttress their conventional power to balance that of the US and to fill in the gaps projected to be left by the absence of nuclear deterrence, which might impel their neighbours in turn to augment their non-nuclear military power.

Russia, China and other states considering relinquishing nuclear weapons would probably seek agreed limits on US non-nuclear military capabilities. There are few, if any, precedents for such limits, as US conventional military power is based as much on quality as it is on quantity. The capabilities that most concern Russia and China derive in large part from information-acquisition and processing technologies, often involving space-based assets, which enable the US to deliver air attacks with great speed and precision. These capabilities are judged by some to be potentially overwhelming. As US strategy analyst Larry Wortzel has noted, Chinese military thinkers 'fear that a conventional [US] attack on China's strategic missile forces could render China vulnerable and leave it without a deterrent'.<sup>21</sup> Arms control traditionally operates on quantitative principles—weapons that can be counted, stacked against their counterparts and then verifiably withdrawn under agreed ratios. But the US military's 'revolution in military affairs' has introduced huge qualitative variables into balance-of-power calculations. The world has no experience of negotiating limits of the complexity that would be required for US qualitative advantages to be taken into account, even if the US were willing to entertain them. As and when political relations between major powers—in particular the US, Russia and China—become more cooperative, the daunting challenge of allaying concerns about the offensive potential of US military power could be taken up.<sup>22</sup> In the nearer term, unofficial analytical communities should lead the way in exploring these issues.

Finally, however, concerns about strategic intentions and conventional force imbalances in a nuclear-disarmed world should not be allowed to justify any US or Russian refusals to reduce nuclear arsenals to low numbers, or a Chinese nuclear build-up—in the event that the ballistic-missile defence problem, treated below, were resolved. As long as each state had survivable nuclear forces capable of threatening each other's capitals and leadership centres (which could not count on immunity even under doctrines prohibiting the deliberate targeting of civilians), conventional-force imbalances need not be less bearable than they have been historically. Indeed, the implementation of nuclear-arms control and reduction measures by the US, Russia and China—short of going from low numbers to zero—could make the political climate more conducive to the cooperative management of conventional military dynamics.

### *Ballistic-missile defence*

Ballistic-missile defences will inescapably influence the prospects of further nuclear reductions and eventually of prohibiting nuclear weapons. If

reliable testing convinces impartial observers that ballistic-missile defences would be highly effective in real-world scenarios, this technology could make nuclear disarmament more feasible, by insuring against the risk of cheating and nuclear threats involving low numbers of weapons. Effective missile defences could also reassure disarming nuclear states about the risk of conventional attack involving ballistic missiles. In each scenario, ballistic-missile defences could help both to counter an important threat and to deter it in the first place. (This would be true whether or not ballistic missiles were banned as part of a regime to eliminate nuclear weapons).

However, as long as the US, Russia and China have no shared conception of whether and how they might regulate their competition in strategic weaponry, the deployment of ballistic-missile defences increases rather than decreases the salience of nuclear weapons. This is due to the risk that the possession of such defences might embolden a state to launch a nuclear or conventional first strike against an adversary's nuclear forces, in the belief that it could then use its ballistic-missile defences to block a retaliatory salvo from whatever forces survived the attack. Even if a state with such defences had no intention of launching any such first strike, other states could not be sure of this.

In a situation in which Russia and China still fear that the US (and each other) could threaten their core security interests, the more extensive and effective ballistic-missile defences are, the less likely these countries will be to reduce their offensive nuclear systems to low levels. Similar calculations would take place in Pakistan if India acquired ballistic-missile defences. The US, Russia and China—and, therefore, the world—would not transition to very small nuclear arsenals, let alone none, if they did not first develop a cooperative approach to ballistic-missile defence, which in turn would require cooperation in managing their offensive strategic forces. Opinion leaders and policymakers from other countries could play an important role in impressing upon these states that the shared goal of implementing a more secure global nuclear order requires them to seriously explore whether and how ballistic-missile-defence deployment can be reconciled with strategic stability.

*Regional nuclear powers, unsettled sovereignty and big-power projection*

The eight nuclear-armed states will not be able to collectively envisage a prohibition of nuclear weapons until conflicts centring on Taiwan, Kashmir, Palestine and (perhaps) the Russian periphery are resolved, or at least durably stabilised. These are questions of unsettled sovereignty involving states that regard them as essentially internal disputes and which retain

nuclear weapons, at least in part, to prevent them from being settled by force against their interests. China insists that Taiwan is an internal affair. India does not accept that Kashmir is a matter for international resolution. Russia's periphery contains pockets of separatism that could produce conflict between Russia and other states that Russia would insist, rightly or wrongly, should not be considered matters of international peace and security. Israel—in common with rejectionist Arab states, Iran and, indeed, the wider international community—has not yet recognised Palestine as a separate state.

If these sovereignty disputes are resolved, it will be by those directly involved, not by outside actors. Nuclear weapons help to ensure that this is the case, by enabling their possessors to deter others from imposing unacceptable outcomes. Once any resolution were achieved, states would want to mobilise outside power, perhaps through the UN Security Council, to help maintain an agreed status quo and restore it if it were broken.

There is some cause for optimism that the Kashmir and Taiwan impediments to nuclear disarmament could be removed in the coming years. India and Pakistan have recently worked to stabilise their relations and identify ways to pacify, if not resolve, the Kashmir dispute. India has traditionally been more prepared to formally accept the status quo in Kashmir than has Pakistan. But the new military leadership of Pakistan under Army Chief of Staff General Ashfaq Kiyani shows signs of recognising that the country's greatest security imperative is to combat the operation of those prosecuting terrorism and violence against the state and civilians. This is related to the problem of extending central governance to the Federally Administered Tribal Areas and stabilising the porous border between these areas and Afghanistan. To the extent that the Pakistani Army and security services concentrate their activities on addressing these largely internal challenges and diminish the historic obsession with confronting India in Kashmir, Indo-Pakistani relations could be normalised, and a formal peace negotiated. Such an outcome is far from clear, but its prospect is better than it has been in decades. As and when the two South Asian powers formally stabilise their security relationship, the possibility of their negotiating nuclear-arms control and further confidence-building measures will become real.

China's growing wealth and power make seeking a breach through formal independence an increasingly unattractive option for Taiwan. This was reflected by the victory of the Nationalist Party in the Taiwanese elections of March 2008, the leader of which, Ma Ying-jeou, had campaigned on rapprochement with Beijing, and by the ensuing tentative moves made

by China and Taiwan to build mutual confidence. As memories of 1949 fade and the challenges of peacefully managing Sino-American relations rise, US leaders have become clearer that Washington's obligations to Taiwan hold only so long as the island does not provoke conflict by declaring independence.<sup>23</sup> If this position gains even more political traction in the US, it could facilitate arms control between the US and China (and therefore Russia) and increase stability. The point here is not to predict such a development, but rather to acknowledge that Chinese officials will regard it as necessary if China is to agree steps to limit and eventually forgo its reliance on nuclear weapons.

Tensions between Russia, its smaller neighbours and national enclaves within them are more fluid and less difficult to resolve than Taiwan or Kashmir. For Russia to diminish its recently increased emphasis on nuclear forces, the US and NATO would need to demonstrate greater sensitivity to Russian concerns about ballistic-missile defence and interference in its periphery. At the same time, the US and NATO have political and moral interests in not leaving newly independent states on Russia's periphery vulnerable to Russian coercion and interference in their internal affairs. Washington has found it difficult to prioritise what it seeks from Russia—further nuclear reductions, closer cooperation on inducing Iran to comply with UN Security Council resolutions, greater respect for civil rights within Russia and non-interference in Georgia and Ukraine jostle among the US's demands and aspirations. If the international community wants the nuclear-arms-reduction and disarmament process to be intensified, it could contribute by urging Washington and Moscow to prioritise reaching better mutual understanding on these and other issues.

The ongoing Palestinian crisis and its effects on Israel's security calculations and Iran's foreign policy give less cause for optimism. This web of challenges need not paralyse efforts to move in other regions and globally to reduce the numbers and salience of nuclear weapons. However, the realisation of later steps towards a prohibition of nuclear weapons would not be feasible without breakthroughs in the willingness of Israel, Palestinians and rejectionist states to establish a reliable *modus vivendi*.

There is significant interaction between these regional dynamics, the wider global order and prospects for advancing towards nuclear abolition. The United States is the primary link. It features among the security concerns of actors in each of the regional clusters in which new balances will be necessary to induce states to reduce and subsequently eliminate their nuclear armouries. The US is key in the China–Taiwan scenario. It also has the responsibility for reassuring Japan in the face of growing Chinese

power. Russia will be interested in eliciting reassurances about US competition on its periphery and US conventional and space power—reassurances which Washington cannot easily provide to the extent that it also seeks to protect the interests of Russia’s neighbours. In the Middle East, US military capabilities at least partly inform the military policies of Iran, Syria and others that Israel must balance. Washington also provides conventional military reassurance to Egypt, Jordan and the Gulf Cooperation Council states.

In South Asia, the appearance of a strategic partnership between the US and India, including on ballistic-missile defence, advanced conventional weaponry and civilian space and nuclear technology, affects the calculations of Pakistan and China. Even without US backing, India’s growing conventional military advantages induce Pakistan to place higher value on nuclear deterrence. Pakistan would probably seek limits on Indian conventional power before it would agree to reduce its nuclear arsenal. India, in turn, would point to its need to balance both Pakistani and Chinese military power, greatly complicating the task of both nuclear and conventional arms control.

#### *Extended deterrence*

Recent US discussions of the importance of seeking a world free of nuclear weapons have elicited intense, albeit quietly expressed, concern that this prospect could encourage nuclear proliferation by casting doubt on the viability of extended deterrence, that is, on the commitments made by Washington to project its military power to deter aggression against its allies and friends. Most prominently, it has been suggested that Japan might reconsider its commitment not to develop nuclear weapons because of a fear that US extended deterrence might be withdrawn.<sup>24</sup> (Turkey is also frequently cited in this regard.) The reasons for this are not immediately clear. The US would only eliminate its last nuclear weapons at the same time as all other actors, including China, eliminated theirs, with verification and enforcement provisions negotiated to all states’ satisfaction. In this scenario, the nuclear threats against which the US currently provides an umbrella nuclear deterrent would have been removed. The US would presumably maintain its security commitments to allies and be prepared to meet these commitments with conventional means. The conventional balancing requirement could be met by building up US and Japanese capabilities to substitute for the loss of nuclear deterrence—assuming this were still necessary in the absence of Chinese nuclear weapons—or by conventional arms control.

The real concern seems to be less about the end state than about the process of moving from today's strategic environment to one without nuclear weapons. That is, if the US were now to evince a clear interest in global prohibition of nuclear weapons, Japan or other US allies might conclude that the US would be unwilling to stand by its extended nuclear deterrent commitments in the decades-long transition to nuclear abolition. In this period, China (and perhaps North Korea) would retain nuclear weapons, and Japanese security officials might judge that Washington would be unwilling to risk nuclear conflict to deter them from coercing Japan. Japan might then seek nuclear weapons to secure itself during an uncertain transition to a nuclear-weapons-free world. This might in turn motivate South Korea to hedge or break its non-proliferation commitment. A similar scenario could be imagined in regard to Turkey, especially if Iran were to acquire a capability to produce nuclear weapons and NATO had attenuated its commitment and/or capacity to extend nuclear deterrence to its members.

While these concerns cannot be dismissed out of hand, the risk that countries that now enjoy an extended deterrent would be left vulnerable on the way to abolition must not be exaggerated. The most immediate need is to reassure states that value American and NATO extended nuclear deterrence that decisions regarding nuclear forces will not be made over their heads. The Japanese government and public strongly support the objective of nuclear disarmament, even as they value extended nuclear deterrence so long as nuclear weapons exist. The Turkish government, too, advocates nuclear disarmament. The nuclear-armed allies of these states, especially the US, would be irresponsible and ineffective if they did not involve them in deliberations on the step-by-step processes that could reduce global nuclear arsenals from current levels to zero. These steps will need to address the issues of conventional-force balancing, regional confidence-building and ballistic-missile defence discussed above. If China, Russia, North Korea, Iran and others do not cooperate in reducing insecurities surrounding the states that now benefit from extended nuclear deterrence, the US, as the principal guarantor, would not and should not be expected to relinquish this deterrent. Moreover, as China's decision to press North Korea to agree to denuclearise appears to indicate, the prospect of Japanese and/or South Korean nuclear armament may in fact be motivating Chinese cooperation on reducing such insecurities. Such cooperation should lessen proliferation risks.

Extended deterrence is among the political-security issues that would need to be addressed on the way to the horizon from which the feasibility of a global prohibition of nuclear weapons could be seriously explored.

Like the issues of verification and the management of nuclear industry discussed in subsequent chapters, decisions regarding extended deterrence would require the active participation of non-nuclear-weapons states. This is yet another way in which nuclear abolition is not simply a challenge for the nuclear-armed states.

### *Nuclear terrorism*

The threat of nuclear terrorism elicits much fear today, especially in the US, the UK, France, Russia, India and Israel. This fear increases resistance to taking nuclear disarmament seriously, though it ought to be irrelevant to decisions about dramatically reducing the number and salience of nuclear weapons. It should be evident that retaining nuclear weapons is unnecessary and not helpful for pre-empting, deterring or retaliating against nuclear terrorism.

The most effective way to prevent nuclear terrorism is to ensure that fissile materials or nuclear weapons cannot be obtained by terrorist organisations. Terrorist groups are highly unlikely to be able to produce fissile materials themselves. The US and the G8 have established and funded important initiatives to improve the security of nuclear materials, and the IAEA and other nuclear-industry organisations are contributing to these and other nuclear-security schemes. The Global Initiative to Combat Nuclear Terrorism, led by the US and Russia, now includes 70 partner states committed to improving accounting, control and physical-protection systems for nuclear materials, enhancing the security of civilian nuclear facilities and taking other measures to prevent nuclear terrorism.

To the extent that the risk of fissile-material diversion grows as the number of states and facilities producing the material increases, the world needs to adopt new rules to prevent the spread of weapons-usable fissile material production capabilities to additional states. This issue is discussed in detail elsewhere in this paper. For now, it is important to note that taking nuclear abolition more seriously could help to overcome the resistance that key non-nuclear-weapons states have mounted to tightening rules on the spread of fuel-cycle capabilities.

States with nuclear weapons still need to be convinced, however, that these weapons are not necessary deterrents against nuclear and biological terrorism. Officials in the US, France, Russia, India and Israel have all at times identified state sponsorship of nuclear and biological terrorism among the threats their nuclear forces are supposed to deter.

There is very good reason to doubt that nuclear weapons could either deter or pre-empt a nuclear or biological terrorist attack. A nuclear attack on

terrorists would be difficult to successfully carry out. The central challenge in targeting terrorists is to locate them; no weapon, nuclear or otherwise, is useful if it cannot be directed to the relevant target. If terrorists can be located with the confidence and precision that would be required to justify using nuclear weapons against them, it is likely that other means of destruction could be effectively deployed, with less collateral damage. The Iraq War vividly illustrates the primacy of intelligence over ordnance in targeting terrorists. Of the 50 aerial strikes US forces mounted on Iraqi leaders in 2003, not one resulted in the death of the intended target, according to an exhaustive Human Rights Watch investigation.<sup>25</sup> However, many untargeted people were killed. The extremely poor record of targeting and killing individual leaders with missile or manned-aircraft strikes would make any US president highly unlikely to authorise using nuclear weapons in this role, as US military officials privately recognise.

It is suggested that the threat of nuclear strikes against states and societies that might aid or harbour nuclear terrorists could motivate these states and societies to expel any terrorists they were protecting. Yet this is a complicated problem, as can be seen from efforts to expel al-Qaeda from Afghanistan, Pakistan, Iraq and Iran. Even when political leaders wish to eliminate terrorists from their midst, their capacity to do so is uncertain. Threatening to use nuclear weapons against such states is fraught with moral, political and strategic problems that make the threat highly counterproductive, as well as not particularly credible. For example, were the US or Israel to threaten to use nuclear weapons against states found to be harbouring nuclear terrorists, this could intensify popular animus against the US and Israel, and against governments that were seen as being complicit with them, to the possible gain of terrorist causes.

Other strategic problems arise from threatening nuclear retaliation against states from which terrorists might acquire fissile materials or weapons. To be able to identify the sponsors of nuclear terrorists, targeted countries such as the US, France or the UK would need to develop the forensic capacity to identify the sources of nuclear materials and weapons used by terrorists. This would require the cooperation of the states that now possess such materials. Samples would be needed to create databases against which to compare the nuclear 'fingerprints' of a terrorist bomb. In the event of a nuclear terrorist attack, more intense cooperation with potential source states would be needed. The highest priority would be cooperation to prevent subsequent attacks. Yet if the US or other nuclear-armed states had declared their willingness to mount nuclear counter-strikes against source countries, those countries might be less

willing to cooperate, either before or after an attack. Would a state provide information for a nuclear-fingerprint database, for example, if it knew that the US could use this information as a reason for striking it with nuclear weapons? These issues need to be explored now, and in the process it will become clearer to what extent nuclear counter-threats are an obstacle to cooperation on combating nuclear terrorism. In conducting such explorations, it would be wise to also consider whether cooperation would be more or less likely if the major nuclear powers were explicitly seeking to take steps towards a world without nuclear weapons.

### **The next steps**

#### *Transparency as an early step?*

Nuclear-armed states are often urged to declare precisely how many nuclear weapons they hold, how many they have produced, how much fissile material they retain, and so on. In March 2008, French President Sarkozy invited 'the five nuclear-weapon states recognised by the NPT to agree on transparency measures'.<sup>26</sup>

A brief exploration of this issue reveals that key states and regions have more work to do to establish security relationships conducive to transparency. Because China retains a nuclear arsenal much smaller than that of Russia or the US, it relies on secrecy regarding the size and disposition of this arsenal to help protect its survivability. China perceives that the US has not clearly accepted a relationship of mutual deterrence with it. That is to say, the US has not reassured China that it will not seek or use military capabilities to negate China's capacity to retaliate with nuclear weapons against any US first strike. The US may know that China has a small arsenal, but if it does not know the exact number and location of weapons capable of threatening US targets, Washington cannot be sure that it could destroy them all in a first strike. Beijing can therefore have some confidence that Washington believes China could destroy an American city or two in retaliation, and hence that the US would be unlikely to risk major warfare with a nuclear attack, for example in any conflict over Taiwan. If, by contrast, the US were certain about China's inventory, Chinese authorities might conclude that they needed to build a larger and more readily launchable arsenal than they now plan. In addition, the uncertainties around US ballistic-missile-defence plans mean that the Chinese authorities are reluctant to declare their holdings of fissile materials or any upper limits they might envisage for their nuclear forces. However, there is an important distinction to be drawn between capabilities and doctrine. None of the above considerations need prevent greater Chinese transparency about

doctrine, which is particularly desirable in view of the ongoing questioning by some Chinese military strategists of the wisdom of adhering to China's no-first-use doctrine in any confrontation with the US over Taiwan.<sup>27</sup>

Pakistan and India both rely on secrecy to augment their nuclear deterrents and limit domestic political pressure to build larger and more costly stockpiles and arsenals. Each hopes that secrecy about the size and location of its nuclear arsenal will keep adversaries from concluding that they could successfully target these capabilities. Keeping adversaries guessing is a way of reducing vulnerability to a first strike, and of thereby easing internal pressure to build larger retaliatory forces operating at higher launch readiness. Opacity about stocks of fissile material provides decision-makers in both states with greater freedom to determine how much is enough. If, for example, Pakistan were to declare an inventory of separated plutonium and highly enriched uranium larger than India's, Indian public opinion might express surprise and concern, and be liable to demand that the government hurriedly expand production.

Modification of Israel's nuclear-opacity policy would have several security implications. It seems clear that if Israel unambiguously announced its possession of nuclear weapons, pressure would grow within Egypt, Iran and other states to ramp up countervailing capabilities. If, in the absence of a verifiable and enforceable agreement to bring about a WMD-free zone in the Middle East, Israel declared how much fissile material it had produced outside international safeguards, domestic pressure could mount on Arab governments and Iran to begin producing fissile material under safeguards. Even if this material were put to purely peaceful uses, its production could well be perceived in the region as a hedge to keep the nuclear-weapons option open, and hence be destabilising.

The reasons for some states' reluctance to become much more transparent about their nuclear holdings need to be addressed, ultimately through conflict resolution and reciprocal confidence-building measures of the kinds discussed above. Yet these concerns should not keep officials and experts in states and international bodies from devising transparency measures that could be effective in the event that the political will emerges to enhance nuclear transparency at regional and/or global levels. Nor is there any reason for Russia and the US not to become more transparent now, including about the inventories and disposition of their 'non-strategic' nuclear weapons, that is, weapons—generally of smaller yields—designed for battlefield use. Transparency measures could be invaluable precursors to an eventual nuclear-disarmament agreement that would require full disclosure of all production and holdings of nuclear weapons and fissile materials.<sup>28</sup>

One way to test the willingness of the US, Russia, China, India, Pakistan, Israel and others to move ahead on nuclear disarmament, and to elaborate the conditions that must be established for them to be able to do this, would be to elicit and discuss their officials' private objections to nuclear transparency. No forum or process has been established to do this discreetly. The long-running discussions in the Conference on Disarmament of a possible treaty to ban unsafeguarded fissile-material production are not conducive to the candour we invite here. An alternative would be for the eight states that have legitimately produced fissile materials outside international safeguards to create a working group on transparency, as part of a good-faith effort to show the rest of the world that they are prepared to take nuclear disarmament seriously.

#### *Further preliminary steps*

Many of the measures discussed in the preceding paragraphs and in ensuing chapters on verification, nuclear-industry management and enforcement would be invaluable both to strengthening protections against proliferation and to facilitating nuclear disarmament. Here we discuss several other steps, each constructive in its own right, that would be beneficial for states to take at an early stage. It will be necessary for some of these to be taken in order that the more far-reaching political and security conditions for the total elimination of nuclear arsenals can come about.

North Korea must cease to pose a nuclear-weapons threat if the legitimate possessors of nuclear weapons are to look over today's horizon and imagine that the elimination of all nuclear arsenals could be feasible. A framework, albeit an uncertain one, exists for North Korea's nuclear disarmament. The immediate challenge is implementation. North Korea has recently declared its plutonium holdings and production history, and talks are currently under way to agree on the details of verification. In the longer term North Korea's suspected efforts to enrich uranium and its nuclear cooperation with Syria will have to be addressed. It must also declare its nuclear-weapons facilities and the weapons themselves.

The process of disclosure will be a complicated one that could serve as a test laboratory for future disarmament-verification processes elsewhere. Even if North Korea were to convince the other participants in the Six-Party Talks that it was providing them with all the information it possessed, there might be discrepancies between its records, the physical evidence and other parties' intelligence estimates. In particular, building confidence in North Korea's claims about the quantities of plutonium lost

during reprocessing<sup>29</sup> and used in its October 2006 nuclear test presents a significant challenge, as there is no easy way of verifying the former quantity and it is impossible to verify the latter. North Korea therefore presents a useful opportunity for demonstrating whether such challenges, which will inevitably arise in the course of attempts to verify disarmament (discussed further in the following chapter), can be resolved successfully. Indeed, given that plutonium production is more susceptible to physical verification than is highly-enriched-uranium (HEU) production, success in verifiably disarming North Korea is vital if the abolition of all nuclear weapons is to be taken seriously.

Differences among North Korea's interlocutors could arise in negotiations, and it is not immediately evident how these would be resolved. Participants should remember, however, that a constructive agreement on a verification process for North Korea is valuable, not only for its immediate contributions to alleviating nuclear insecurity, but also for its use as a test case for future nuclear disarmament. Needless to say, if North Korea refuses to cooperate, either in disclosing its nuclear record or, most importantly, in dismantling all of its weapons and related production capability, this would set a floor below which the other nuclear-weapons states would not reduce their own arsenals.

The case of Iran tests a number of parts of the international system that must be strengthened to build confidence that regional and global nuclear-weapons prohibitions would be feasible. Iran was caught violating its IAEA safeguards agreement. The detection system worked in time, before Iran acquired fissile materials or nuclear weapons. The responsible enforcement authorities were summoned. They ordered Iran to freeze—to stop its suspicious, potentially threatening activities until their peaceful nature could be established and confidence in Iran's intentions restored. But six years after its clandestine activities were discovered, Iran is still staring down the enforcement authorities—the IAEA board of governors and the UN Security Council—having defiantly taken steps that it was expressly ordered not to. If Iran continues to successfully defy the rules, procedures and enforcement authorities of the nuclear non-proliferation regime, there is no reason for anyone to have confidence that rules to guide and secure a nuclear-weapons-free world would be enforced.

Some will argue that Iran is motivated to continue its defiance, and other states are inclined to tolerate it, because the US, Israel and others possess nuclear weapons. The nuclear 'double standard' is said to explain or excuse Iran's interest in obtaining nuclear-weapons capabilities. It is certainly possible that if no one else possessed nuclear weapons, Iran

would be more cooperative and the international community more insistent. But Iranian leaders insist that they do not seek nuclear weapons, and they have not said that the existence of nuclear weapons elsewhere is what motivates them to continue enrichment. Nor do they justify their refusal to comply with legally binding Security Council resolutions in these terms.

The Iran case is deeply damaging to the objective of global nuclear disarmament. A party to the NPT that has broken its safeguards agreement and failed to cooperate with the IAEA to resolve all outstanding questions regarding the exclusively peaceful nature of its nuclear activities is defying the proper enforcement mechanisms of the non-proliferation regime. If and when Iran fully complies with these mechanisms, this would be the time to negotiate adjustments to the non-proliferation regime to prevent future violations and to address the 'double standards' criticism.

Global nuclear abolition cannot happen without the simultaneous or prior establishment of a verifiable WMD-free zone in the Middle East. Iran's refusal to comply with IAEA and Security Council obligations renders both objectives impossible. Israel's possession of nuclear weapons does too. But Iran, unlike Israel, blocks even the first steps towards creating such a zone by not recognising Israel's right to exist. It is politically unrealistic to expect a state to relinquish its nuclear deterrent as long as its neighbours and declared adversaries do not recognise its existence or demonstrate the political will to live in peace with it. Indeed, Iran's belligerent attitude towards Israel and its support of organisations that practise terrorism is a major reason why the international community is so troubled by its operation of facilities that could produce nuclear-weapons fuel. The removal of this apparent threat is a necessary political and security precondition for allowing evolutionary steps towards regional and global nuclear disarmament.

Regardless of developments in Iran and North Korea, the international community could demonstrate its willingness to begin making the changes necessary to facilitate nuclear disarmament by making the illicit proliferation of nuclear weapons an international crime. Slavery, piracy and hijacking are international crimes today, but the proliferation of nuclear weapons is not. UN Security Council Resolution 1540 obliges all states to adopt national legislation to prevent and criminalise the proliferation of nuclear-weapons capabilities to non-state actors. (Several states—including Pakistan, which continues to rely on imports to improve its nuclear deterrent—ensured that proliferation to *states* was not covered by the resolution.) Making proliferation to non-state actors an international crime would diminish the risk that proliferation networks would thrive

in states with lax enforcement of national laws. Such networks could serve not only terrorists but also states that aspired to break their non-proliferation obligations and acquire nuclear-weapons capabilities. Under such a law, proliferators would be subject to arrest and prosecution anywhere in the world. States that did not support this international legal buttressing of commitments already made under Resolution 1540 would reveal their real, as opposed to rhetorical, attitudes toward nuclear disarmament.

States that possess nuclear weapons could quickly and importantly build confidence by altering the operational postures of their nuclear forces and by making them less salient in their national-security doctrines. Here India, Pakistan and Israel offer relatively positive models. Pakistan, as well as India, refrains from deploying nuclear weapons mated with their delivery systems, and neither country's force is poised for rapid launch. They are thus less susceptible to accidental use. Israel does not rattle nuclear sabres to gratify a domestic audience, assert its status or intimidate other states. The nuclear-armed states as a group would do much to reassure the world if they adopted a standard whereby they did not routinely deploy nuclear weapons poised for immediate use and vulnerable to destruction if not used upon warning of an incoming attack. This is primarily an issue for the US and Russia, but it should also be a general principle that no national leader should be in the position of feeling they must unleash the destructive power of nuclear weapons immediately upon warning of attack, or risk losing their state's capacity to retaliate.

In previous discussions of the desirability and feasibility of nuclear disarmament, experts in states with nuclear weapons have predicted that, as the big nuclear powers reduce their arsenals to low numbers, states that do not now possess nuclear weapons might become tempted to acquire them.<sup>30</sup> At the stage where the largest arsenals numbered weapons in the low hundreds, the argument goes, an upstart possessor of nuclear weapons could believe that it had the opportunity to rise dramatically in the international nuclear ranks. This possibility cannot be dismissed, but it should not be seen as a barrier to disarmament. Reduction to relatively small arsenals would be part of an evolutionary process that states could readily halt or reverse if new actors sought nuclear weapons. In any case, if much increased collective confidence in the enforceability of strengthened non-proliferation rules is not achieved, the current nuclear-armed states will not undertake reductions to numbers so low as to invite, in their view, new proliferation. Moreover, an aspiring nuclear-armed power would need to weigh the political and strategic gains it hoped to make against risks and costs of proliferation that presumably would be much

greater than in today's world. The proliferator would be breaking a truly global anti-nuclear-weapons norm, rather than seeking to join a handful of nuclear-weapons possessors in a divided, inequitable nuclear order of 'haves' and 'have-nots'. In other words, the political, economic and security barriers to nuclear armament would be high enough to outweigh any hoped-for gains to be made from seeking to balance the arsenals of states moving towards zero.

It is likely that the more serious 'low numbers' issue would be that the possessors of nuclear weapons would prefer to stop at a plateau of small nuclear forces rather than take on the perceived added risks and costs of going to zero. The nuclear-armed states might be tempted to try to make a new bargain with non-nuclear-weapons states, in which the radically reduced political and military salience and numbers of nuclear weapons would be sufficient to enable the adoption and robust enforcement of a stronger non-proliferation regime—the outcome that primarily motivates whatever interest nuclear-armed states currently have in nuclear disarmament. The question would then become whether leading non-nuclear-weapons states would be willing to negotiate and implement such a revised bargain.

The challenge of achieving stability and security in a world with much greater nuclear parity at much lower total numbers should be addressed sooner rather than later to demonstrate a serious interest in nuclear disarmament. Official and unofficial experts should be encouraged on an international basis to model this problem.

## Notes

- 1 Tony Blair, 'Parliamentary Statement on Trident', 4 December 2006, [www.number-10.gov.uk/output/Page10532.asp](http://www.number-10.gov.uk/output/Page10532.asp).
- 2 Testimony of General Kevin Chilton to the US Senate Armed Services Committee, 12 March 2008, p. 8, <http://www.stratcom.mil/Spch&test/CC%20SASC%20testimony%2012%20Marchbo8.html>. For earlier, similar remarks from Chilton, see 'US Needs Nuclear Weapons for Rest of Century: General', Agence France-Presse, 4 March 2008, <http://afp.google.com/article/ALeqM5iTzGwvCk5GwEruTtZjFLeGRjB8Rw>.
- 3 William Walker, correspondence with authors, 22 April 2008.
- 4 See Singh, speech to 'Towards a World Free of Nuclear Weapons' conference.
- 5 Robert S. Norris and Hans M. Kristensen, 'Russian Nuclear Forces, 2008', NRDC Nuclear Notebook, *Bulletin of the Atomic Scientists*, vol. 64, no. 2, May–June 2008, pp. 54–7, <http://thebulletin.metapress.com/content/t2j78437407v3qv1/fulltext.pdf>.
- 6 Shultz, Perry, Kissinger and Nunn, 'Toward a Nuclear-Free World'.
- 7 See Luxembourg Conference Declaration, International Conference on Preventing Nuclear Catastrophe, 24–25 May 2007, <http://www.pnc2007.org/eng/declaration/declaration/>.
- 8 Nicolas Sarkozy, 'Presentation of SSBM [sic] *Le Terrible*', Cherbourg, 21 March 2008, <http://www.ambafrance-uk.org/President-Sarkozy-s-speech-at,10430.html>.
- 9 Rebecca Johnson, 'Is the NPT Up to the Challenge of Proliferation?', *Disarmament Forum*, no. 4. 2004.
- 10 Author interviews with officials in Washington and London, April, May and June 2007.
- 11 Sarkozy, 'Presentation of SSBM [sic] *Le Terrible*'. French officials intended this speech, delivered at the launch of a French nuclear submarine, to be the new government's major articulation of France's nuclear policy. For an illuminating analysis of the speech, see Bruno Tertrais, 'France and Nuclear Disarmament: The Meaning of the Sarkozy Speech', Carnegie Proliferation Analysis, 1 May 2008.
- 12 Blair, 'Parliamentary Statement on Trident'.
- 13 Des Browne, 'Laying the Foundations for Multilateral Disarmament', statement to the Conference on Disarmament, Geneva, 5 February 2008, <http://www.mod.uk/defenceinternet/aboutdefence/people/speeches/sofs/20080205layingthefoundationsformultilateraldisarmament.htm>.
- 14 Larry M. Wortzel, *China's Nuclear Forces: Operations, Training, Doctrine, Command, Control and Campaign Planning* (Carlisle, PA: Strategic Studies Institute, May 2007), p. 16, <http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubID=776>.
- 15 Kristensen, 'Chinese Nuclear Arsenal Increased by 25 Percent since 2006, Pentagon Report Indicates', FAS Strategic Security Blog, 6 March 2008, [www.fas.org/blog/ssp/2008/03/chinese\\_nuclear\\_arsenal\\_increa.php/](http://www.fas.org/blog/ssp/2008/03/chinese_nuclear_arsenal_increa.php/).
- 16 *Ibid.*
- 17 Norris and Kristensen, 'India's Nuclear Forces, 2007', NRDC Nuclear Notebook, *Bulletin of the Atomic Scientists*, vol. 63, no. 4, July–August 2007, pp. 74–8, <http://thebulletin.metapress.com/content/hm378jxpm12u4342/fulltext.pdf>.
- 18 Shyam Saran, 'Cold Warriors Do A Flip', *Times of India*, 26 February 2008.
- 19 Norris and Kristensen, 'Pakistan's Nuclear Forces, 2007', NRDC Nuclear Notebook, *Bulletin of the Atomic Scientists*, vol. 63, no. 3, May–June 2007, pp. 71–4, <http://thebulletin.metapress.com/content/k4q43h2104032426/fulltext.pdf>.
- 20 Harold Brown, 'New Nuclear Realities', *Washington Quarterly*, vol. 31, no. 1, Winter 2007–08, pp. 7–22, [http://www.twq.com/o8winter/docs/o8winter\\_brown.pdf](http://www.twq.com/o8winter/docs/o8winter_brown.pdf).
- 21 Wortzel, 'China's Nuclear Forces: Operations, Training, Doctrine, Command, Control and Campaign Planning', p. viii.
- 22 Many states may today assume that US non-nuclear military superiority will continue indefinitely, but it should be remembered that history records the sudden decline of a number of great powers. American national-security officials and analysts may therefore worry about the durability of American military primacy in a world without nuclear weapons, as might states that now rely on US security guarantees. This concern should not, however, be used

as an argument against prohibiting nuclear weapons. The US and its current allies and friends could prepare for a comparative decline in American power by devoting greater effort now to building regional security regimes in Northeast Asia and the Gulf, and with Russia on the southern and eastern flanks of Europe. In view of recent experience in the Balkans and Iraq, and in dealing with North Korea—and taking account of rising transnational challenges such as climate change, terrorism and organised crime—the high value placed on kinetic military power in US thinking about national and international security will need to be reconsidered in any case. The most pressing security challenges today—in Iraq, Afghanistan, Pakistan, the Middle East, the Balkans, Africa and elsewhere—require pacification and constructive capacities more than destructive ones. As US Defense Secretary Robert Gates has observed, ‘Other countries are not going to come at us in a conventional war’. Karen DeYoung, ‘Gates: US Should Engage Iran with Incentives, Pressure’, *Washington Post*, 15 May 2008, p. A4.

<sup>23</sup> This shift is reflected most clearly in private communications with Taiwanese leaders and in the private comments of former high-ranking US officials, including former leaders of Pacific Command. Conversations with author, early 2008.

<sup>24</sup> Remarks by former US Deputy National Security Advisor J.D. Crouch in response to presentation by Perkovich to the conference ‘The Crisis in Nonproliferation: Meeting the Challenge’, American

Enterprise Institute for Public Policy Research, Washington DC, 8 April 2008, <http://www.aei.org/events/filter.all,eventID.1703/transcript.asp>.

<sup>25</sup> Human Rights Watch, *Off Target: The Conduct of the War and Civilian Casualties in Iraq* (New York: Human Rights Watch, 2003), p. 23.

<sup>26</sup> Sarkozy, ‘Presentation of SSBM [sic] *Le Terrible*’.

<sup>27</sup> See Wortzel, ‘China’s Nuclear Forces: Operations, Training, Doctrine, Command, Control and Campaign Planning’.

<sup>28</sup> For discussions of possible transparency measures, see for example Gunnar Arbman, ‘Nuclear Transparency from the Perspective of Non-Nuclear Weapon States’, in Nicholas Zarimpas (ed.), *Transparency in Nuclear Warheads and Materials* (Oxford: Oxford University Press for the Stockholm International Peace Research Institute, 2003); Steve Fetter, ‘A Comprehensive Transparency Regime for Warheads and Fissile Materials’, *Arms Control Today*, vol. 29, no. 1, January–February 1999, [http://www.armscontrol.org/act/1999\\_01-02/sjff99.asp](http://www.armscontrol.org/act/1999_01-02/sjff99.asp); and ‘Reporting by States Parties’, working paper submitted by Canada to the Preparatory Committee for the 2005 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, NPT/CONF.2005/PC.III/WP.2, 5 April 2004, <http://www.reachingcriticalwill.org/legal/npt/prepcom04/papers/canadawp2.pdf>.

<sup>29</sup> Reprocessing is the extraction of plutonium from spent fuel.

<sup>30</sup> The American author has heard highly respected former senior US officials make this point on many occasions.

## CHAPTER TWO

# Verifying the Transition to Zero

### **The politics of verifying disarmament**

Verification serves a number of functions in any arms-reduction process. It helps to build confidence that states are abiding by the terms of an agreement. By detecting non-compliance, it acts as a trigger for enforcement actions, and is therefore also a deterrent. Without strong verification provisions, it is difficult to generate political will among states to give up military capabilities.

Although non-nuclear-weapons states generally acknowledge the role of verification, there may well be a divergence of views among them about exactly how important it is. States, such as Japan and South Korea, that have chosen to rely on the US nuclear umbrella to counterbalance a nuclear-armed neighbour, would be apt to insist upon particularly high standards of verification. A majority of non-nuclear-weapons states might well not require the same standard of verification, concluding that any uncertainties would leave them not significantly worse off than they are in today's world laden with nuclear weapons.

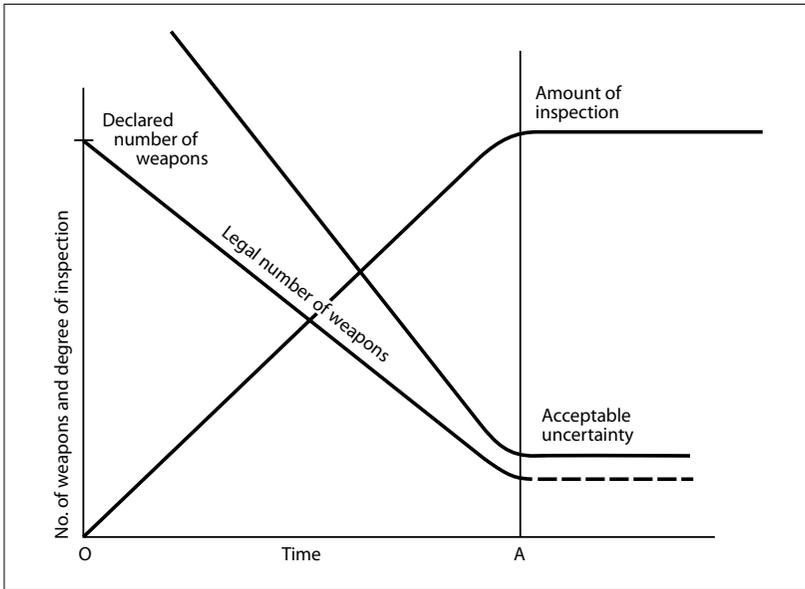
Nuclear-armed states are not likely to share this perspective. Their security interests and responsibilities, historical experiences and socio-political acculturation to possessing nuclear weapons may make them disinclined to accept the material and political uncertainties outlined in the following discussion. Almost certainly, politically significant elements within these states would demand 'perfect' verification as a condition for supporting (and ratifying) a prohibition of nuclear weapons.<sup>1</sup>

*Would 'perfect' verification be necessary?*

Speaking before the US Senate Foreign Relations Committee during its hearings on the 1987 Intermediate Nuclear Forces (INF) Treaty, Ambassador Paul Nitze stated that an effective verification system must be able to detect a violation in which a party 'moved beyond the limits of the treaty in a *militarily significant* way'. For example, in the case of the SS-20, a mobile intermediate-range ballistic missile banned under the INF treaty, the threshold for military significance was set at about 50 missiles.<sup>2</sup> In practical terms, this meant that when the US attempted to verify Soviet compliance with the treaty, it put in sufficient inspection effort to assure itself that the Soviet Union had fewer than 50 SS-20s left. As the most common version of the SS-20 (the Mod 2) had three re-entry vehicles, this could have amounted to up to 150 warheads. Verifying to the same degree of confidence that the Soviet Union had dismantled all its SS-20s would have required more overflights and inspections and been correspondingly more expensive.

No verification system is designed to detect arbitrarily small treaty violations (whether or not they are intentional). But what constitutes a militarily significant violation depends on the context. Had the US and the Soviet Union possessed fewer nuclear weapons of other types when the INF treaty was concluded, verification of SS-20s would probably have needed to be more stringent. Russia and the US have had very little incentive to cheat in the nuclear-arms reductions they have undertaken so far. Each country has possessed such large weapons and fissile-material stockpiles that there has been no motivation for secreting away a few weapons or kilogrammes of plutonium. There would have been little incentive to cheat even if there had been no risk of detection; with the risk of detection, the incentives have been strongly against cheating. And, partly because each side has retained assured nuclear retaliatory capability, the actual standard of verification required has been rather low.

In 1961, President Kennedy's science adviser, Jerome Wiesner, argued that as zero was approached, the quantity of undisclosed weapons or fissile materials that would be militarily significant would get progressively smaller.<sup>3</sup> This would increase the demands placed on verification. This argument is certainly intuitively appealing. In a transition from the last hundred or tens of weapons to zero, would not a state preparing to give up its nuclear deterrent be extremely concerned about any risk that others were cheating? Would not all states assume that others had incentives to cheat, at least to a much greater degree than under any



**Figure 1:** The 'Wiesner curve'. Based on figure 40 in Allan S. Krass, *Verification: How Much is Enough?* (London: Taylor and Francis for SIPRI, 1985), p. 168.

arms-control treaty hitherto negotiated? Would not perfect, or at least unattainably good, verification therefore be needed in the final transition to zero?

The so-called Wiesner curve (shown in Figure 1) might possibly be misleading for three reasons. Firstly, would the militarily significant quantity in a nuclear-weapons-free world actually be so small as to make verification unfeasible? Or, in plainer language, would a small cache of fissile materials or nuclear weapons, whether acquired by a 'rogue state' or a major power, really pose an unacceptable threat to international peace and security? Analysts have argued this point both ways.<sup>4</sup> We will not rehearse the arguments here, as what matters is the perceptions of states. Different states are likely to have different views on the significance of very low-numbers cheating.

Secondly, as US non-proliferation expert Allan Krass has observed, in Wiesner's analysis the 'level of distrust is implicitly assumed to remain constant during the disarmament process'.<sup>5</sup> If, as zero is approached, robust verification finds no unresolvable indications of possible cheating and states become convinced that each truly intends to fulfil the agreement, they might no longer require such stringent verification. US arms-control analyst Steve Fetter has suggested that verification might need to be most

robust at the level of around 100 warheads.<sup>6</sup> If no evidence of cheating emerged, states might then have enough confidence to dismantle their last warheads without spiralling demands for verification. This argument hinges on the assumption that verification would promote confidence, not only that states were complying with the terms of a disarmament agreement, but also that they had the intention of continuing to do so. This assumption is lent some empirical support by the fact that the US and Russia time-limited the verification arrangements for two strategic arms control treaties (START I and the INF) that are of indefinite duration.<sup>7</sup>

Finally, the Wiesner model ignores the fact that verification is a means to an end, not an end in itself. The end is compliance, and enforcement mechanisms too must exist for compliance to be promoted. As we discuss in more depth in Chapter 4, effective enforcement mechanisms would still be crucial even if verification were perfect. Imperfections in any verification system could potentially be offset by more robust enforcement mechanisms.

These issues of verification standards and practices have not been explored extensively even among the nuclear-armed states, let alone between nuclear-armed and non-nuclear-armed states. Such explorations would need to be undertaken well before a prohibition on nuclear weapons were negotiated. This is a subject on which useful preliminary analysis and discussion could begin now, at both official and unofficial levels. The February 2008 UK proposal to enlist weapons laboratories from all NPT nuclear-weapons states in exploring such verification issues should be welcomed.<sup>8</sup>

### **The mechanics of verification**

We turn now to the mechanics of verification; examining the technologies and procedures that could be available to verify a transition to zero, their deficiencies and the prospects for overcoming these deficiencies. Throughout this discussion, it is important to bear in mind the political context of verification described above. At one extreme, states could ultimately be satisfied with a 'do your best' approach to verification; at the other, they might demand a very high standard of proof. In the former scenario, the verification weaknesses we identify below would simply cease to be regarded as problems. In the latter, they would become significant obstacles to abolishing nuclear weapons if they could not be solved. Given the uncertainty about the standard of verification that would be required, taking disarmament seriously must involve examining the

potential verification pitfalls. This discussion is intended to highlight the key challenges. It is not exhaustive; there are a number of important issues that limitations of space prevent us from exploring—not least the question of what body should be tasked with verifying disarmament. Should it be the IAEA, or should a new inspectorate be created especially for the purpose? Is an international organisation needed at all?

*What is disarmament?*

The phrase ‘complete nuclear disarmament’ encompasses a range of end states. At one extreme lies what might be termed the ‘purist’ view of disarmament.<sup>9</sup> In this view, the objectives of nuclear disarmament would be to securely eliminate nuclear weapons and, as far as possible, erase states’ capabilities to produce them. Following dismantlement, the non-nuclear components of weapons would be destroyed. Fissile material would be placed under international safeguards and converted, as far as possible, into forms not usable in nuclear weapons. The facilities used to design, fabricate and maintain nuclear weapons would be demolished or, at least, completely reoriented to purposes unrelated to nuclear weapons.

The purist position rejects the possibility of deliberately preserving some form of nuclear-weapons-reconstitution capability to act as a hedge. This study does not, in part because some hedging capabilities would inevitably exist, at least while weapons and related infrastructure were being dismantled. For the sake of argument, however, the paper first considers disarmament from a broadly purist perspective. Then, in Chapter 5, hedging is examined.

A key challenge in defining the terms of an abolition agreement would relate to dual- and multi-use activities, materials and equipment. The political and economic issues involved mean that there is substantial potential for disagreement on these questions, even among purists. The problem of what civilian nuclear activities should be permitted in a disarmed world is addressed at length later in this paper. A brief exploration of two other dual- or multi-use issues—production facilities and delivery systems—should help to illustrate some of the difficulties.

Any nuclear-disarmament agreement would need to ensure that states’ nuclear-weapons complexes were not being used for proscribed purposes, whether this were achieved by destroying them, mothballing them or converting them to legitimate uses. But how should the term ‘nuclear-weapons complex’ be defined? Clearly those facilities involved in the fabrication of weapons pits (the metallic cores of nuclear warheads) or the

final assembly of warheads, for example, would require monitoring, but what about those involved in the production of non-nuclear components? For instance, plants that currently mould, press and shape high-explosive charges or manufacture electronic components for nuclear warheads could easily be used to produce components for other purposes, and in some cases already are.<sup>10</sup> Would these need to be monitored? If so, would monitoring be possible without compromising the secrecy of non-nuclear military programmes? Would plants that produce equipment or materials, such as lithium-6, used in the manufacturing of 'secondaries' (the components of thermonuclear warheads that produce energy through nuclear fusion) require monitoring?

Should a disarmament agreement outlaw some types of delivery vehicle? The most obvious target for such a ban would be the ballistic missile. Ballistic missiles can have long ranges and are very difficult to defend against. They are therefore the delivery vehicle *par excellence* for high-cost, high-impact munitions such as nuclear weapons. The consequences of break-out from a nuclear-weapons-free regime would be considerably aggravated if the state in question possessed ballistic missiles. From this perspective, there is a strong case for banning them. Indeed, Russia has recently proposed making global the bilateral 1987 INF treaty, which eliminated all US and Russian ground-launched missiles with ranges from 500km to 5,500km, and France has suggested a worldwide ban on all short- and intermediate-range ballistic missiles.

However, depending on the munitions technology available to a state, ballistic missiles can also be used to deliver conventional, chemical or biological weapons. A September 2007 survey by the Arms Control Association lists 32 states that are known or believed to possess ballistic missiles.<sup>11</sup> Would it be necessary for these states to give up their missiles to bring about a nuclear-weapons-free world? If so, would they be willing to do so? Would states that possess ballistic missiles, but not cruise missiles or advanced air forces, insist that their rivals agree to ban those delivery systems, as a matter of effective equity, in return for the banning of ballistic missiles?

The purpose of this exposition is not to argue that questions and problems such as these pose insurmountable obstacles to disarmament, but rather to show that there are real questions about the scope and obligations of a potential disarmament agreement. It also illustrates that at least some of these questions are not merely technical problems that can be delegated to specialists, but are strategic issues, in that they impact on states' security and economic interests.

*Checking correctness: verifying what has been declared*

## i. Verifying the dismantling of warheads

A central aim of verification would be to ensure that states had put declared warheads, and their constituent components and materials, beyond use. This requirement would represent a new departure for nuclear-arms-control treaties. Because of the difficulties involved in verifying the dismantlement of warheads—mainly due to national-security concerns about warhead inspection—treaties have to date focused almost exclusively on delivery vehicles and their launchers. Indeed, Article I of the NPT prohibits inspectors from viewing warheads directly unless they happen to have the appropriate security clearances, and from using many other verification techniques routinely used with other fissile materials. In the late 1990s, it appeared that the next US–Russia arms-control treaty, START III, would require the destruction of warheads, along with appropriate transparency measures. But START III was never concluded, and its place was taken by the 2002 Moscow Treaty, which contains no verification provisions and does not require warheads to be destroyed. Nonetheless, preparations for START III stimulated extensive and detailed research into how the destruction of warheads might be verified.

In the following paragraphs, a scheme for verifying the dismantlement of warheads is sketched out.<sup>12</sup> This picture might be termed the standard model, and it represents a rough consensus in the literature. There are of course numerous variations on this central theme, but few are radically different.

Firstly, states would be required to submit detailed ‘baseline’ declarations specifying the location, type and possibly the history of each warhead.<sup>13</sup> Warhead containers (such as transport canisters, re-entry vehicles and free-fall bomb cases) would be tagged with a unique identifier conceptually—and quite possibly practically—similar to a barcode. To verify that baseline declarations were correct, inspectors would be permitted to inspect a random sample of warhead containers to check that they matched the state’s declaration—the larger the sample, the greater the confidence in the declaration. Inspectors would also be allowed to count the total number of warheads present at each declared site to ensure that none had been omitted from the declaration. Ideally, verification of deployed warheads would start at their deployment sites, so that a chain of custody could be established for as much of the disarmament process as possible. It would clearly be necessary to ensure that warhead components could not be removed and secreted away at any time during the dismantlement process. To enable this, warhead containers would need to be sealed with devices that could reliably detect any unauthorised attempt to open them.<sup>14</sup>

Although there are undoubtedly sensitivities associated with international inspectors being permitted into nuclear-weapons storage and deployment sites, the problems do not seem insurmountable. As part of the verification arrangements for START, for instance, inspectors are allowed to count the re-entry vehicles in the nose cone of a ballistic missile, which are covered in such a way that inspectors cannot learn sensitive design details. Indeed, in general, managed-access techniques are relatively well understood and developed.<sup>15</sup> International inspectors would need only a slightly greater degree of access in order to verify the baseline declarations described above.

During verification, inspectors would not be permitted to inspect the warheads themselves, only their containers. It would therefore be necessary to provide evidence that real warheads were inside the containers. Some confidence might be built by establishing a robust chain of custody for the warheads, starting from the place where they were stored or deployed. In addition, it would probably also be necessary to authenticate the warheads by measuring their properties in a way that did not reveal classified design details. This step, potentially the weakest link in the dismantlement process, is discussed further below.

Having been authenticated, warheads would then be dismantled away from international inspectors.<sup>16</sup> The perimeter and portals of dismantlement facilities (or any other facility in which it was permitted to open the containers) would need to be continually monitored to detect unauthorised removals.<sup>17</sup> The effort required in the verification process would be substantially reduced to the extent that automatic, rather than human, monitoring were feasible. Dismantlement facilities would also need to be periodically 'swept' by inspectors to ensure that no warhead components had been retained. The recovered fissile material would be converted into forms from which sensitive information (such as shape, mass and fabrication technique) could not be inferred, and placed under standard international safeguards. The non-nuclear components of warheads would be destroyed. Depending on the sensitivity of the component in question, it might be possible for this to be done in the presence of inspectors. High explosive, for instance, burns in a very characteristic way, and there would be no reason why inspectors could not witness its destruction, so long as they did not learn sensitive details about its shape.

Extensive efforts have been made elsewhere to elaborate this model in much greater depth than can be presented here and, on balance, it seems that verification of the dismantling of declared warheads is within the realms of

possibility. This is not to say that all problems have been solved. For instance, given the importance of containment and the establishment of reliable chains of custody during the dismantlement process, there are real questions about whether current tags and seals are up to the job.<sup>18</sup> Nonetheless, such problems should not be insurmountable, given sufficient political will and funding. The one possible exception to this generally optimistic conclusion is the problem of authenticating warheads. Although current approaches may ultimately prove successful, there are reasons, outlined immediately below, to believe that this may become a sticking point.

ii. Are information barriers the solution to the authentication problem?

Russia and the US have already given considerable thought to the problem of how to authenticate warheads. Research has centred on the concept of information barriers.<sup>19</sup> In this approach, inspectors would measure the radioactive emissions of a warhead in a container using standard detectors. But because inspectors are not permitted to view the output of the scanner directly, as this might disclose sensitive design details, an 'information barrier' would be used to filter the output of the detector and remove sensitive information. In principle, the filtered output could be nothing more than a green or red light indicating whether or not a genuine warhead was present inside the container.

The principal difficulty of information-barrier technology is the problem of arriving at a formula for determining whether or not the object inside the box is a warhead. One approach, known as attribute verification, involves essentially defining a warhead as an object that possesses a certain set of characteristics. For instance, any object that contained a certain minimum mass of plutonium of a particular range of isotopic compositions could be deemed to be a warhead. This was the method favoured by the Trilateral Initiative, a joint project between Russia, the US and the IAEA to permit the verification of plutonium derived from weapons.

Although this method holds considerable promise, it leaves a number of questions unanswered, not least where the cut-off point should be. How much plutonium or uranium must an object contain before it is deemed to be a warhead? Because the quantity of fissile material in a warhead is classified, all an inspected party can do is declare that a given warhead contains at least, say, 4kg of uranium, and hope that other parties accept its figures. But would states be willing to take such declarations on trust? This problem is perhaps most acute for non-nuclear-weapons states, who ought not to possess detailed information about the design of nuclear weapons.

How could they assess, without undertaking proscribed research, whether such claims were reasonable? Would Saudi Arabia or Syria, for example, be likely to accept a verification system based on Israeli claims about the designs of its nuclear weapons?

Even if acceptable attributes could somehow be chosen, attribute verification cannot provide assurance that none of the fissile material from a nuclear weapon has been diverted. It is frequently overlooked that authenticating a warhead using the attribute method is not equivalent to verifying that no fissile material has been removed from a warhead.<sup>20</sup> This deficiency in attribute verification may not matter much in today's world, where nuclear-armed states have large stockpiles of fissile material, and so little incentive for clandestine diversion, but it could become significant as zero levels were approached.

This discussion should not be taken to imply that authenticating warheads is impossible. To some extent its feasibility depends on a political judgement about the degree of confidence required from the verification process. At a technical level, it may well be possible to overcome the problems highlighted here. Even if attribute verification could not be made to work, it is possible that an alternative (or potentially complementary) technology, template verification, could. Template verification involves comparing the radioactive spectrum of the object under verification to a 'template' spectrum, and determining whether the object is a warhead on the basis of how similar its spectrum is to the template. This technology suffers from its own set of problems, not least regarding how such a template could be created, and it is not currently the leading candidate.<sup>21</sup> But what this discussion does demonstrate is that more work is required to solve the problem of verifying the dismantling of declared warheads, and that technologies appropriate for US–Russian bilateral agreements in today's world may not be suitable for wider use in a world moving towards zero nuclear armouries. Moreover, nuclear-weapons states need to build confidence in authentication technology among non-nuclear-weapons states. To this end, as well as continuing to research information-barrier technology by and amongst themselves, nuclear-weapons states should also co-operate in its development—so far as is possible within the constraints of Article I of the NPT—with non-nuclear-weapons states (as the UK has already begun to do with Norway).

Finally, nuclear-armed states should begin a review of their warhead classification rules and decide whether, in the context of a treaty on complete nuclear disarmament, additional information about warhead design might be released to an inspectorate. If nuclear-armed states felt

able to declassify the quantity and isotopic composition of fissile material in their warheads, this would significantly simplify verification. Ultimately, nuclear-armed states would have to weigh the verification benefits against the proliferation risks of releasing such information.<sup>22</sup> Information would not need to be made public now, but it would facilitate the development of a verification system if there were a willingness to release it in future as part of a global move towards a nuclear-weapons-free world.

### iii. Dealing with fissile material, delivery systems and infrastructure

Verification would of course also be concerned with treaty-limited items other than warheads. Warheads do, however, pose the biggest challenge and, by comparison, verifying the disposal of fissile material, the elimination of delivery systems and the shutdown or conversion of infrastructure would be relatively straightforward. Delivery vehicles, for instance, have been the subject of many arms-control negotiations. Their size makes verification relatively straightforward. Although each type of delivery system undoubtedly presents its own specific set of challenges, a wealth of experience of verifying delivery systems exists, and there appear to be no insoluble problems. The size of assembly and disassembly facilities and many other parts of a nuclear-weapons complex means that verifying their status is also unlikely to present major technical difficulties, even though currently experience of such verification is limited.<sup>23</sup>

A disarmament treaty would probably require states to dispose of all the fissile material from dismantled weapons. HEU can be 'denatured' through down-blending — that is, mixing it with uranium of a lower enrichment to form low-enriched uranium (LEU), from which standard reactor fuel can be fabricated. This is a straightforward process. Indeed, following a 1993 agreement, Russia down-blends around 30 tonnes of HEU per year for sale to the US. There are two long-term options for disposing of excess plutonium: 'immobilising' it by burying it along with intensely radioactive nuclear waste, thereby making it extremely difficult to extract, or burning it in a civilian power reactor as mixed-oxide (MOX) fuel to generate electricity. Immobilisation technology is unproven, and a planned US immobilisation plant is at least ten years behind schedule. Although MOX fuel has been successfully fabricated and used in Europe for several years, MOX fuel plants in the US and Russia are also at least a decade behind schedule. Moreover, the US Department of Energy estimates that it will cost around \$10 billion to build and operate plutonium-disposal facilities in the US (although this must be offset against the value of the fuel

thereby produced). Nevertheless, standard techniques exist for verifying the processing of fissile material. Whether such techniques are adequate is addressed in Chapter 3, where IAEA safeguards are discussed.

iv. Next steps: demonstrating proof of concept

In spite of our generally optimistic conclusions about the feasibility of verifying declared warheads, it is important to note that no state has ever actually verified the end-to-end process of dismantling and decommissioning one nuclear warhead. Various bilateral treaties have given the US and Russia experience of verifying parts of the nuclear-disarmament process.<sup>24</sup> But no part of the warhead-dismantlement process has ever been verified, although much of the relevant technology has been investigated (most notably in the Trilateral Initiative).

The US and Russia could take a significant step that could earn them credit at the 2010 NPT Review Conference by agreeing and adopting a prototype end-to-end verification scheme for the dismantling and decommissioning of one or more warheads.<sup>25</sup> Verification should start with the removal of the warhead from its delivery system and end with the placing of its fissile material under international safeguards. By demonstrating verifiable disarmament in the form that most people envisage when they think of eliminating nuclear arsenals, the US and Russia would identify challenges, show goodwill and perhaps begin a process of acculturating key institutions to the vision of a world without nuclear weapons. The conference of weapons laboratories from the NPT nuclear-weapons states proposed by the UK would be an important complementary initiative, offering the P5 a forum in which to explore further the scope for cooperation on verification technologies and procedures.

*Assessing completeness: worrying about what is not declared*

The preceding discussion surveyed the technology available for verifying the dismantling and disposal of declared nuclear warheads and other treaty-limited items. But the question arises of why states would go to the trouble of trying to defeat a verification system when they could simply fail to declare hidden warheads. Retaining warheads clandestinely would be easier and cheaper, and there would be much less risk of being caught. Warheads are small and easily moveable. Although radioactive, they can easily be shielded, and there is no realistic hope that radiation detectors could find them at distances of more than a few metres. The problem is not limited to warheads; a state capable of manufacturing fissile material would have no difficulties in keeping an illicit stockpile secret.

The detection of clandestine stocks of warheads, warhead sub-assemblies and fissile material presents a much bigger challenge to disarmament than does the authentication of declared warheads. Yet the latter, easier question has attracted far more attention. For a prohibition on nuclear weapons to be embraced, nuclear-armed states would need to be convinced that the risks associated with not disarming outweighed the risk of major failures in the verification and enforcement regime. They would be much more likely to reach this conclusion if they were confident that there was a reasonable chance of clandestine stockpiles of warheads and fissile material being detected. In this section we address what can be done. There is no single solution, but a number of overlapping techniques may be applied, ranging from verifying past production of fissile material to gathering intelligence on current activities.

i. Accounting for past production and current holdings of fissile materials

Two key functions in the disarmament process would be served by accounting for past production and current holdings of fissile material. Firstly, comparing production with current holdings might enable confidence to be built that states had not clandestinely retained fissile material (whether or not in the form of warheads). Secondly, an inventory of current holdings would form the baseline for future efforts to ensure that fissile material was not diverted. Moreover, accurate accounting has an important role to play in preventing and detecting the theft of fissile material, and hence in bolstering efforts to prevent proliferation and nuclear terrorism. Most of the steps discussed below are therefore probably worth undertaking in any event, irrespective of progress towards complete disarmament. (For this reason, the marginal cost of verifying disarmament may not be especially great).

States would first be required to submit to an inspectorate comprehensive declarations of their current stocks and past fissile-material production and use. Such declarations would probably need to cover all weapons-usable fissile materials (such as uranium-233 and neptunium-237), and not only uranium-235 and plutonium. Compiling and verifying these declarations would be far from straightforward, and it would be difficult to prove their accuracy.

One particular challenge would be ensuring that declarations accurately accounted for all past production. The problem lies not so much in the possibility that a nuclear-armed state might have produced fissile material in secret facilities, though this is a possibility, as with the challenge of verifying that declared facilities have been operated as stated,

sometimes over the course of many years.<sup>26</sup> The difficulty is that states' own records are the principal — and sometimes only — source of evidence. Some confidence in these records could be built by checking that they were internally consistent. The greater the range of material available for cross-checking, the more confidence would be built. In some states, the range of records available will be quite large, and will include plant-operating records for all stages of the fuel cycle, financial receipts and planning, plant-maintenance and warhead-assembly and disassembly records. In other states, available sources are more limited. In Russia, for instance, the 'only comprehensive plutonium accounting scheme' is believed to consist of financial records documenting transfers of final plutonium product from the Ministry of Atomic Energy to the Ministry of Defence.<sup>27</sup>

Traditional forensic analysis could also be useful in verifying states' records, for example in checking that the paper on which documents are printed is the right age. Unfortunately, one side effect of the switch from paper to computer records over the past two decades is that doctoring records has become easier and less time-consuming. In addition, records stretching back over 50 years are inevitably incomplete and sometimes erroneous. If verification of past production were limited to the examination of records provided by states, it would be possible for a determined and careful violator to cheat by altering those records.

One source of independent evidence is a branch of nuclear forensics known as nuclear archaeology. Most plutonium for weapons was manufactured in graphite-moderated reactors, and the amount of plutonium produced in such reactors can be reconstructed using nuclear-archaeology techniques to analyse the trace isotopes that accumulate in graphite during reactor use.<sup>28</sup> But, although such techniques can reduce uncertainties, they cannot eliminate them. Moreover, forensic techniques relating to heavy-water reactors (which account for 11 of the world's 45 plutonium-production reactors) and enrichment plants (which account for the majority of past fissile-materials production) are much less accurate. In addition, many facilities in which fissile material was produced, such as a number of gaseous-diffusion facilities, have been shut down, and some have also been partially dismantled, further limiting the use of nuclear forensics.

The problems do not stop at verifying past production. Inevitable measurement errors introduce discrepancies between declarations and measured quantities of current holdings. The IAEA faces this problem today even when dealing with comparatively small quantities of fissile material.<sup>29</sup> Under today's safeguards standard, the agency aims to detect the diversion of a 'significant quantity' of nuclear material, defined as 'the approximate

	UK		US	
	Plutonium (tonnes)	HEU (tonnes)	Plutonium (tonnes)	HEU (tonnes of U-235) <sup>30</sup>
Amount recorded in state's inventory	3.22	21.64	102.3	623.5
Actual holdings	3.51	21.86	99.5	620.3
Material unaccounted for	-0.29	-0.22	2.8	3.2
Material unavailable for verification	>0.2	>0.6	>3.4	>10

**Table 1:** Results of exercises by the US and the UK to account for their plutonium and HEU production and holdings, undertaken between 1994 and 2002. Actual holdings were correct as of the following dates: 31 March 1999 (UK plutonium), 31 March 2002 (UK HEU), 30 September 1994 (US plutonium), 30 September 1996 (US HEU).

amount of nuclear material for which the possibility of manufacturing a nuclear explosive device cannot be excluded'. This quantity is currently set at 25kg for HEU and 8kg for plutonium. Given that HEU production in the US and Russia is measured in many hundreds of tonnes, verifying US and Russian HEU holdings to within a significant quantity thus defined would require an unattainable measurement error of less than 0.01%. An excellent illustration of the problem and its possible consequences in a disarmament context can be seen in efforts made by the UK and the US on a number of occasions over the past 15 years to account for their fissile material.<sup>31</sup> The first row of Table 1 shows how much fissile material the two countries calculated ought to be present, according to inventories based on their records; the second row shows how much was actually measured to be present. The proportionately minor discrepancy between these sets of figures, shown in the third row of the table, is designated as 'material unaccounted for'. In the case of the US, the material unaccounted for would be enough to build around a thousand warheads. It would be a formidable challenge for the US to convince other states that none of this material had been retained in a clandestine stockpile. And the UK and US accounts were probably among the most accurate in the nuclear-armed states; the uncertainties for the Russian programme in particular are likely to be much higher.<sup>32</sup> A former high-ranking Chinese nuclear official reflected his nation's sensitivity to these issues when he observed in a recent conversation with one of the authors that the inevitable uncertainties in US and Russian fissile-material production inventories were greater than China's total fissile-material production. Given this, reassuring China about the possibility of major powers' evasion of a total ban on nuclear weapons would not be an easy task.<sup>33</sup>

There is a second, distinct challenge that would arise in the context of nuclear-disarmament verification. Much of the fissile material listed in states' declarations would not be available for verification. Substantial quantities have, for example, been used in nuclear detonations. Other material, such as that used in reactors, transformed by radioactive decay or lost in waste streams during processing, is extremely hard to verify with any accuracy. Moreover, much fissile material is held in classified form. Weapons pits, for instance, have classified shapes, masses and isotopic compositions, making it impossible for inspectors to verify the amount of material present in a pit (although, as discussed above, information about the isotopic composition and possibly mass of warheads could perhaps be declassified for inspection purposes). Similar limitations apply to naval reactor fuel. Under current rules, even material that was once in weapons but has now been converted into other forms is still sensitive, unless it has been blended in such a way as to hide its original isotopic composition. Whereas a national agency could verify all classified material, international inspectors could not (recall that information-barrier technology does not permit inspectors to measure the quantity of fissile material in a warhead).

Thus, substantial amounts of the fissile material that states have produced would, for various reasons, be unavailable for verification. Inspectors would have to take on trust the inspected state's claims about the whereabouts of this material. They would have no way of knowing that the material had not been diverted to a clandestine stockpile in violation of a disarmament agreement. This would not be a concern for national inspectors conducting an internal audit (such as the UK and US stocktakings described above), but it would concern international inspectors charged with verifying disarmament. Shown in the fourth row of Table 1 are very conservative estimates of the quantities of fissile material produced by the UK and the US that would be unavailable for verification, derived solely from estimates of material used in tests (as such material is impossible to verify).<sup>34</sup> In practice, because of classification rules and the material that is made extremely hard to verify by process losses, use in a reactor, decay, or transportation abroad, these quantities would probably be a great deal larger.

In short, substantial uncertainties in fissile-material inventories are unavoidable. Even with blameless intentions and honest accounting, such uncertainties would be on the order of at least a few per cent of production. Given that it is impossible to account for material to an accuracy anywhere near one nuclear weapon's worth, states would need to take a decision

about how much effort and money they were prepared to expend attempting to verify past production and current holdings.

Although the problems of accounting for past production become most important in the context of abolishing nuclear weapons, they may start to be addressed before this stage is reached if the proposed Fissile Material Control Initiative (a voluntary scheme 'to increase security, transparency, and control over fissile material stocks')<sup>35</sup> is implemented, or if, less probably, the still-to-be-negotiated Fissile Material Cut-Off Treaty (FMCT) requires the declaration and verification of existing stocks. If either of these arrangements can be agreed upon and reasonably successfully implemented, this could build confidence in declarations of fissile-material holdings and help to pave the way towards abolition.

## ii. Challenge inspections

On-site inspections are sometimes suggested as a possible solution to the problem of clandestine warheads and fissile materials. If the international body charged with verifying disarmament—or, depending on the terms of the prohibition agreement, a state party to it—had reason to suspect that a state had retained proscribed items or materials, it could demand a 'nuclear challenge' inspection to investigate further. In an extreme case, a challenge inspection might theoretically involve 'any time, anywhere' access. While challenge inspections would be likely to form an important part of any verification regime, a number of problems would need to be solved if they were to be as useful as they might at first appear.

Intrusive inspections risk compromising secrets that a state has legitimate reason to keep. These could be nuclear-related—for example, there may be commercially sensitive information, such as advanced centrifuge designs, that states and companies will want to keep secret. Classified information about conventional weapons programmes is, however, more likely to cause problems. When, for example, evidence of a possible link between Iran's nuclear programme and its military complex at Parchin, near Tehran, came to light, the IAEA's request for inspection access became highly contentious for this reason.

Curtailing the access rights of inspections can severely limit their utility and credibility, but is necessary in order for them to be acceptable to states. No state has ever voluntarily permitted 'any time, anywhere' access. South Africa came close to doing so, but only after it had dismantled its arsenal, and Iraq was forced to accept such an inspection in 1991. The most intrusive form of challenge inspection yet negotiated was that developed for the 1993 Chemical Weapons Convention (CWC). Under the convention, if

a state obtains evidence that another may be secretly manufacturing chemical weapons, it may request that the Organisation for the Prohibition of Chemical Weapons conduct a challenge inspection at the suspect location. In theory, a challenge inspection could take place anywhere, including at a nuclear-weapons-production facility. However, the host state is still permitted to manage access, for example by removing 'sensitive papers from office spaces' or shrouding 'sensitive displays, stores and equipment'. Furthermore, the host state is only required to give such access as is consistent with any 'constitutional obligations it may have with regard to proprietary rights or searches and seizures' and national-security concerns.<sup>36</sup> Such managed access would probably impair the effectiveness of inspections to detect secret stockpiles of nuclear weapons or material.

An interesting aspect of the access problem relates to the issue of freedom of movement across international borders. The whole purpose of short-notice inspections is defeated if states have advance warning of the inspectors' arrival. However, states that issue single-entry visas for inspectors, or even simply scan passports at the point of entry, receive warning as soon as this information is processed. Iran effectively receives notice of an inspection before inspectors even leave Vienna airport, when the airline sends details of all passengers to Tehran. One—clearly expensive—solution to such problems would be to base inspectors permanently in a state. Another might be to allow inspectors complete freedom of movement across international borders, as they already have within Europe's Schengen zone, but this could be unacceptable to many states.

There are considerable political barriers to challenge inspections taking place at all. There has never been a CWC challenge inspection, despite suspicions that some of the convention's signatories may retain banned capabilities. The failure to instigate a single inspection in the 11 years that the convention has been in force seems to have increased reluctance to use them. In the nuclear context, the IAEA has a similarly powerful right to conduct so-called 'special inspections', but it has only ever requested one, in North Korea in 1993. North Korea refused access, and this failure appears to have deterred the agency's secretariat from calling any more.<sup>37</sup>

Finally, challenge inspections, even if agreed upon and used, would not on their own greatly increase the chances of treaty violations being detected. To be able to detect undeclared warheads or fissile material, inspectors would first need to have some idea of where to look. However, dependable evidence that proscribed items were stored in a particular undeclared location would be exceptionally hard to come by, as warheads

and their components can be moved and hidden very easily. For challenge inspections to be effective, they must be backed by other instruments, such as intelligence, that have some chance of finding initial evidence of a violation.

Notwithstanding these limitations, it is difficult to envisage a disarmament agreement without challenge inspections, since the inspectorate would need some procedure for investigating allegations of the possession of clandestine warheads or fissile material. The utility of challenge inspections might be significantly increased if the body overseeing inspections and enforcement was entitled to presume guilt when a state refused to accept one.

There is much that states can do today to start ascertaining whether the problems outlined above are soluble, such as investigating whether it is possible to devise a protocol for challenge inspections that would enable the protection of legitimate secrets while still giving inspectors the access needed to detect treaty violations. Such explorations would demonstrate states' goodwill in taking seriously the obligation to negotiate towards complete nuclear disarmament.

### iii. What role for intelligence?

The image of a clandestine stockpile consisting of a few warheads gathering dust in a basement is a potentially misleading one. Physicist Richard Garwin has pointed out that, given the importance of keeping nuclear weapons safe and secure, there is likely to be activity associated with any clandestine warhead stockpile:

If a state does intend to divert its warheads ... it would have to both keep records and inform a limited number of individuals about the purpose of its covert store of nuclear weapons. Otherwise, these weapons would be of little use and of considerable hazard to its purpose. The state would also need to provide security, surveillance and, very likely, appropriate maintenance for the covert warheads, as well as the means to bring them out and mate them with delivery vehicles.<sup>38</sup>

Though limited, this activity would present opportunities for detection by national governments using intelligence capabilities (particularly human and signals intelligence) that are not at the disposal of international bodies such as the IAEA. The use of national intelligence by international verification bodies is controversial, not least because it risks compromising

the international organisation's independence. Key questions are, therefore, whether intelligence should be formally integrated into the verification process, and whether states would be willing to share intelligence information.

There are real political advantages in an international verification body being seen as independent, objective and unconnected to national governments. On the other hand, it is hard to imagine how a ban on nuclear weapons would be verifiable without leveraging the world's intelligence capabilities. Article VIII.A of the IAEA's statute permits the agency to receive information from member states, and intelligence has played an important role in some IAEA operations. The US, for instance, provided satellite imagery to the agency when it was attempting to verify North Korea's initial declaration in 1992 and 1993.<sup>39</sup> This evidence helped the IAEA to plan its inspections, and ultimately to prove North Korea's non-compliance with NPT obligations. Nonetheless, intelligence is not generally a key source of information for the IAEA. The extent to which intelligence should be used by the international body charged with verifying disarmament is an issue that states should discuss.

National intelligence agencies are generally reluctant to share information with each other or with the IAEA. The UK and US, for instance, became aware of Libya's clandestine centrifuge programme in 2000 through their intelligence on the A.Q. Khan network,<sup>40</sup> but the IAEA only learnt about it in 2003. Indeed, there was apparently so little communication between the UK, the US and the IAEA over Libya that the IAEA was reportedly informed about Gadhafi's decision to abandon Libya's WMD programme by television news. Irrespective of the rights and wrongs of the decisions not to share intelligence in this case, a lack of willingness to share intelligence in a nuclear-weapons-free world would seem to be a lost opportunity for much-needed verification. The inspectorate would be the obvious coordinator for intelligence information. By comparing states' intelligence reports with each other and with information from its own inspectors, states' declarations and open-source literature, the inspectorate would be able to draw a more complete picture than could any individual state's intelligence service.

Greater willingness on the part of states to share intelligence with international organisations will come about only with increased trust that international civil servants will not disclose such information to their states of origin or other actors. At the same time, the international organisation tasked with verifying disarmament would need to have confidence that

intelligence provided by a state was genuine, and not an attempt to frame an enemy. The required levels of trust cannot be built quickly, but there are numerous opportunities for national governments and international bodies to cooperate more closely and test the extent to which intelligence can be usefully employed in international verification.

In their efforts to detect and prevent terrorism, the US, the European Union and others are developing and deploying monitoring systems and other intelligence-gathering capabilities that could be used to strengthen verification of a nuclear-weapons ban. Though it was not initially conceived for arms-control or non-proliferation purposes, port and border-crossing surveillance, including radiation detection, could turn out to be a useful contribution to verification. Similarly, the Proliferation Security Initiative is not generally considered a disarmament tool, but the international cooperation and occasional interdiction activities associated with it could offer a model for a robust verification system.

### **Transparency as a sign of good faith?**

#### *Lessons from South Africa*

Though each is far from infallible, the verification techniques described above could, if used in combination with each other, certainly help to build confidence that states had not clandestinely retained prohibited items and materials. However, central to the challenge of verification is the problem of ‘proving a negative’, of verifying the absence of something. The IAEA faces this problem when it tries to draw, in safeguards terminology, a ‘broader conclusion’ from its investigations about ‘the absence of undeclared nuclear activities’ in states with an Additional Protocol in force.<sup>41</sup> The issue is whether the absence of evidence really does constitute evidence of absence, and on what grounds it is rational to decide that it does.

One state, South Africa, did manage—in effect—to prove this negative, after it dismantled its nuclear-weapons programme in the early 1990s. It is useful to explore how it did so. Between 1990 and 1993, South Africa unilaterally dismantled the six completed nuclear weapons and an unfinished seventh that it had secretly produced. Verifying South Africa’s declared fissile-material stocks was relatively straightforward; verifying its production history to confirm the absence of undeclared fissile material proved much harder. Though the quantity of HEU produced by South Africa was small (even by comparison with that of a very modest producer of HEU such as the UK), the IAEA could not be certain that all material had been accounted for. Discussing the process in 1992, then-IAEA Director

General Hans Blix remarked that ‘there is inherent difficulty in verifying the completeness of an original inventory in a country in which a substantial nuclear program has been going on for a long time’.<sup>42</sup> After extensive investigations, the IAEA could conclude nothing more definite than that ‘having regard to the uncertainties normally associated with data of this nature, it is reasonable to conclude that the uranium-235 balance ... of the pilot plant is consistent with uranium feed’.<sup>43</sup>

Nonetheless, South Africa did succeed in convincing the IAEA and, more importantly, the world at large that it had completely dismantled its weapons programme and returned all HEU to peaceful use.<sup>44</sup> It did so by being highly transparent and cooperative. It briefed inspectors on the history of its programme and gave them unfettered access to all relevant facilities, records, materials and personnel. Where discrepancies arose, it cooperated fully to resolve them. Ultimately what built trust that South Africa had not secretly retained any HEU was not the results of technical IAEA verification activities, which were not conclusive, so much as South Africa’s open and transparent behaviour.<sup>45</sup>

*Making the transparency model more broadly applicable*

At first sight, it would seem a formidable task for the current nuclear-armed states to build confidence through transparency. All of them have manufactured many more nuclear weapons and produced much more fissile material than South Africa ever did. Greater transparency will not prove the absence of small clandestine stockpiles.

Criticism along these lines, however, misses the point. Transparency measures would not be expected to furnish information that would magically enable declarations to be rigorously verified. They would certainly enable further checking for internal consistency, but that would not be their primary purpose. That purpose would be to demonstrate good faith. Transparency would signal that a state had nothing to hide, and thus might make it possible for the international community to accept an imperfect verification process.

Crucially, in the South African case, the government had little incentive to cheat on its pledge of nuclear disarmament: it had just undergone a widely supported and applauded process of regime change and was keen to repudiate much that was associated with the previous regime, and its security concerns had been attenuated. Furthermore, it posed no threats to its neighbours or to the major powers. It seems likely that, had there been more scepticism about South Africa’s intentions, states might have

been less willing to accept that it had fully disarmed on the basis of inconclusive verification results. In the transition to a world free from nuclear weapons, where doubts about intentions might well persist, it would be a much greater challenge to make confidence-building through transparency sufficient to compensate for technical deficiencies in verification.

The value of transparency as a tool of the disarmament process would grow to the extent that there was a formalised process by which states would be required to provide detailed and comprehensive declarations of past and present activities in the form of 'nuclear histories',<sup>46</sup> permit visits to all relevant facilities and, most importantly, make all relevant personnel available for interviews. This would require a very high degree of openness on the part of states (although more modest measures, too, would still have value). Inspectors would need to be convinced that they were not being taken on a 'guided tour' designed to obscure activities that the state wanted to keep hidden.

Transparency was an important element of the confidence-building measures associated with the CWC, and the experience of implementing the CWC is instructive. States negotiating the CWC decided that the start date for declarations would be 1 January 1946. The start of the Second World War might be a loosely equivalent date in a nuclear context, but there would be difficulties associated with requiring extensive nuclear histories with an early start date. First, would there be any real value in declaring facilities that, by the time nuclear weapons were abolished, would be more than a century old, or long since destroyed? Some CWC inspections have taken place quite literally in the middle of fields because the facilities being inspected had long since been demolished.<sup>47</sup> Would similar visits in a nuclear context be worth the effort? Would transparency really be served by a visit made in 2058 to the recently closed US weapons-pit-production facility at Rocky Flats?

The scope of the declarations required by the CWC is also very broad. Article III.1.c.(i) of the CWC requires a state to declare 'any chemical-weapons production facility under its ownership or possession'. Similar phrasing could pose difficult definitional questions in a nuclear context. For instance, would states be required to declare factories that made ballistic casings for a range of weapons, including nuclear ones? If so, what should be done about factories that made the metal for the ballistic casings, or constructed more specialised components, such as altimeters?

More importantly, some nuclear-weapons states may be simply unable to provide the information required. The first generation of weapons

designers is dead and, as discussed above, many early records from nuclear programmes have been lost or destroyed, if indeed they ever existed. Incomplete histories could actually be counterproductive, by giving the false impression that states had something to hide. These difficulties could be avoided by shortening and narrowing the scope of the histories, but this might then detract from their confidence-building value.

To prevent the problem of incomplete records from worsening, nuclear-armed states should establish national commissions to start compiling these histories now, even if they keep them secret for the time being. The information on fissile-material production and holdings released by the US and UK discussed above is a significant precedent—and it is to those states' credit that this information was made public. States should make concerted efforts to retain key documents and records in a form that permits forensic analysis to confirm that they are genuine (which might mean, for instance, keeping paper records). They should also conduct and record interviews with key scientists. Seminars with several witnesses might be even more useful, as participants could jog one another's memories. The value of all this would be substantially enhanced if states were able to agree among themselves standards for the compilation of nuclear histories and the preservation of data.

Interviews with key personnel would be valuable in clarifying and verifying nuclear histories. States that permitted the inspectorate to interview key figures in each of their nuclear-weapons and fissile-material-production programmes would send a strong message that they had nothing to hide. Such interviews could not be hostile examinations; states would not willingly subject their nuclear scientists and engineers, many of whom would possess extensive knowledge of highly classified programmes, to the sorts of interrogation faced by defeated parties in war. Rather, responsible experts working for an international inspectorate would cull oral histories from knowledgeable figures in each nuclear-weapons programme to check individual accounts against each other and the written record.

The IAEA recognises the great value of interviewing key personnel in nuclear programmes for resolving questions of compliance and verifying disarmament, a value that was demonstrated in Iraq in the 1990s. However, recent experience does not bode well for the practice. In negotiations on the CTBT (which still has not entered into force), the US, Russia, China and others refused to include in the treaty explicit authorisation of the use of interviews in the verification process.<sup>48</sup> Iran has not acceded to all IAEA requests to interview leaders of its nuclear programme, despite

Security Council resolutions ordering its full cooperation and transparency.<sup>49</sup> Such interviews as have been granted have taken place under intimidating conditions controlled by the Iranian state. Most states with nuclear programmes of any kind are wary of having outsiders elicit information from their nuclear scientists and engineers. This culture of secrecy would need to be attenuated for the elimination of nuclear weapons to become possible.

Another issue that would need to be considered in relation to any transparency regime is that of states that had nuclear-weapons programmes at some point, but did not go on to develop nuclear weapons. Would they also be required to submit nuclear histories? Openness about programmes that are widely known about (such as those in Argentina, Australia, Brazil, Romania and Sweden) might build confidence in the intentions of those states and encourage more honest and detailed declarations from the nuclear-armed states. On the other hand, it is not clear what would be the effect of revealing programmes that were less widely known about. Such revelations could be counterproductive, increasing tensions between states and perhaps also creating discord within them (many Canadians, for instance, might be dismayed to learn that their country once had a nuclear-weapons programme).

A fundamental question about confidence-building through transparency remains whether conclusions drawn from this kind of verification would be actionable. Transparency (or the lack of it) is very influential with inspectors visiting sites, negotiating with officials and interviewing scientists. Whether these inspectors can then convince the international community of their conclusions without hard supporting evidence is another matter. For instance, as with South Africa, it would probably be impossible for inspectors to prove that a disarming Israel had declared all its plutonium. Would inspectors be able to convince Arab states, Iran and Pakistan that Israel had no clandestine stockpile on the basis that they 'felt' that Israel was not trying to hide anything? Conversely, let us imagine that inspectors came to believe that the US was trying to hide something, even though measurements of its fissile-material stockpile showed no discrepancies with the record beyond the normal margin of error. Would the international community be willing to risk derailing the entire disarmament process by attempting to force the US to cooperate with further measures, even though the inspectors' view was strictly no more than a strong suspicion? After all, the IAEA board of governors and the UN Security Council were extremely reluctant to take action against

Iran even after the IAEA had provided incontrovertible evidence that Iran had breached its safeguards agreement.

### **Civil-society monitoring**

It is often argued that technical means of verification alone would not provide sufficient assurance to enable the prohibition of nuclear weapons. Accordingly, another possible supplement to technical verification has been suggested, in addition to transparency measures: ‘societal verification’, or civil-society monitoring.<sup>50</sup> The idea behind civil-society monitoring is that the responsibility for detecting a treaty violation should rest not just with designated inspectors but with society at large. The case for making use of such monitoring would probably grow if a renaissance of the nuclear industry increased the overall amounts of verification required by bringing capabilities and expertise to new states.

Typical proposals suggest that a nuclear-disarmament treaty should require states to enact national laws making it the right—and indeed the duty—of every citizen to report any evidence of a treaty violation to an international body. Governments would be required to educate their populations about this duty. Under a global prohibition, directors and chief executive officers in nuclear-related industries could be required annually to sign legal documents certifying that no production of illicit nuclear equipment or material had occurred in their enterprise.<sup>51</sup> Employees could be required to sign annual agreements to reveal any illicit nuclear activity of which they became aware or face prosecution, on the basis that this obligation would override normal corporate secrecy commitments. Parallel laws forbidding enterprises or the state from penalising or obstructing whistle-blowers or from taking retaliatory action against their families would testify to a state’s commitment to adhering to a nuclear-weapons ban, as would laws granting asylum to whistle-blowers and their families from other states if needed. A further, more controversial, suggestion is that substantial monetary rewards, funded internationally, should be made available in return for information leading to the detection of violations of a nuclear-weapons ban.

Few issues prompted so diverse or vigorous a range of responses from those who reviewed drafts of this paper as did civil-society monitoring. Debate centred on two key questions. Could it work? And would it be acceptable?

For civil-society monitoring to be feasible, there would need to be potential whistle-blowers and a realistic way for them to inform. Sceptics

argue that in an autocratic state which demanded a high degree of loyalty from its citizens, none of the few who knew about a clandestine nuclear-weapons programme would be willing to come forward, and that the government would go to great lengths to silence any who did. The Soviet Union's success in hiding for a long time a huge biological-weapons programme that it continued in contravention of the 1972 Biological and Toxin Weapons Convention has been cited as an example of the failure of whistle-blowing. The sceptical view is that civil-society monitoring requires a free press to provide a platform for whistle-blowers and, even more importantly, to highlight state attempts to silence them, and therefore would only really be viable in a democracy.

Advocates of civil-society monitoring argue that it is feasible in non-democratic societies because only one informer is needed. No state can command the absolute loyalty of every one of its citizens, especially in the face of the strong global norm that would come about as a result of the abolition of nuclear weapons. Moreover, with modern technology such as encrypted websites that could keep a whistle-blower's message and location secret,<sup>52</sup> whistle-blowing could be feasible in any country with internet access. Proponents point out that leaks from authoritarian societies are hardly unknown, especially if one includes individuals who have approached foreign intelligence services. The defection of Saddam Hussein's son-in-law Hussein Kamal from Iraq in 1995, which marked the turning-point for UN Special Commission and IAEA verification efforts, is a high-profile example. It can also be argued that the post-1972 Soviet biological-weapons programme in fact demonstrated the success of civil-society monitoring because it was eventually disclosed by an inside informant.

The question of the acceptability of societal monitoring is even more controversial than that of its efficacy. Making use of civil-society monitoring would require states to enact laws expressly intended to rank above normal national loyalty. Clearly, the issue would pose hard questions to all states, not only nuclear-armed ones, about how far they were willing to go to enable complete disarmament.

### **Costs: how much and who should pay?**

As with almost all arms-control agreements, expense would be a major issue in negotiations about nuclear disarmament, with states trying to keep costs as low as possible. Discussions of cost centre on two important questions: 'how much?' and 'who will pay?'

A detailed cost estimate for nuclear disarmament is beyond the scope of this paper. It is, however, an important issue, and governments and non-governmental analysts should attempt to develop estimates to help inform the debate. Various general observations can nevertheless be made. First, costs fall into two categories: the cost of verifying the transition to zero, and the ongoing cost of preventing rearmament (the safeguards needed to prevent rearmament are discussed in Chapter 3).

The cost of verifying the transition to zero, though non-recurring, would probably be substantial: verification technology would need to be developed, inspectors trained and employed, existing assembly/disassembly facilities converted to permit verification (or new ones built), perimeter monitoring installed, oral histories conducted and analysed—the list goes on. Unfortunately, the cost of verification also usually proves to be much greater than initially forecast. For instance, an early unreleased UK study suggested that the installation of the verification system for the CTBT would cost around \$80 million.<sup>53</sup> The bill for the International Monitoring System for the CTBT (not yet complete) now appears likely to be on the order of \$1 billion.<sup>54</sup>

The projected expense of verifying an FMCT could give some idea of the cost of the safeguards needed to prevent rearmament. The IAEA has estimated the annual verification costs of an FMCT at between 50 and 150 million euros.<sup>55</sup> These should, however, be regarded as lower limits, since verification in a nuclear-weapons-free world would probably need to be much more rigorous than it would for an FMCT.

But expense could also prove to be a driver of disarmament, as it was during the Cold War. A proper analysis of the cost of abolition must take into account the savings made by reducing and ultimately scrapping nuclear arsenals and their associated infrastructure. (The analysis would also need to determine whether these savings would be immediate, or realised only after the initial outlay on verification and the destruction of weapons and related facilities). All nuclear-armed states, but the US and Russia especially, spend considerable sums on their nuclear arsenals; the US spent more than \$50bn on nuclear-weapons-related activities in 2006.<sup>56</sup> Such figures help to put the cost of verification into perspective. On this scale, the cost of verifying a nuclear-abolition agreement is likely to be modest. That is certainly the lesson from the CTBT. As a result of its unilateral decision to suspend nuclear testing in 1992, the US launched a programme of 'stockpile stewardship' to ensure the safety and reliability of its nuclear arsenal without the use of testing. Even when the costs for new facilities related to

stewardship are excluded, the US spent \$3.5bn on this programme in 2006.<sup>57</sup> Compared to this, the estimated cost of verifying the CTBT (which helps ensure that no other state gains an advantage over the US through testing), though much higher than originally expected, is very modest.

On the question of who pays for verification, the CTBT and the CWC both offer potentially influential precedents. In negotiations on the CTBT, it was suggested that the five permanent members of the Security Council (P5) should cover the cost of verification. The P5 opposed this, arguing that, since the absence of nuclear explosions was an international public good, all states should cover the cost of the treaty. Ultimately, this argument prevailed; all CTBT verification costs are allocated on the scale used by the UN to appropriate funds, adjusted for differences in participation. This is undoubtedly the funding formula that nuclear-armed states would prefer for verifying full nuclear disarmament. But the CWC offers a contrasting, and arguably more appropriate, precedent. Under the CWC, states are required to cover the costs of destroying their own chemical munitions (though Russia has been given substantial financial aid to help it to do this). Other costs, in particular those of ongoing verification, are met by all participating states, similarly on the basis of a variant on the UN formula. This system could be applied to nuclear disarmament as a compromise arrangement.

## Notes

- <sup>1</sup> The need for perfect verification has been expressed to us on a number of occasions; interestingly, however, we have yet to come across it in print. The closest approximation we have found is Henry Sokolski and Gary Schmitt, 'Advice for Nuclear Abolitionists', *The Weekly Standard*, vol. 13, no. 33, 12 May 2008. That we have heard much talk about the need for perfect verification but have not seen it argued in print seems to us to be a symptom of the tendency of the 'dismissive realists' (to use defence expert Michael Quinlan's term) to reject disarmament out of hand rather than debate it in a serious way.
- <sup>2</sup> Office of Technology Assessment, US Congress, *Verification Technologies: Cooperative Aerial Surveillance in International Agreements* (Washington DC: US Government Printing Office, July 1991), p. 104, Box C-1, footnote 1, <http://www.princeton.edu/~ota/disk1/1991/9114/9114.PDF>.
- <sup>3</sup> Allan S. Krass, *Verification: How Much is Enough?* (London: Taylor and Francis for SIPRI, 1985), pp. 167–71.
- <sup>4</sup> For the argument that small caches would not pose an unacceptable threat, see, for instance, James Leonard, Martin Kaplan and Benjamin Sanders, 'Verification and Enforcement in a NWFV', in Jack Steinberger, Bhalchandra Udgaonkar and Joseph Rotblat (eds), *A Nuclear-Weapon-Free World: Desirable? Feasible?* (Boulder, CO: Westview Press, 1993); for the opposite view, see Charles L. Glaser, 'The Flawed Case for Nuclear Disarmament', *Survival*, vol. 40, no. 1, Spring 1998, pp. 114–16.
- <sup>5</sup> Krass, *Verification: How Much is Enough?*, p. 169.
- <sup>6</sup> Conversation with authors, London, November 2007.
- <sup>7</sup> For an exploration of trust and disarmament, see Ken Booth and Nicholas J. Wheeler, 'Beyond Nuclearism', in Regina Cowan Karp (ed.), *Security Without Nuclear Weapons? Different Perspectives on Non-Nuclear Security* (Oxford: Oxford University Press for SIPRI, 1992).
- <sup>8</sup> Browne, 'Laying the Foundations for Multilateral Disarmament'.
- <sup>9</sup> Broadly, this is the position taken in the Model Nuclear Weapons Convention, a draft convention to ban nuclear weapons put together by an international association of nuclear-disarmament advocates. It is the most comprehensive attempt to date to draft such a treaty. See *Securing Our Survival: The Case for a Nuclear Weapons Convention* (Cambridge, MA: International Physicians for the Prevention of Nuclear War, International Association of Lawyers Against Nuclear Arms, International Network of Engineers and Scientists Against Proliferation, 2007), <http://www.icanw.org/securing-our-survival>.
- <sup>10</sup> Some plants manufacture a combination of civilian-use and nuclear-weapons-related technologies. For example, the All Russian Research Institute of Automatics manufactures both initiators for nuclear weapons and portable neutron generators for peaceful purposes such as well-logging (recording the geologic formations around gas and oil wells). See <http://www.vniia.ru/eng/ng/index.html>.
- <sup>11</sup> Arms Control Association, 'Worldwide Ballistic Missile Inventories', fact sheet, September 2007, <http://www.armscontrol.org/factsheets/missiles.asp>.
- <sup>12</sup> The scheme laid out here is essentially an amalgamation of the proposals put forward in the following works: Committee on International Security and Arms Control, National Academy of Sciences, *Monitoring Nuclear Weapons and Nuclear Explosive Materials: An Assessment of Methods and Capabilities* (Washington DC: National Academies Press, 2005), [http://www.nap.edu/catalog.php?record\\_id=11265](http://www.nap.edu/catalog.php?record_id=11265); 'Verifying Deep Reductions in Nuclear Forces', in Harold A. Feiveson (ed.), *The Nuclear Turning Point: A Blueprint for Deep Cuts and De-Alerting of Nuclear Weapons* (Washington DC: Brookings Institution Press, 1999); Fetter, 'Verifying Nuclear Disarmament', Henry L. Stimson Center, Occasional Paper no. 29, October 1996, <http://www.stimson.org/wmd/pdf/fetter.pdf>; Edward Ifft, 'Monitoring Nuclear Warheads', paper presented to the conference 'Reykjavik Revisited: Steps Toward a World Free of Nuclear Weapons',

- Hoover Institution, Stanford University, CA, 24–25 October 2007; Raymond Juzaitis and John McLaughlin, 'Challenges of Verification and Compliance within a State of Universal Latency', paper presented to the conference 'Reykjavik Revisited: Steps Toward a World Free of Nuclear Weapons'; Patricia M. Lewis, 'Verification of Nuclear Weapon Elimination', in Karp (ed.), *Security Without Nuclear Weapons? Different Perspectives on Non-Nuclear Security*; Tom Milne and Henrietta Wilson, 'Verifying the Transition from Low Levels of Nuclear Weapons to a Nuclear Weapon-Free World', VERTIC Research Report no. 2, June 1999; Theodore Taylor, 'Technological Problems of Verification', in Steinberger, Udgaonkar and Rotblat (eds), *A Nuclear-Weapon-Free World: Desirable? Feasible?*; Taylor, 'Verified Elimination of Nuclear Warheads', *Science and Global Security*, vol. 1, nos. 1–2, 1989, pp. 1–26, [http://www.princeton.edu/~globsec/publications/pdf/1\\_1-2Taylor.pdf](http://www.princeton.edu/~globsec/publications/pdf/1_1-2Taylor.pdf); and Zarimpas (ed.), *Transparency in Nuclear Warheads and Materials*, Part II.
- <sup>13</sup> Fetter, 'Stockpile Declarations', in Zarimpas (ed.), *Transparency in Nuclear Warheads and Materials*.
- <sup>14</sup> Eric R. Gerdes, Roger G. Johnston and James E. Doyle, 'A Proposed Approach for Monitoring Nuclear Warhead Dismantlement', *Science and Global Security*, vol. 9, no. 2, 2001, pp. 113–41, [http://www.princeton.edu/~globsec/publications/pdf/9\\_2gerdes.pdf](http://www.princeton.edu/~globsec/publications/pdf/9_2gerdes.pdf).
- <sup>15</sup> John R. Walker, 'Chemical Weapons Verification: The UK's Practice Challenge Inspection Programme at Government Facilities', in J.B. Poole (ed.), *Verification Report 1991: Yearbook on Arms Control and Environmental Agreements* (Tallahassee, FL: Apex Press for VERTIC, 1991).
- <sup>16</sup> Oleg Bukharin, 'The Changing Russian and US Nuclear Weapon Complexes: Challenges for Transparency', in Zarimpas (ed.), *Transparency in Nuclear Warheads and Materials*, pp. 189–96.
- <sup>17</sup> Juzaitis and McLaughlin, 'Challenges of Verification and Compliance within a State of Universal Latency'.
- <sup>18</sup> Johnston, 'Tamper-Indicating Seals for Nuclear Disarmament and Hazardous Waste Management', *Science and Global Security*, vol. 9, no. 2, 2001, pp. 93–112, [http://www.princeton.edu/~globsec/publications/pdf/9\\_2johnston.pdf](http://www.princeton.edu/~globsec/publications/pdf/9_2johnston.pdf). It is also worth noting that physical containment does not allow a state to *prove* that it has not diverted nuclear material in the same way that material accountancy can. But in large facilities, such as Japan's Rokkasho reprocessing plant, which handles so much plutonium that, given the measurement errors that exist, material accountancy is unable to effectively keep track of it all, the primary safeguard is containment, a much-criticised arrangement.
- <sup>19</sup> Office of Nonproliferation Research and Engineering, 'Technology R&D for Arms Control', *Arms Control and Nonproliferation Technologies*, Spring 2001, pp. 4–17, <http://www.fas.org/sgp/othergov/doe/acnt/2001.pdf>; Committee on International Security and Arms Control, *Monitoring Nuclear Weapons and Nuclear Explosive Materials: An Assessment of Methods and Capabilities*, pp. 97–108.
- <sup>20</sup> The Nuclear Material Identification System developed at the US Oak Ridge National Laboratory is capable of measuring masses and so could, in theory, be used by international inspectors if nuclear-armed states declassified the quantity of fissile material in their warheads. However, the ability to measure masses comes at the expense of a considerable increase in complexity. Such an increase is undesirable in an international verification context, as it makes it much more difficult for inspectors to ensure that the verification system is operating as designed and has not been rigged as part of an effort to violate an agreement. See Office of Nonproliferation Research and Engineering, 'Technology R&D for Arms Control', p. 7. Robust containment measures certainly reduce fears that a state could remove fissile material from a warhead after it has entered the verification system. A state could, however, always divert fissile material before such containment measures had been put in place.
- <sup>21</sup> For a good discussion of the attribute v. template debate, see Bukharin, 'Russian

- and US Technology Development in Support of Nuclear Warhead and Material Transparency Initiatives', in Zarimpas (ed.), *Transparency in Nuclear Warheads and Materials*, pp. 166–73.
- <sup>22</sup> In July 1989, the Soviet Union found it in its interests to permit measurement of a nuclear warhead without information barriers. See Steve Fetter, Thomas B. Cochran, Lee Grodzins, Harvey L. Lynch and Martin S. Zucker, 'Gamma-Ray Measurements of a Soviet Cruise-Missile Warhead', *Science*, vol. 248, no. 4,957, 18 May 1990, pp. 828–34.
- <sup>23</sup> 'Verification of Nuclear Disarmament: Final Report on Studies into the Verification of Nuclear Warheads and their Components', working paper submitted by the UK to the 2005 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, NPT/CONF.2005/WP.1, 18 April 2005, [http://www.reachingcriticalwill.org/legal/npt/RevCon05/wp/verification\\_UK.pdf](http://www.reachingcriticalwill.org/legal/npt/RevCon05/wp/verification_UK.pdf); Bukharin and Doyle, 'Verification of the Shutdown or Converted Status of Excess Warhead Production Capacity: Technology Options and Policy Issues', *Science and Global Security*, vol. 10, no. 2, 2002, pp. 103–24, [http://www.princeton.edu/~globsec/publications/pdf/10\\_2%20103%20124%20bUKHARIN.pdf](http://www.princeton.edu/~globsec/publications/pdf/10_2%20103%20124%20bUKHARIN.pdf).
- <sup>24</sup> Under the INF treaty, for instance, US and Russian inspectors verified the destruction of delivery systems, ensured that missile-production facilities were not being used to produce prohibited delivery vehicles and inspected military bases for nuclear materials.
- <sup>25</sup> Bukharin and Doyle, 'Transparency and Predictability Measures for US and Russian Strategic Arms Reductions', *The Nonproliferation Review*, vol. 9, no. 2, Summer 2002, pp. 82–100, <http://cns.miis.edu/pubs/npr/volog/92/92bukh.pdf>.
- <sup>26</sup> The possibility of declared facilities being used for proscribed purposes was recognised at least as early as 1959, during early UK discussions of the feasibility of disarmament. Private communication, UK government official, April 2008.
- <sup>27</sup> Thomas W. Wood, Bruce D. Reid, John L. Smoot and James L. Fuller, 'Establishing Confident Accounting for Russian Weapons Plutonium', *The Nonproliferation Review*, vol. 9, no. 2, Summer 2002, p. 134, <http://cns.miis.edu/pubs/npr/volog/92/92wood.pdf>.
- <sup>28</sup> *Ibid.*, pp. 128–33; Fetter, 'Nuclear Archaeology: Verifying Declarations of Fissile-Material Production', *Science and Global Security*, vol. 3, nos. 3–4, 1993, pp. 240–4, [http://www.princeton.edu/~globsec/publications/pdf/3\\_3-4Fetter.pdf](http://www.princeton.edu/~globsec/publications/pdf/3_3-4Fetter.pdf).
- <sup>29</sup> For an example of how this issue is presented to media, see the attempts by British Nuclear Fuels to explain why material had 'gone missing' from the Sellafield nuclear site in Cumbria. British Nuclear Fuels PLC, 'Media Response: Publication of Materials Unaccounted For', 13 August 2005, <http://www.bnfl.com/content.php?pageID=49&newsID=70>.
- <sup>30</sup> The US gives figures for the mass of the isotope U-235. The UK figures relate to the total quantity of HEU.
- <sup>31</sup> US Department of Energy, 'Plutonium: The First 50 Years: United States Plutonium Production, Acquisition, and Utilization from 1944 through 1994', DOE/DP-0137, February 1996, [http://www.fissilematerials.org/ipfm/site\\_down/doe96.pdf](http://www.fissilematerials.org/ipfm/site_down/doe96.pdf); US Department of Energy, 'Highly Enriched Uranium: Striking a Balance: A Historical Report on the United States Highly Enriched Uranium Production, Acquisition, and Utilization Activities from 1945 through September 30, 1996', draft, revision 1, January 2001, [http://www.fissilematerials.org/ipfm/site\\_down/doe01.pdf](http://www.fissilematerials.org/ipfm/site_down/doe01.pdf); UK Ministry of Defence, 'Historical Accounting for UK Defence Highly Enriched Uranium', March 2006, [http://www.fissilematerials.org/ipfm/site\\_down/mod06.pdf](http://www.fissilematerials.org/ipfm/site_down/mod06.pdf); UK Ministry of Defence, 'Plutonium and Aldermaston: An Historical Account', 2000, <http://www.fas.org/news/uk/000414-uk2.htm>.
- <sup>32</sup> Experience from Project Sapphire (a US programme to recover HEU from Kazakhstan) suggests that uncertainties in the Russian fissile-material stock

- might be around 4% – enough for around 4,000 warheads. See Michael Brown, ‘Phased Nuclear Disarmament and US Defense Policy’, Henry L. Stimson Center, Occasional Paper no. 30, October 1996, p. 17, <http://www.stimson.org/wmd/pdf/brown.pdf>.
- <sup>33</sup> Private communication, 16 April 2008.
- <sup>34</sup> The declarations do not give the quantity of HEU used in detonations, so the figures for HEU are based on the assumption that three times more HEU than plutonium was consumed.
- <sup>35</sup> Robert J. Einhorn, ‘Controlling Fissile Materials and Ending Nuclear Testing’, paper presented to the conference, ‘Achieving the Vision of a World Free of Nuclear Weapons: International Conference on Nuclear Disarmament’, Oslo, 26–27 March 2008, [http://disarmament.nrp.no/wp-content/uploads/2008/02/Paper\\_Einhorn.pdf](http://disarmament.nrp.no/wp-content/uploads/2008/02/Paper_Einhorn.pdf).
- <sup>36</sup> CWC, Verification Annex, Part X, para. 41.
- <sup>37</sup> John Carlson and Russell Leslie, ‘Special Inspections Revisited’, paper presented to the Institute of Nuclear Materials Management 2005 symposium, Phoenix, AZ, July 2005, [http://www.asno.dfat.gov.au/publications/inmm2005\\_special\\_inspections.pdf](http://www.asno.dfat.gov.au/publications/inmm2005_special_inspections.pdf). Partly in recognition of these problems associated with special inspections, ‘complementary access’, a provision of the Additional Protocol (see note 41 below), was, to some extent, designed as an alternative. However, there are important limitations to the verification techniques that inspectors can employ during a complementary-access visit and, significantly, states are allowed to refuse access and satisfy inspectors instead ‘through alternative means’ – whether appropriate such means will always exist is very doubtful. See IAEA, ‘Model Protocol Additional to the Agreement(s) between States and the International Atomic Energy Agency for the Application of Safeguards’, INFCIRC/540 (Corrected), September 1997, Article 5(c), <http://www.iaea.org/Publications/Documents/Infircs/1997/infirc540c.pdf>.
- <sup>38</sup> Richard L. Garwin, ‘Technologies and Procedures for Verifying Warhead Status and Dismantlement’, in Zarimpas (ed.), *Transparency in Nuclear Warheads and Materials*, p. 152.
- <sup>39</sup> Jeffrey T. Richelson, *Spying on the Bomb* (New York: W. W. Norton & Company, 2007), pp. 521–4.
- <sup>40</sup> Wyn Q. Bowen, *Libya and Nuclear Proliferation: Stepping back from the brink*, Adelphi Paper 380 (Abingdon: Routledge for the IISS, 2006), pp. 65–6.
- <sup>41</sup> The Additional Protocol is a further (currently optional) agreement for NPT signatories, designed to give the IAEA the tools it needs to be able to draw credible conclusions about whether a state is conducting clandestine nuclear activities. As of 30 May 2008, 88 states had an Additional Protocol in force.
- <sup>42</sup> Quoted in Darryl Howlett and John Simpson, ‘Nuclearisation and Denuclearisation in South Africa’, *Survival*, vol. 35, no. 3, Autumn 1993, p. 167.
- <sup>43</sup> IAEA, ‘The Agency’s Verification Activities in South Africa’, GOV/2684, 8 September 1993, para. 29.
- <sup>44</sup> Adolf von Baeckmann, Gary Dillon and Demetrius Perricos, ‘Nuclear Verification in South Africa’, *IAEA Bulletin*, vol. 37, no. 1, 1995, <http://www.iaea.org/Publications/Magazines/Bulletin/Bull371/37105394248.pdf>; Howlett and Simpson, ‘Nuclearisation and Denuclearisation in South Africa’.
- <sup>45</sup> Private communications with current and former UK and US officials, London, November 2007.
- <sup>46</sup> These would be broader than the fissile-material and warhead declarations discussed above in that they would be expected to tell the story of the entire programme in all its aspects, not just declare current stocks and past fissile-material production and use.
- <sup>47</sup> Private communication with a UK official, London, November 2007.
- <sup>48</sup> Though states are as a result under no explicit obligation to make nuclear personnel available for interview under the CTBT, a state could do so as a way of demonstrating its willingness to meet its Article IV.57 obligation ‘to make every reasonable effort to demonstrate its compliance with [the] Treaty’.

- <sup>49</sup> In particular, Iran refused to grant an interview with one of the former heads of its Physics Research Centre.
- <sup>50</sup> See for example Rotblat, 'Societal Verification', in Steinberger, Udgaonkar and Rotblat (eds), *A Nuclear-Weapon-Free World: Desirable? Feasible?*.
- <sup>51</sup> Private communication with Doyle, London, November 2007.
- <sup>52</sup> Private communication with Fetter, London, November 2007.
- <sup>53</sup> Private communication with UK official, London, November 2007.
- <sup>54</sup> It is difficult to find a more exact estimate, but \$1 billion appears to be the right order of magnitude, given that the verification system has been under construction since 1996, the bulk of it is now complete, and the annual budget for the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization is currently around \$100 million (the majority of which is spent on developing the verification system).
- <sup>55</sup> Tariq Rauf, 'A Cut-Off of Production of Weapons-Usable Fissionable Material: Considerations, Requirements and IAEA Capabilities', statement to the Conference on Disarmament, Geneva, 24 August 2006, p. 26, <http://www.reachingcriticalwill.org/political/cd/speeches06/24AugustIAEA.pdf>.
- <sup>56</sup> Steven M. Kosiak, *Spending on US Strategic Nuclear Forces: Plans & Options for the 21st Century* (Washington DC: Center for Strategic and Budgetary Assessments, 2006), p. i, [http://www.csbaonline.org/4Publications/PubLibrary/R.20060901.Spending\\_on\\_US\\_Str/R.20060901.Spending\\_on\\_US\\_Str.pdf](http://www.csbaonline.org/4Publications/PubLibrary/R.20060901.Spending_on_US_Str/R.20060901.Spending_on_US_Str.pdf).
- <sup>57</sup> The \$3.5bn figure only includes the cost of 'directed stockpile work' and six supporting 'campaigns' (which encompass various weapons-related activities) and excludes the cost of support facilities such as the Dual-Axis Radiographic Hydrodynamic Test Facility. US Department of Energy/National Nuclear Security Administration, 'FY 2008 Congressional Budget Request', Volume 1, DOE-CF014, February 2007, p. 59, [http://www.cfo.doe.gov/budget/08budget/Content/Volumes/Vol\\_1\\_NNSA.pdf](http://www.cfo.doe.gov/budget/08budget/Content/Volumes/Vol_1_NNSA.pdf).

## CHAPTER THREE

# Managing the Nuclear Industry in a World without Nuclear Weapons

### **Keeping the world safe in the nuclear-energy renaissance**

Calls for nuclear disarmament are intensifying just as nuclear energy is expected to expand greatly worldwide. Much more tension exists between the two objectives of nuclear disarmament and the expansion of nuclear energy than has been publicly discussed.

Shortly after the Second World War, the US, as the sole possessor of nuclear weapons, sought international agreement on a plan to control nuclear energy. The Baruch Plan and its more enlightened predecessor, the Acheson–Lilienthal Plan, were attempts to head off a nuclear-arms race by designing a framework for the international control of all nuclear activities that would prevent the production of nuclear weapons and would thereby enable the US securely to eliminate its fledgling arsenal. Since the failure of the Baruch Plan, however, the challenges of nuclear disarmament have not been addressed alongside those of managing an expansion in nuclear energy. The total elimination of nuclear arsenals almost disappeared from the international agenda until after the Cold War.<sup>1</sup> It briefly resurfaced with Mikhail Gorbachev's 1986 call for nuclear abolition, the Reykjavik summit in October that year and Rajiv Gandhi's 1988 speech to the UN on nuclear disarmament. But the accident at Chernobyl in April 1986 had put an end to any hopes of a significant expansion in a nuclear industry that had been in grave difficulty for some years. The NPT Extension Conference of 1995 and the Review Conference of 2000 put disarmament back on the agenda, albeit tentatively, but at that time the nuclear industry was still in the doldrums.

The potential global expansion of nuclear energy over the next decades carries proliferation risks if there are not new and reliably enforced rules for managing it and keeping it secure. But key non-nuclear-weapons states are already expressing deep reluctance to consider any new rules if the nuclear-weapons states do not undertake a yet-to-be-defined plan for nuclear disarmament.<sup>2</sup> At the same time, the nuclear-armed states will not agree to eliminate their nuclear arsenals if they are not confident that proliferation will be prevented through the enforcement of stronger non-proliferation rules.

This circular problem between the nuclear haves and have-nots is exacerbated by a further inequality—between those states that possess enrichment or reprocessing capabilities and those that do not. If there is to be a significant expansion of nuclear energy, global capacity to manufacture nuclear fuel will need to be increased. With demand for nuclear fuel projected to rise dramatically, several states, including Argentina, Brazil, Canada, Iran and South Africa, have either expressed an interest in developing enrichment programmes or have already begun such programmes. Many international leaders recognise that the spread of fuel-cycle facilities to non-nuclear-weapons states poses a proliferation risk.<sup>3</sup> States that possess such facilities for civilian purposes could use them, or associated know-how, to produce fuel for weapons. Yet the states that are either hoping to develop or are developing enrichment programmes oppose (more or less strenuously) rules to prevent the spread of dual-use fuel-cycle capabilities, partly because this would further entrench the existing inequality between fuel-cycle suppliers and recipients. If more non-nuclear-weapons states, such as those mentioned above, develop enrichment capabilities before any new rules are enacted, resistance to such rules will only intensify, especially in the Middle East and elsewhere in Asia.

Proposals to resolve this central dilemma are currently being developed. The World Nuclear Association, the IAEA and the Nuclear Threat Initiative,<sup>4</sup> along with a number of states, have proposed various mechanisms for assuring fuel supply in the hope that states will choose to eschew new national facilities for enriching uranium and separating plutonium.<sup>5</sup> In some of the proposals, fuel would only be supplied on condition that the state forgoes national fuel-cycle capabilities. A number of states would like to see an outright global ban on the spread of fuel-cycle facilities to states that do not already possess them, even if many would not say so publicly. However, because a number of key non-nuclear-weapons states, including Brazil, Egypt, Iran and South Africa, firmly reject the idea of

binding rules, voluntary restraint appears to be the most that is politically feasible in the near term. But voluntary agreements whereby states agree on an ad hoc basis to forgo fuel production in return for international nuclear cooperation do not offer robust confidence that proliferation will be avoided in the long run. If states that aspire to developing major new civilian nuclear programmes will not accept binding rules to forgo enrichment and reprocessing, are there other measures that they would endorse to improve confidence that nuclear proliferation will not occur, given that current safeguards may be inadequate in a nuclear-disarming world?

In a sense, current nuclear suppliers—many of whom live under nuclear-deterrent umbrellas—and aspiring buyers and sellers are talking past each other. The former are looking for strong bulwarks against future proliferation, while the latter want to keep their options open—most wish to defend their ‘nuclear rights’, and perhaps to hedge against future insecurity. What has been absent is direct bargaining in which suppliers and buyers clearly articulate their interests and the trade-offs they are prepared to negotiate. Developing-country non-nuclear-weapons states have tended not to engage in creative give-and-take in addressing the global fuel-cycle challenge. This may reflect the natural tendency of the weaker party to a negotiation to wait to hear what the stronger has to offer, or it may be a consequence of a comparative lack of nuclear expertise. Whatever the cause, the reticence of future nuclear buyers leaves many questions unanswered about the future of global nuclear energy and the evolution of the non-proliferation regime. If the web of issues around nuclear energy and non-proliferation is not disentangled, it is likely that it will not be possible to reach the latter stages of nuclear disarmament, though this need not preclude many earlier steps in this direction.

Another major potential tension between the growth of nuclear energy and the elimination of nuclear arsenals centres on global shortages in capacity to produce nuclear-reactor components. For the next decade, the world’s nuclear industry can probably build no more than ten reactors per year.<sup>6</sup> Though few—if any—of the countries that do not currently have power reactors and have expressed an interest in acquiring them are likely to have the required physical and regulatory infrastructure for handling safety, security and liability issues for the next ten to 15 years, the long lead times needed for nuclear-plant projects mean that contracts have to be drawn up many years in advance of construction, and current suppliers will enjoy a seller’s market for the foreseeable future. They will prioritise buyers that already have superior nuclear expertise and related physical and social infrastructure, and which present the least risk of disruption

from political turmoil or disputes about liability or payment. These buyers will tend to be in China, the US, South Korea, Europe and possibly India. For both commercial and technical reasons, established vendors will be less interested in non-nuclear-weapons states in the developing world, especially the less politically stable ones. If developing countries seeking nuclear cooperation are thereby rebuffed, and feel that their right under Article IV of the NPT to assistance in developing nuclear technology for peaceful purposes is being disregarded, they could become still further alienated from the non-proliferation regime. Key non-nuclear-weapons states might then become even less supportive than they are today of rules for managing nuclear industry, including the fuel cycle. This could, in turn, make nuclear-armed states less willing to disarm.

While it is too early to know whether supply constraints will prompt a backlash against efforts to strengthen the non-proliferation regime, representatives of states that are able to supply nuclear technology and expertise and those of states newly aspiring to develop nuclear industries should address these issues candidly. The IAEA is now constructively engaging relevant parties on these matters. These discussions could be broadened to include civil society in developing countries and leading commercial vendors.

Along with the shortfall in the global capacity to manufacture reactors, there is also a skills shortage. Even without a nuclear renaissance, finding enough inspectors to implement all the verification measures necessary to facilitate disarmament (including those discussed in the previous chapter) would be a stiff challenge. If the inspectorate has to compete with an expanding nuclear industry for personnel, the problem will be exacerbated. Clearly, if a nuclear-weapons-free-world is to be achieved alongside a global expansion of nuclear energy, considerable investment in training will be required.

Today, nuclear-weapons states and their allies are willing to tolerate weaknesses in safeguards partly because of their possession of nuclear weapons, which, they feel, protects them from some of the potential consequences of proliferation. Whether or not a rational cost-benefit analysis would show that safeguards should be strengthened in today's world, they would almost certainly need to be improved significantly if complete nuclear disarmament were to be taken seriously. This is true regardless of whether attempts to prevent the spread of fuel-cycle technology are successful.

The challenge may be complicated in the future by technological developments that could make it harder to safeguard civilian nuclear activities.

Experience in Libya and Iran (which is only now coming close to mastering centrifuge technology, over 20 years after the initiation of its enrichment programme) seems to show that the difficulty of getting centrifuge technology to work has been an important barrier against unsafeguarded fissile-material production.<sup>7</sup> Iraq suffered similar, if less acute, difficulties.<sup>8</sup> This barrier may be gradually eroded as more states acquire advanced industrial bases. It is also possible that other enrichment technologies that can be concealed more easily than the gas centrifuge will come into play over the long term. Laser enrichment, if it could be made to work on a commercial scale, would be of particular concern.<sup>9</sup>

There needs to be more research and debate on how the expansion of nuclear energy can be made compatible with progress toward eliminating all nuclear arsenals. It needs to involve experts beyond the nuclear industry and nuclear-weapons establishments. Non-nuclear-weapons states must be brought more fully into the process, with an understanding that emphasis should be on the practical issues at hand, rather than the issue of broader global inequities, which is better addressed in other forums. If governments lag in sponsoring such interactions, non-governmental actors should fill the gap. As a contribution to this debate, we now summarise options for strengthening control of the nuclear industry. These range from incremental improvements to existing safeguards to the radical option of eliminating the most proliferation-sensitive activities.

### **The evolutionary approach: improving IAEA safeguards**

Against the background of the anticipated nuclear-energy renaissance, there has been much discussion of the limitations of IAEA safeguards.<sup>10</sup> Although it is the IAEA's ability to detect the diversion of nuclear material from declared civilian facilities that has been most questioned in the context of non-nuclear-weapons states with nuclear-power programmes, the harder task is in fact detecting undeclared nuclear facilities, especially small gas-centrifuge enrichment plants.

Many incremental improvements could be made to IAEA safeguards. One relatively inexpensive option would be to move the starting point of material accountancy further up the production chain to place all yellow-cake (refined uranium ore) under safeguards.<sup>11</sup> Another improvement, which would be particularly important in the context of disarmament, would be the extension of safeguards to cover other fissile materials, apart from uranium and plutonium, from which nuclear weapons could be manufactured, in particular the neptunium-237 isotope. Another option

would be to increase the frequency of inspections so that diversions would be detected more rapidly; the IAEA has, however, been altering its practice in the opposite direction in the past few years.<sup>12</sup> A much more expensive option, deemed highly desirable by some, would be to redesign the whole safeguards system so as to be capable of detecting diversions of much smaller quantities of nuclear material.

An analysis of the politics of the verification process demonstrates that even if the political will and financing were available to implement all these changes and many more on the shopping list, it is doubtful whether safeguards, in the traditional sense, could ever be sufficient to build the confidence necessary for the abolition of nuclear weapons.

Verification is not an end in itself. It has various purposes. Among them are to deter cheating by raising the risk of detection and to trigger enforcement actions capable of bringing a state back into compliance with an international agreement it has violated. To these ends, an effective system of safeguards would fulfil three criteria. It would:

- have a high probability of detecting a violation;
- be capable of providing timely warning of a violation; and
- be able to provide convincing evidence of a violation.

It is the second and third criteria that we focus on here (although the first issue is also an important one for states to discuss; in particular, in the context of disarmament, how high is high enough?).

Currently, the IAEA aims to detect a diversion of nuclear material in about the same time as it would take a state to convert that material into a nuclear weapon.<sup>13</sup> The agency assesses this period to be a month for plutonium and HEU, and a year for LEU (though these figures may well be significant overestimates). Enforcement, however, has typically taken much longer than detection. The limiting factor in rectifying non-compliance is not the timeliness of the warning from the IAEA, but the time taken for enforcement action to be agreed on and to work. For instance, the warning that the international community received in August 2002 of Iran's clandestine uranium-enrichment programme was timely. However, it was almost four and a half years before the Security Council passed its first sanctions resolution in December 2006, and by July 2008, Iran had still not complied with that or two further sanctions resolutions. Changing the safeguards system so that the IAEA could detect non-compliance earlier—by,

say, increasing the frequency of inspections—would do little to solve this essentially political problem.

If zero nuclear weapons were the agreed universal standard, the Security Council would probably be willing to act more rapidly in the event of a very serious violation (such as, for instance, the actual diversion of nuclear material, as opposed to the maintenance of an extensive clandestine centrifuge effort). But even if the Security Council could agree upon enforcement action in a matter of days, in such a serious case, it might already be too late to prevent the violator from manufacturing a nuclear weapon.<sup>14</sup> However fast the IAEA can be made to operate, complete disarmament may remain elusive as long as safeguards are designed to do nothing more than detect a violation.

A related problem arises with the third of these criteria, that of providing convincing evidence. Recent experience shows that states may view it in their interest to question the judgement of the IAEA and not immediately accept its conclusions. When Iran's clandestine nuclear programme was discovered, Russia, China and other states delayed action by insisting that the IAEA provide *proof* of Iran's intentions. The strong evidence of non-compliance presented by the IAEA was apparently not enough. (Similarly, when the IAEA discovered that South Korea had performed undeclared reprocessing and enrichment experiments, the US, its close ally, lobbied other members of the agency's board of governors to ensure that it was not found in non-compliance with its safeguards agreement.)

Actually proving that a state has violated an agreement can be very difficult and often takes time, no matter how effective and well-funded safeguards are. As mentioned above, the difficulty is probably most acute in the case of clandestine facilities. Although the Additional Protocol significantly enhances the IAEA's prospects of collecting information suggestive of undeclared nuclear activity, it may be impossible for the IAEA to prove that a clandestine facility exists unless it can inspect the suspect site (this is particularly true in the case of small clandestine enrichment plants). In practice, of course, a state with a clandestine facility would in all probability simply refuse the IAEA access. Recent experience suggests that the Security Council might not back an IAEA request for access without first requiring stronger evidence than the IAEA could provide without an inspection. Again, we have a circular problem, which is more political than it is technical. Enhanced IAEA safeguards are unlikely to inspire enough confidence to make a nuclear-weapons-free world possible unless the international community is willing to accept a considerably lower

standard for assessing evidence, such as a balance of probabilities rather than proof beyond reasonable doubt.

The problem might be alleviated by closer cooperation between the IAEA and national intelligence agencies. With the possible exception of the Manhattan Project in the US, there appear to have been no instances of a state managing to build and operate a secret fuel-cycle facility of any significance without at least arousing the strong suspicions of a state with advanced intelligence assets. Whether it was Israel in the 1960s, Pakistan in the 1970s and 1980s, North Korea in the 1990s, Iran in more recent years or Syria in 2007, key states have always detected clandestine fissile-material production before weapons were produced. That not all such detections resulted in actions which prevented proliferation is due at least in part to the difficulties of using national intelligence to inform international verification activities.

Another possibility is for the IAEA to be tasked with looking for evidence of weaponisation. Currently, the IAEA's authority and ability to verify that military research and development is not connected to nuclear weapons is very limited, especially where no nuclear material is involved.<sup>15</sup> Tasking the IAEA with detecting weaponisation activities might be an important additional protection in a nuclear-weapons-free world (and indeed in today's world), increasing both the probability of detecting a violation and the warning time provided. However, it would be expensive, difficult and potentially controversial. For instance, there is no universal agreement on what—apart from the discovery of certain nuclear-weapon components or a few particular activities—would constitute evidence of a nuclear-weapons programme.

### **The radical approach: multinational or international ownership of fuel-cycle facilities**

One alternative to traditional safeguards on nuclear facilities owned by states is for the fuel cycle to be 'multinationalised' (where facilities are owned and operated by a coalition of states) or even internationalised (with ownership and operation in the hands of an international body, as envisaged by the Acheson-Lilienthal Plan). Some commentators have gone so far as to argue that it would be impossible to move to a nuclear-weapons-free world without first placing all enrichment and reprocessing facilities, and possibly all nuclear materials as well, under multinational or international ownership or control (in addition to IAEA safeguards).<sup>16</sup> Would India be willing to dismantle its last nuclear warhead if the Khan Research Laboratories in Pakistan were still enriching uranium under exclusive

Pakistani control, albeit under the watchful eye of IAEA inspectors? Even if India did prove willing, it would almost certainly be on the condition that India itself could continue plutonium production under exclusively Indian control, in which case the existence of nationally controlled fuel-cycle capabilities could test the stability of Indo-Pakistani relations. In another part of the world, if Japan and China continued national fuel-cycle activities for peaceful purposes and under safeguards, would other Asian states seek similar national fuel-cycle capabilities? The chances of their doing so might be lessened if greater non-nuclear extended deterrence from the US were offered, but that could raise other alarms, as discussed in Chapter 1.

Moving beyond nationally owned fuel-cycle facilities could be a key step towards disarmament, and it is a concept that states should discuss seriously—though specifying and implementing the procedures to make the transition would be hugely complicated and politically challenging.<sup>17</sup> There is no precedent for a key facet of a major modern industry being collectively owned by a number of multinational firms, let alone being owned in its entirety by a single international organisation. At present, the idea meets firm resistance from almost every state and enterprise now producing fissile materials, especially the states with nuclear weapons. Nevertheless, two multinational enrichment organisations—the Urenco consortium and Eurodif—do already exist. As a private firm, the former in particular might offer a useful guide for further investigations.

Multinationalisation or internationalisation of the fuel cycle would not completely assuage proliferation concerns. The problem of clandestine fuel-cycle facilities would remain. While multinational or international ownership could help, by restricting or fragmenting knowledge to try to ensure that as few individual workers as possible had end-to-end knowledge of sensitive processes and that nationality groups within the workforce did not collectively have such knowledge, some workers would still learn proliferation-sensitive information. Indeed, the infamous A.Q. Khan network grew out of Urenco, insofar as Khan stole blueprints, components and valuable procurement information while employed by one of the consortium's contractors as a junior scientist. For a multinational fuel-cycle consortium to operate effectively, like any organisation, it must have senior managers with a good knowledge of the entire process. There will always be a risk that these personnel could put this expertise to prohibited uses.

Moreover, ownership would not guarantee control. Shared or international ownership might make it more embarrassing for a state to be found

diverting nuclear material from a facility on its territory, and increase the penalties for its doing so, but it would not necessarily prevent such diversion. States would need to assess the risk of a host government 'sending in the troops', physically taking control of an enrichment or reprocessing plant and using it to produce fissile material for weapons.

In theory, this problem could be minimised by locating fuel-cycle facilities on the territory of 'completely trustworthy' states. In practice, domestic pressure might make any such states reluctant to play host, especially if the facility in question were a reprocessing plant dealing with imported nuclear waste. Besides, for the sake of equity, multinational fuel-cycle facilities would probably need to be hosted by a number of states in different regions. Furthermore, perhaps most importantly, the chances of the international community agreeing on which states were 'completely trustworthy' currently appear slim.

There are many different possible models for multinational or international control of the fuel cycle. Key questions include what facilities should be included (just enrichment and reprocessing plants, or all nuclear facilities?) and precisely how these facilities should be owned and operated. States, the nuclear industry and civil society should start to consider which models might best assuage proliferation concerns, which are the most feasible politically and which make best economic sense. These investigations should help to shape the important debate about how to guarantee supply to states that lack the capability to manufacture their own nuclear fuel. It is vital that such discussions include both potential suppliers and consumers.

Non-nuclear-weapons states are unlikely to agree to new rules or arrangements for limiting access to fuel-cycle capabilities unless all states play by the same rules. Genuine commitment to and movement towards nuclear disarmament would go a long way towards satisfying the demand for equity, but might not overcome resistance to discriminatory approaches to fuel-cycle management. If nuclear-armed states, and perhaps others, do not want all states to retain the right to enrich uranium and separate plutonium on a national basis as they see fit under safeguards, the most acceptable alternative would be to move towards a standard whereby only multinational facilities were allowed everywhere, notwithstanding the difficulties involved. This issue of nuclear equity will be among the most crucial and challenging that states will face in the nuclear realm, whether or not abolition becomes a priority.

### **Can the most sensitive nuclear activities be compatible with a nuclear-weapons-free world?**

Historically, arms-control treaties have sought to regulate, rather than ban, even the most sensitive dual-use technologies. In contemplating whether and how to achieve a world free of nuclear weapons, states must consider whether the most sensitive nuclear activities would need to be banned outright. Even a discussion about banning reprocessing is anathema to some. Nevertheless, if no acceptable form of regulation can be established for the proliferation-sensitive activities that many states which today promote disarmament are seeking to conduct, the abolition of nuclear weapons may not prove possible.

#### *Reprocessing*

Along with enrichment, reprocessing is the most proliferation-sensitive part of the fuel cycle. Historically, the failure to coordinate plutonium production with MOX fuel fabrication has led to the emergence of large plutonium stockpiles.<sup>18</sup> Linking plutonium production more closely to demand would help to reduce these stockpiles and promote disarmament. By itself, however, this step would be unlikely to completely assuage proliferation concerns. Current reprocessing technology produces separated plutonium, and this is the most difficult part of the fuel cycle to safeguard effectively.<sup>19</sup> Moreover, any state with reprocessing technology could leave the NPT and use the technology to produce fissile material for nuclear weapons. This break-out potential could be highly damaging. Japan's reprocessing programme, for example, is frequently criticised as being a way of keeping a 'bomb in the basement'. In a nuclear-weapons-free world, the suspicion of those with reprocessing capabilities — whether or not it was justified — could be destabilising.

On the other hand, plutonium is a potentially valuable energy resource. In the short term — over the next few decades, say — the world is extremely unlikely to face uranium shortages, and reprocessing may continue to be uneconomic.<sup>20</sup> Several decades ahead, however, if there is a significant and sustained expansion of nuclear energy, the demand for reprocessing could increase considerably, as conventional uranium resources are depleted. There is, of course, still doubt about whether the nuclear renaissance will actually take place. If it does not, a ban on reprocessing might be feasible, and widely considered to be an acceptable price to pay for a nuclear-weapons-free world. If, however, the nuclear renaissance proves to be real (and it may take decades to gauge this), a ban on reprocessing might

increase reliance on fossil fuels as uranium stocks diminish, damaging efforts to curtail global warming.<sup>21</sup> Once more, there is a web of issues that states need to disentangle. Over the long run, will reprocessing be necessary to combat climate change? Are reprocessing and nuclear disarmament incompatible? If they are, which do states care about more?

*Non-nuclear-weapons use of HEU*

The break-out potential of HEU is arguably greater than that of plutonium. Whereas plutonium can only be used in a complex implosion design, HEU can be used in a simple gun-type nuclear weapon, and may therefore be more attractive to less technologically advanced proliferators. It seems reasonable to assume that the prospects for eliminating all nuclear arsenals will be significantly improved if HEU is no longer used at all (or, perhaps, if it is managed under unprecedented controls, such as limiting enrichment levels so that fuel would not be usable in weapons without further enrichment).

HEU has some uses outside nuclear-weapons programmes. Much the most significant of these is as fuel for various types of nuclear reactors, including research reactors, reactors to propel naval vessels such as submarines, aircraft carriers and (Russian) civilian icebreakers, and space reactors for powering satellites.

In theory, it should be technically possible to eliminate HEU from all types of reactors. Various initiatives to eliminate HEU from most research reactors are currently under way.<sup>22</sup> Although some important technical challenges remain, it appears that most, if not all, of the research reactors now using HEU can be converted to LEU fuel. If conversion proves impossible in every case, dismantling the handful that remained would seem a small price to pay for complete nuclear disarmament. Similarly, even if it were not possible to convert icebreakers and space reactors (the former are likely to be much easier to convert than the latter), it is difficult to imagine this would be a serious roadblock to disarmament.

Perhaps the biggest barrier to phasing out the production and use of HEU is its use in naval vessels, particularly submarines. Nevertheless, converting naval reactors to run on LEU fuel is possible—France is in the process of converting its vessels for economic reasons. Reports on the enrichment levels in Chinese naval reactors are contradictory, but if they are fuelled with HEU, it is believed that the fuel would be near the 20% enrichment HEU/LEU threshold, and so relatively simple to convert. Similarly, Russian submarines and submarines being developed by India reportedly use fuel with enrichment levels below 45%, making conversion

appear feasible. The conversion of naval reactors to LEU fuel does however have two important drawbacks. First, it would almost certainly involve forsaking the 'lifetime cores' (reactors that do not need to be replaced) that are features of the newest British and American submarines. Second, LEU-fuelled reactors are bigger and noisier than HEU-fuelled ones. The second consideration is probably more important than the first to UK and US policymakers. On balance, however, the barriers to the elimination of HEU seem less daunting than those to the elimination of reprocessing.

*Should naval reactors be banned?*

A more radical step than ending the use of HEU in naval reactors would be to ban naval reactors entirely, including submarine reactors and reactors on aircraft carriers. Article 14 of the Comprehensive Safeguards Agreement (the basic IAEA safeguards agreement) permits states to withdraw from safeguards nuclear material that is for use in 'non-proscribed' military activities—that is, the production of fuel for naval reactors. No state has yet exercised this right (although Canada has considered it), but in a nuclear-weapons-free world, it could represent a significant loophole. States need to consider whether it would be an unacceptable one.

In total, seven nations have built, or are attempting to build, nuclear submarines: the five nuclear-weapons states plus India and Brazil. In addition, a number of other nations, including Canada, Australia and Pakistan, have shown varying degrees of interest in acquiring them. Would these states, or any other non-nuclear-weapons states that might be inclined to consider the use of naval reactors in the future, be prepared to renounce them permanently in order to help bring about a nuclear-weapons-free world as part of a non-discriminatory agreement? Or would they be willing to give international inspectors unprecedented access to some of their most sensitive technologies in order to assuage international concerns? States that possess or are considering the development of nuclear-powered naval vessels should begin to consider options for safeguarding the fuel cycle in a naval context.

## Notes

- <sup>1</sup> One exception was the McCloy–Zorin Accords, signed in September 1961 by the US and the Soviet Union, which set out a series of ‘principles as the basis for future multilateral negotiations on disarmament’. For a summary of the various abolitionist movements that there have been over the decades, see Michael Krepon, ‘Ban the Bomb. Really.’, *The American Interest*, vol. 3, no. 3, January–February 2008, pp. 88–93.
- <sup>2</sup> James M. Acton, ‘Strengthening Safeguards and Nuclear Disarmament: Is There a Connection?’, *The Nonproliferation Review*, vol. 14, no. 3, November 2007, pp. 525–35.
- <sup>3</sup> See for example UN Secretary-General Kofi Annan, ‘Address to the Nuclear Non-Proliferation Treaty Review Conference’, New York, 2 May 2005, <http://www.un.org/events/npt2005/statements/npt02sg>.
- <sup>4</sup> The World Nuclear Association represents and promotes the nuclear industry and the Nuclear Threat Initiative is an NGO working on reducing the risk of use and preventing the proliferation of nuclear, biological and chemical weapons. It is co-chaired by former US Senator Sam Nunn and Cable News Network founder Ted Turner.
- <sup>5</sup> Tariq Rauf and Zoryana Vovchok, ‘Fuel for Thought’, *IAEA Bulletin*, vol. 49, no. 2, March 2008, pp. 33–7, to appear at <http://www.iaea.org/Publications/Magazines/Bulletin/>.
- <sup>6</sup> Mark Hibbs and Ann MacLachlan, ‘Vendors’ Relative Risk Rising in New Nuclear Power Markets’, *Nucleonics Week*, vol. 48, no. 3, 18 January 2007. See also Sharon Squassoni, ‘The Realities of Nuclear Expansion’, Testimony before the US House of Representatives Select Committee on Energy Independence and Global Warming, 12 March 2008, pp. 7–10, [http://www.carnegieendowment.org/files/3-12-08\\_squassoni\\_testimony1.pdf](http://www.carnegieendowment.org/files/3-12-08_squassoni_testimony1.pdf).
- <sup>7</sup> Iran’s centrifuge programme was initiated in 1985 and was still fairly embryonic when it was revealed in 2002. IAEA, ‘Implementation of the NPT Safeguards Agreement in the Islamic Republic of Iran: Report by the Director General’, GOV/2004/83, 15 November 2004, para. 23, <http://www.iaea.org/Publications/Documents/Board/2004/gov2004-83.pdf>. Although there may be a number of reasons for this slow pace of development, one must surely be the inherent difficulty of centrifuge technology. For a discussion of Libya’s centrifuge programme, see Bowen, ‘*Libya and Nuclear Proliferation: Stepping back from the brink*’, Chapter 2.
- <sup>8</sup> Mahdi Obeidi and Kurt Pitzer, *The Bomb in My Garden* (Hoboken, NJ: John Wiley & Sons, 2004), Chapters 3–6.
- <sup>9</sup> See Jack Boureston and Charles D. Ferguson, ‘Separation Anxiety (Laser Enrichment)’, *Bulletin of the Atomic Scientists*, vol. 61, no. 2, March–April 2005, pp. 14–18, <http://thebulletin.metapress.com/content/p3v65u514051j882/fulltext.pdf> (since this article was published, General Electric has acquired the rights to the SILEX laser-enrichment process). See also Allan S. Krass, Peter Boskma, Boelie Elzen and Wim A. Smit, *Uranium Enrichment and Nuclear Weapon Proliferation* (London: Taylor and Francis for SIPRI, 1983), Chapter 2, <http://www.sipri.org/contents/publications/Krass83/Krass83.pdf>.
- <sup>10</sup> See for example ‘Nuclear Safeguards: In Pursuit of the Undoable’, *Economist* (US edition), vol. 384, no. 8,543, 25 August 2007, p. 56. For a critique of the current state of nuclear safeguards, see Henry Sokolski (ed.), *Falling Behind: International Scrutiny of the Peaceful Atom* (Carlisle, PA: Strategic Studies Institute, February 2008), <http://www.npec-web.org/Books/20080327-FallingBehind.pdf>.
- <sup>11</sup> James Acton and Joanna Little, ‘The Use of Voluntary Safeguards to Build Trust in States’ Nuclear Programmes: The Case of Iran’, *Verification Matters*, no. 8, May 2007, pp. 31–2, <http://www.vertic.org/publications/VM8.pdf>.
- <sup>12</sup> Jill N. Cooley, ‘Integrated Nuclear Safeguards: Genesis and Evolution’, in Trevor Findlay (ed.), *Verification Yearbook 2003* (London: VERTIC, 2003) pp. 38–9, [http://www.vertic.org/assets/YB03/VY03\\_Cooley.pdf](http://www.vertic.org/assets/YB03/VY03_Cooley.pdf).
- <sup>13</sup> In states with an Additional Protocol in force, this target is relaxed once the IAEA has concluded that there are no undeclared nuclear materials in the state. See *ibid.*

- <sup>14</sup> The worst-case scenario would involve a state doing each of the following before it diverted nuclear material: (i) fully designing a nuclear weapon; (ii) manufacturing all the non-nuclear components for the weapon; and (iii) mastering the technology for fabricating the nuclear-weapon pit. In such a scenario, the time between diverting the material and manufacturing the nuclear weapon might be days or even hours. China, for instance, manufactured its first pit in one day. Even if air strikes could be organised in this short time, they could only be effective if the location of the weapons facility was known (a questionable prospect).
- <sup>15</sup> James Acton and Carter Newman, 'IAEA Verification of Military Research and Development', *Verification Matters*, no. 5, July 2006, [http://www.vertic.org/publications/VM5%20\(2\).pdf](http://www.vertic.org/publications/VM5%20(2).pdf).
- <sup>16</sup> For instance, Marvin Miller and Jack Ruina have written that 'The only real control of breakout in a [nuclear-weapons-free world] is strict international control of all facilities for the production of fissionable materials that could be used in nuclear weapons.' Marvin Miller and Jack Ruina, 'The Breakout Problem', in Steinberger, Udgaonkar and Rotblat (eds), *A Nuclear-Weapon-Free World: Desirable? Feasible?*, p. 101.
- <sup>17</sup> For an example of some preliminary discussions, see IAEA, 'Multilateral Approaches to the Nuclear Fuel Cycle: Expert Group Report submitted to the Director General of the International Atomic Energy Agency', INFCIRC/640, 22 February 2005, <http://www.iaea.org/Publications/Documents/Infircs/2005/infirc640.pdf>.
- <sup>18</sup> Walker, 'Destination Unknown: Rokkasho and the International Future of Nuclear Reprocessing', *International Affairs*, vol. 82, no. 4, July 2006, pp. 743–61.
- <sup>19</sup> Frans Berkhout and William Walker, 'Safeguards at Nuclear Bulk Handling Facilities', in J.B. Poole and R. Guthrie (eds), *Verification Report 1992: Yearbook on Arms Control and Environmental Agreements* (London: VERTIC, 1992). Reprocessing technologies that do not produce separated plutonium (such as the UREX+ process) are currently under development. How proliferation-resistant these technologies are is, however, a controversial issue. See for instance Frank von Hippel, 'Managing Spent Fuel in the United States: The Illogic of Reprocessing', International Panel on Fissile Materials, Research Report no. 3, January 2007, pp. 20–4, [http://www.fissilematerials.org/ipfm/site\\_down/ipfmresearchreport03.pdf](http://www.fissilematerials.org/ipfm/site_down/ipfmresearchreport03.pdf).
- <sup>20</sup> Matthew Bunn, John P. Holdren, Steve Fetter and Bob van der Zwaan, 'The Economics of Reprocessing versus Direct Disposal of Spent Nuclear Fuel', *Nuclear Technology*, vol. 150, no. 3, June 2005, pp. 209–30, <http://www.puaf.umd.edu/Fetter/2005-NT-repro.pdf>.
- <sup>21</sup> See *ibid* for a contrary view. These authors argue that reprocessing will remain uneconomic, because the cost of extracting uranium from seawater—which, they judge, would remain a viable option when other uranium sources were depleted—is lower than the cost of reprocessing.
- <sup>22</sup> Bunn, *Securing the Bomb 2007* (Cambridge, MA and Washington DC: Project on Managing the Atom, Harvard University and Nuclear Threat Initiative, September 2007), pp. 37–9 and 72–7, [http://www.nti.org/e\\_research/securingthebombo7.pdf](http://www.nti.org/e_research/securingthebombo7.pdf); von Hippel, 'A Comprehensive Approach to Elimination of Highly-Enriched-Uranium from All Nuclear-Reactor Fuel Cycles', *Science and Global Security*, vol. 12, no. 3, 2004, pp. 137–64, [http://www.princeton.edu/~globsec/publications/pdf/12-3\\_von%20Hippel\\_SGS\\_137-164.pdf](http://www.princeton.edu/~globsec/publications/pdf/12-3_von%20Hippel_SGS_137-164.pdf).



## CHAPTER FOUR

# Enforcement

Chapter 1 posited that before states would proceed over the horizon to prohibit nuclear weapons, they would need to take mutually reinforcing steps to build political confidence, reduce the number and salience of nuclear weapons, and stabilise political and military relations to the point where nuclear weapons did not appear indispensable for preventing war among major powers. Chapter 2 assumed that such steps could be taken, and explored how a prohibition on nuclear weapons might be verified. Chapter 3 suggested ways in which an international expansion of nuclear energy could be reconciled with the elimination of all nuclear arsenals. We now consider how a nuclear-weapons prohibition might be enforced.

Even if near-perfect means existed for verifying a nuclear-weapons ban, a state—or sub-state group—could still fail to comply and dash to acquire nuclear weapons. Nuclear-armed states and their citizens would therefore want to be sure that enforcement of such a ban would be exceptionally reliable before they dismantled their last nuclear weapon.

Curiously, the challenges of enforcing compliance with a nuclear-weapons prohibition have been under-addressed. For example, the Canberra Commission on the Elimination of Nuclear Weapons commissioned by the Australian government in 1995 to ‘develop ideas and proposals for a concrete and realistic program to achieve a world totally free of nuclear weapons’ acknowledged that ‘states must...be confident that any violations detected will be acted upon’. However, in the course of its admirable 120-page report on steps towards a nuclear-weapons-free world, all it has to

say about the nature of such enforcement action is that ‘the Security Council should continue its consideration of how it might address, consistent with specific mandates given to it and consistent with the Charter of the United Nations, violations of nuclear disarmament obligations’.<sup>1</sup> Proponents of the Model Nuclear Weapons Convention did better in a document that explored the security dynamics that would need to exist for states to comply with such a convention.<sup>2</sup> Their basic conclusion appears both correct and insufficient to encourage states now relying on nuclear-deterrent umbrellas to sign up: ‘The stability of a nuclear weapon free regime may depend on the assessment by major powers that it is in their security interests, and on the normative force of the prohibition of acquiring nuclear weapons that would grow as the regime was institutionalized and endured.’<sup>3</sup> In the following discussion we try to sharpen some of the choices that would need to be made in establishing an enforcement system.

There are two distinct challenges in creating enforcement mechanisms strong enough to embolden states to let go of their nuclear umbrellas, one of which is normally glossed over. Firstly, it would be necessary to develop punishments that could deter states from breaching their obligations and deny states the benefits of any violation. This challenge is widely recognised. However, for such punishments to be ‘triggered’, there must be decision-making avenues and procedures that enjoy international legitimacy and that would work in a manner timely and robust enough to deter or eliminate threats. Most discussions of nuclear disarmament in recent decades have underestimated this second challenge, tacitly assuming that, in the event of a violation, agreed enforcement actions would be employed. Before addressing what appropriate enforcement actions might be, therefore, we explore the various reasons why enforcement might be less than straightforward.

### **Why enforcing compliance might be contentious**

The term ‘break-out’ evokes images of a state that has covertly acquired nuclear weapons and announces it with a bold, aggressive gambit of blackmail or aggression. Yet this is not the only—or even the most likely—possible type of cheating on a nuclear-weapons prohibition. There is a wide spectrum of non-compliant actions with which an enforcement system might have to contend.

Effective verification should make it possible to detect an attempt to build nuclear weapons before the job is completed and nuclear blackmail or aggression is employed. This is a mixed blessing: if violations were detected some time before weapons were actually produced, the violator

(and perhaps its allies) could argue that it had not intended to build nuclear weapons. It could claim that the suspicious activity had peaceful purposes, and was insufficiently declared only by mistake. In a more brazen violation of the rules, it could say it had not intended to actually complete the weapons, but had, for instance, merely sought to warn an adversary to stop its threatening behaviour and to motivate the international community to stop dithering and intervene.

Among other violation scenarios that might present decision-makers with dilemmas about enforcement, what would be the international community's reaction if the inspectorate found evidence that a state had secretly produced polonium-210 (a material that can be used in the initiator of a nuclear weapon), for example, but no evidence of a programme to acquire fissile materials? If the inspectorate discovered a clandestine enrichment facility, but no evidence that it had yet been used to manufacture HEU, would the international community agree on swift punitive sanctions? Iran recently presented similar scenarios.

The room for ambiguity and disagreement over enforcing compliance is great. Bruce Larkin, the author of an 'interpretative encyclopaedia' of nuclear-disarmament-related issues, has identified a number of possible sources of discord, which we list below, along with one addition of our own:

- Disagreement about whether break-out was being accomplished, or even if it was intended.
- Disagreement about whether the action—classic break-out or not—was sufficiently serious to require enforcement.
- Disagreement about the urgency of the enforcement action required (resulting from disagreement about the timescale for break-out).
- Disagreement about whether the means of enforcement to hand would or could be effective.
- Disagreement about the relative importance to be assigned to enforcement, as against other interests that states might have in relation to the alleged violator.
- Concern on the part of some states that a specific enforcement initiative was both unsound in itself and an instrument for enhancing the authority and power of the enforcers.<sup>4</sup>

States would evaluate the seriousness of a non-compliant activity, not only on the basis of the action itself, but also in light of their security, political and economic relations with the alleged violator. There would be a wide spectrum of threat perceptions among states, varying according to the characteristics of both the threatened and the threatening states.

The problem of nuclear 'break-out' is most acute for Israel. Because it is such a small country, even a small number of warheads could pose an existential threat to it. It would therefore certainly fear that it might be annihilated if one of its most belligerent adversaries acquired a small number of nuclear weapons and was not deterrable. Whether this fear would be rational or not is largely immaterial. Israel would not agree to give up its last nuclear weapons unless it were convinced that the threat from its neighbours had diminished profoundly, that enforcement mechanisms were truly effective and that it would have sufficient warning from intelligence to be able to win a break-out race. (There is also the possibility that Israel might decide that it would gain security by offering to give up its nuclear weapons in order to prevent proliferation that would make it less secure. Here, Israel would need to be confident that (i) all the relevant regional states were sufficiently transparent and cooperative that none would seek to acquire or retain WMD; (ii) if they did, they would almost certainly be detected; and (iii) if they were detected, Israel would be able to defeat them itself, or could rely on the US and the international community to deal with the matter effectively.)

At the other end of the spectrum is the United States. Break-out would almost certainly not pose an existential threat to the US because of its size, its conventional power and the technical advantages it enjoys that would probably allow it to reconstitute its nuclear arsenal without too much difficulty. Not only would the US be able to respond to a nuclear attack by conventional means but, more importantly, it might feel able to deter one without its own nuclear weapons because its conventional military (and possibly also its 'cyber', or information-warfare) capabilities mean that it could inflict intolerable damage on any government and on terrorists whom it could locate.<sup>5</sup> On the other hand, if on the path to nuclear abolition the US had attenuated some of its most potent conventional strike capabilities, its capacity to deter and defeat break-out would be diminished. Clearly there is tension between the need to reduce and balance out major powers' conventional capabilities to facilitate nuclear abolition and the need for conventional capabilities to be able to respond to potential violations. In any case, as both a political and psychological matter, the US (like other governments and societies) would be—rightly—unwilling

to distinguish between a threat to its existence and, say, a threat to 'only' one or two major cities. The destruction of one or more cities in a scenario in which fears of more such attacks were realistic because the source of threat had not been immediately eliminated might cause the US to react in extreme ways.

Other nuclear-weapons states lie in the middle of the threat spectrum. The United Kingdom is a small country and London, its political and financial centre, holds a significant proportion of the population. A few nuclear weapons of relatively modest yield that destroyed London as a functioning city would seem like an existential threat. The UK, along with France and China, does not have conventional military power-projection capabilities sufficient to give it strong confidence that it could pre-empt or deter an attack from a few illicitly produced nuclear weapons launched on a ballistic missile by a distant adversary.

Before giving up their last nuclear weapons, states would want to feel confident that the risk of even a 'small' break-out was lower than the risk of keeping a small number of nuclear weapons and suffering a failure of nuclear deterrence. Cold-blooded analysts might try to reassure them that break-out would be likely to be detected before any illicit nuclear weapons were produced, and that, at worst, a successful break-out attempt would involve only a minimal number of nuclear weapons, because larger-scale break-out would be detected and interdicted before many deliverable weapons were produced. A nuclear renegade would not for long be able to take and hold territory or otherwise impose its will, because other states would mobilise counterforce, including, if necessary, reconstituted nuclear weapons (reconstitution capabilities are discussed in Chapter 5). Indeed, past experience suggests that nuclear weapons 'work' only to deter or defeat military aggression against their possessor, not as a shield behind which to successfully take and hold territory. Ballistic-missile defences—assuming they were permitted and effective—and advanced air forces could blunt any threat of airborne nuclear attack that the renegade might launch in order to deter efforts to remove him. Conventionally armed missiles and air power could further threaten to negate or at least minimise the renegade's capacity to use a small illegal arsenal. In such a context, the aggressor would be militarily and politically isolated, and the commitment and collective power of the states transgressed against would eventually prevail.

The most probable enforcement problems would be less immediately threatening than the scenario of the renegade leader who attacks another state while announcing to the world that his state has secretly produced

nuclear weapons. The medium power breaking a nuclear prohibition in order to deter a larger power from intervening in its territory is one more probable scenario. Most probable of all would be ambiguous non-compliant activities such as the ones over which the UN Security Council has wrestled with Iran. Disagreements over evidence, the seriousness of the alleged non-compliance, the urgency of enforcement and so on could prompt endless rumination and debate among enforcers. Assuming for the moment that the Security Council had an enforcement role, its veto-wielding members—the US, Russia, China, the UK and France—have different allies and friends among states. This raises the prospect that the enforcers might not perceive and respond unanimously to all suspicious activities or violations. For example, if Israel, in the midst of a crisis with an Egyptian government led by the Muslim Brotherhood, were caught secretly producing centrifuges for a new uranium enrichment facility that it said was for peaceful purposes, the US might urge a different international response from that urged by, say, Russia, France or China. If questions arose about Japan's nuclear activities, China might favour a different response from that favoured by the US. Of course, at an abstract and perhaps a moral level, all should be treated equally, but this is not how international politics have tended to operate.

Connecting this back to the theme of Chapter 3, the probability of non-compliance and problems with enforcement is in part determined by how much leeway there is for national nuclear-related activities under the weapons-prohibition regime. The fundamental insight of the Acheson–Lilienthal Plan six decades ago was that the less such leeway there was in the regime, the more difficult it would be for ambiguity about non-compliance to develop and, therefore, for disputes about enforcement to emerge.

### **The UN Security Council in a nuclear-weapons-free world: relations between China, Russia, and the United States**

It is difficult to envisage an alternative to the UN Security Council as the body tasked with enforcing a prohibition of nuclear weapons. The P5 would all need to agree for any alternative body to be created. These powers are five of the eight nuclear-armed states, and would prohibit nuclear weapons only on terms they found acceptable. If one or more of them wanted enforcement to reside in the body in which they alone have veto powers, it is impossible to see how an alternative could be imposed on them.

Any consideration of the role of the Security Council as authoriser of the enforcement of a nuclear-weapons prohibition would need to address

the issue of the veto. Would states possessing nuclear weapons be willing to eliminate their arsenals knowing that if a P5 member (or an ally of one) were to violate a prohibition on nuclear weapons, the violator or one of its friends could veto enforcement? Alternatively, might the current P5 be willing to relinquish their veto power and their nuclear weapons at the same time? There is no a priori answer to this question, but a bigger leap away from past experience and current politics is required to imagine that the P5 would relinquish the veto than to think that at least one of them would insist on retaining it.

Relationships between the US, China and Russia in the Council are, once again, central. Not only do two of these three states determine the evolution of the largest and most dynamic of the world's nuclear arsenals, but the three together exert substantial influence in the Middle East, Northeast Asia and South Asia, where current and prospective nuclear challenges are greatest. They have been difficult to harmonise on the issues of Iran and—up until around 2006—North Korea. All the P5 insist that they have no interest in other states acquiring nuclear weapons. Yet in the mid 1990s, when many intelligence services believed that Iraq was not complying fully with UN resolutions mandating its elimination of all WMD capabilities, Security Council members disagreed on how rigorously to enforce compliance. And when confronted with Iran's and North Korea's violations of safeguards agreements, the NPT and Security Council resolutions, the US, China and Russia made substantially different assessments of the degree of threat and the pace and character of measures to seek compliance. China and Russia have consistently been more reluctant than the US both to impose sanctions and to increase their severity once they have been introduced.

Competing national priorities within states could severely complicate the creation and maintenance of a nuclear-weapons-free world. States rarely make decisions on the basis of one factor alone. When non-proliferation objectives conflict with other objectives, it is always necessary to perform some kind of balancing act. US President George Bush, for example, stated in a 2004 election debate with Senator John Kerry that the greatest threat to the US was the proliferation of nuclear weapons. Yet in dealing with the acute proliferation challenges presented by North Korea and Iran, the Bush administration vacillated between favouring regime change and pursuing the diplomatic options preferred by other permanent Security Council members. This raised questions about whether the US in fact had priorities higher than non-proliferation. Similarly, when the US chose to go ahead with its nuclear-cooperation agreement with India

in 2005, it assessed that the strategic advantages of a partnership with India would outweigh damage to the NPT.<sup>6</sup> Every state faces such dilemmas—the resistance of China and Russia to dealing more robustly with North Korea and Iran is a consequence of competing Chinese and Russian economic, political and security priorities in relation to those countries.

These are among the issues that would need to be seriously addressed in any deliberations on whether and how to proceed with the total elimination of nuclear weapons and enforce security in a world without them. It is difficult to imagine China, Russia, France, the UK and the US genuinely embarking on a course of nuclear disarmament in the absence of a significant reconciliation of their interests and approaches to regional and global security. If they were willing and able to achieve such reconciliation, enforcement would be much more imaginable. A first-order task, then, is for Beijing, Moscow and Washington to begin discussions of the conditions they think are necessary to establish to begin a genuine transition to a nuclear-weapons-free world. Other states can and should press these three to accept this responsibility.

### **Adding India, Israel, and Pakistan to the mix**

If building P5 convergence appears daunting, it would be relatively straightforward compared with winning Indian, Pakistani and Israeli endorsement of mechanisms to bring about a world without nuclear weapons. For the purposes of nuclear disarmament, these states are as important as the P5. But they pose even more complicated challenges. Like other nuclear-armed states, they would not give up their arsenals unless they felt reassured that their security interests would be served in a post-nuclear-weapons environment. Due to their unsettled regional relations, Israel and Pakistan have less confidence in that eventuality than do the US, Russia, China, the UK and France. India, Pakistan and Israel would need to be brought into processes to determine how to manage international enforcement of rules and peaceful relationships well before later steps to eliminate nuclear arsenals could be taken.

India raises the most interesting questions here. It has a history of championing nuclear disarmament. New Delhi might thus be expected to commit to eliminating its nuclear arsenal as and when all other states do. Yet the other nuclear-weapons states should not be surprised if in negotiations on a ban on nuclear weapons, India were to insist on conditions that went to the heart of the international security system. India did not establish the high currency value of nuclear weapons, but since they have

gained this coin, why would India not be tempted to bargain its weapons for at least as much power in the international system as its rival China and the less globally important nuclear-armed states, the UK and France? India has long campaigned for a permanent seat on the Security Council. The international response to India's position has been ambivalent for a variety of reasons, among them its non-adherence to the NPT. Nevertheless, in the context of global nuclear disarmament, India should be willing to conform to a new treaty bringing all states into a non-discriminatory regime prohibiting nuclear weapons. It takes no imagination, though, to foresee that if the Security Council were to be the established enforcer of a nuclear-weapons ban, in return for surrendering the security assurances provided by its nuclear weapons, India would want not just a seat but an equal voice—that is, a veto power—in the Council. Balance-of-power concerns and India's political and security relationship with China would make it difficult for any Indian political party to accept a situation in which China had a veto on enforcement matters and India did not.

Attempting to address the disarmament issue together with Security Council reform, including India's quest for permanent admission to the Council, might overload both efforts. Equally, however, India could force the issue by refusing to cooperate in nuclear abolition unless it received a permanent Security Council seat. Pakistan would probably oppose Indian membership of the Council, and might be tempted to seek equal billing, even though it lacks the other attributes that most in the international community associate with valid candidacies for permanent seats. Or else Pakistan might seek to rally other states to oppose Indian permanent membership, thereby placing the disarmament process at risk. Either way, it would be in Pakistan's national interest to try to ensure that it would not be disadvantaged by Indian membership in the body responsible for enforcing nuclear disarmament and international peace and security.

Israel's concerns will probably remain deeply rooted in the region surrounding it, and Israelis are realistic enough to recognise that a bid for permanent membership in the Security Council would be widely rejected and would not be worth seeking. However, before eliminating its nuclear arsenal Israel would insist that the Security Council demonstrated its willingness and ability to enforce resolutions that affected Israel's security. In this sense, Israeli nuclear disarmament would affect and be affected by the role and operation of the Security Council.

In order to avoid the complications associated with Security Council membership, veto rights and so on, leaders of a nuclear-weapons-

prohibition effort might propose that the prohibiting treaty or convention establish a separate body to authorise enforcement action. A separate mechanism could strengthen confidence in enforcement by excluding veto powers, and could help to keep the disarmament agenda from being entangled with Security Council reform. The current P5 could retain their cherished veto powers for all matters except those covered by a nuclear-weapons prohibition.

This solution could bring its own problems, however, as the international security system in a world without nuclear weapons could, of course, face non-nuclear threats, some of which would not be easily separable from nuclear ones. Such non-nuclear threats might come from an actor who was also accused of non-compliance with the nuclear ban, or from a party to a regional or global dispute in which non-compliance was alleged against a different party. Would an allegation of nuclear non-compliance always take precedence over other threats to international peace and security? What if the actions authorised by the Security Council and the enforcer of the nuclear-weapons prohibition contradicted each other? With whom would jurisdiction lie? Who would be responsible for disentangling the different elements of threat, conflict and international law, and how would a separate nuclear-enforcement body relate to the Security Council?

### **Is automatic enforcement the answer?**

One possible solution to the problem of enforcement might be to make it automatic. For example, if the proper verification authorities found that a state was trying to acquire nuclear weapons—the specific indicators of which would have been defined in the prohibition process—all states would automatically be mandated to freeze investment in the violator state, or cease arms-supply and other trade relationships with the violator. Penalties would flow from properly established evidence of violation without requiring a vote from any enforcement body.

The question of automatic enforcement would be politically explosive, whether governments agreed to it or not. Past experience would seem to indicate that states would probably insist on leaving room for circumstantial deliberation and negotiations over how to respond to allegations of cheating. They would not want to commit their political authority or their armed forces to potentially dangerous enforcement actions without case-by-case decision-making processes. Yet at the same time, governments engaged in a debate about automatic enforcement who favoured leaving enforcement subject to case-by-case deliberation

would be vulnerable to domestic opponents arguing that such an enforcement regime would be too weak to allow the safe elimination of the nuclear deterrent.

Equally, if there were robust automatic-enforcement procedures, domestic opponents might criticise signatory governments for unwittingly setting traps that could be unfairly sprung. They might warn that their own state could be falsely accused, or punished for responding to emerging threats by beginning to reconstitute nuclear capabilities. Politicians imagining such scenarios would tend to oppose an automatic-enforcement regime. There are further pragmatic reasons why states might prefer to retain case-by-case discretion: if one of the most economically and militarily powerful states in the international system were found to be non-compliant with an element of a nuclear-weapons-prohibition agreement, and embargoes on that state were automatic, erstwhile investor states might fear economic retribution from the violator, or worse. Automaticity might give them an excuse—‘we had no choice but to sanction you’—but it would not necessarily dissuade the powerful state from retaliating.

For all these reasons, it would probably not be possible for a consensus to be reached on establishing robust automatic-enforcement measures against non-compliant actors. Even in the event of the co-evolution of political confidence-building, conflict resolution and incremental steps toward nuclear abolition, the more powerful states in the international system would probably want to retain discretion over when and how to act against non-compliance. In other words, enforcement would essentially depend on relations among major powers. Moreover, the possibility would remain that the most powerful states would act unilaterally or in coalitions against a non-compliant state if the established authorising body was unwilling or unable to decide to act. Concern about this possibility would doubtless feature prominently in any deliberations on whether to undertake a nuclear-weapons prohibition and, if one were agreed, on how to enforce it. To sharpen these issues and clarify the key questions, think tanks and experts from interested states should be encouraged to collaborate in exploring them.

### **Enforcement mechanisms: sanctions and punishments after break-out**

Contemporary analysts generally agree that the enforcement procedures for dealing with non-compliance with a nuclear-weapons ban should be essentially the same as those associated with existing treaties, only surer. The Security Council (or whichever body was tasked with enforcing

nuclear disarmament) would begin by demanding clarification of suspect activities and an end to non-compliance. Nuclear cooperation with the non-compliant state could be suspended, and other forms of diplomatic pressure and isolation brought to bear. Economic sanctions could be imposed, with graduated degrees of severity. Military sales and cooperation could be curtailed. Some analysts suggest that a nuclear-weapons prohibition would be so important that its violators should be expelled from all international organisations. Ultimately, military action could be taken to end non-compliant activities and/or to destroy threatening capabilities, or, *in extremis*, to remove a threatening government.

Decisions on each of these issues would depend heavily on how the eight nuclear-armed states and other key actors resolved the enforcement-authorising dilemmas discussed above. If the major actors could not agree on the key questions of who should decide on enforcement, whether and how veto power should be retained and the degree of automaticity involved, the application of particular enforcement tools would be too fraught with doubt for states to be motivated to complete nuclear disarmament. Even if robust enforcement procedures could be agreed, decisions on which particular measures to adopt might still be complicated by disagreements of the kind reviewed earlier. Again, the necessity of major-power cooperation reasserts itself—the most difficult enforcement measures to enact would be those against the more powerful states and their friends and allies.

The debate on the effectiveness of enforcement action has often been dominated by the question of whether sanctions or constructive engagement is more appropriate. But the crucial point is not whether, in a given circumstance, a particular kind of enforcement action would be the right response. It is that unless the US, Russia, China, France, the UK, India, Pakistan and Israel each had confidence that agreed enforcement actions would be implemented in the circumstances that it worried about the most, it would not give up its last nuclear weapons. Furthermore, these states would need to be convinced that enforcement would be timely, that the standard of proof required to justify enforcement action would not be so high that it could not in practice be met, and that enforcement would be effective. Words to this effect in a treaty would not, by themselves, be enough to build confidence.

Fortunately, the early steps in preparing the conditions for eliminating nuclear arsenals—including the strengthening of non-proliferation rules and their enforcement—would provide the permanent members of the Security Council with ample opportunity to show each other and the rest of

the world whether or not they could make the Council an effective enforcement body. If they failed to cooperate on these early steps, the process of negotiating or implementing a prohibition on nuclear weapons would stop.

### **Should states be permitted to withdraw from an agreement to abolish nuclear weapons?**

Article X of the NPT, on withdrawal from the treaty, permits a state to withdraw 'if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interest of its country'. Debate about this provision centres on the issue of what might be called 'dishonourable withdrawal'—cases in which a state leaves the NPT to avoid fulfilling its treaty obligations.<sup>7</sup> Examples of dishonourable withdrawal would include the scenario in which a state leaves the treaty only after being found in non-compliance (as North Korea did), or when a state acquires nuclear material and technology, ostensibly for peaceful purposes under Article IV of the treaty, but then withdraws and uses it to develop nuclear weapons. All states today concede that withdrawal from the NPT is a sovereign right, providing it is exercised honourably (although they are notably vague in delineating precisely what this excludes in practice).

A crucial question is whether a similar right to 'honourably' withdraw should exist in an agreement to abolish nuclear weapons. The absence of a withdrawal provision would not be unprecedented. For instance, the 1925 Geneva Protocol prohibiting the use of chemical and biological weapons (to use modern terminology) has no withdrawal clause. The rationale for not including one in an agreement to abolish nuclear weapons is strong: the withdrawal of any one state from the treaty would prejudice the interests of all the others. Moreover, because a nuclear-weapons prohibition would be universal and non-discriminatory, unlike the NPT regime, the justification for a withdrawal option would be weaker, and the consequences of withdrawal graver. While under the NPT, five states possess nuclear weapons that make them able to balance or override the power of a state withdrawing from the treaty, under a universal prohibition such ready-made balancing would not exist.

All recent arms-control agreements have, however, contained a withdrawal clause. For states to be willing to forgo one they would need to be convinced that the Security Council was willing and able both to (i) prevent other states from illegally leaving an abolition agreement and (ii) protect their vital interests so that they would have no need to withdraw themselves. Even if both these conditions were met, national leaders might

still be reluctant to sign up to an agreement without a withdrawal clause, partly out of a natural tendency to hedge and partly, as always, out of sensitivity to domestic opinion.

A more viable alternative to excluding the withdrawal option might be to permit withdrawal, but only in certain circumstances and with very stringent conditions attached. To this end, a number of the proposals that have been made with respect to Article X of the NPT in recent years could prove valuable.<sup>8</sup> For instance, in order to increase the political costs of withdrawal, the conditions under which withdrawal from an abolition agreement was permitted could be specified in detail, and the procedure for submitting a notice to withdraw be made to require extensive consultation and discussion.

However, it would probably be necessary to go further and build in explicit protections against the problem of 'dishonourable' withdrawal. To build confidence that states that violated an abolition agreement could not then abandon it, withdrawal could be explicitly forbidden in circumstances in which a state had been found in non-compliance with any of its obligations. It would also be important to ensure that a state had not begun a secret nuclear-weapons programme prior to withdrawal. In the context of the NPT, former US Assistant Secretary of State Robert Einhorn has suggested that if a state wishes to withdraw, it should have to submit to 'highly intrusive verification measures similar to those imposed on Iraq in the fall of 2002'.<sup>9</sup> Although it appears unlikely that states would agree to this provision today, they might do so as part of an agreement to abolish nuclear weapons. Finally, there is the scenario in which a state that has withdrawn makes military use of nuclear material and equipment that it previously acquired under a nuclear-cooperation agreement. A proposal made for the NPT by former IAEA Deputy Director General for Safeguards Pierre Goldschmidt could be adapted to address this possibility—nuclear cooperation could be made contingent on the recipient state agreeing, either to forgo its right to withdraw from the nuclear-weapons ban, or to place all material and equipment under safeguards that would remain even if it did withdraw.<sup>10</sup>

Specifying in detail conditions for withdrawal and the consequences of abusing the right to withdraw would probably be more acceptable to states than eliminating the right entirely. Moreover, because determining the conditions for withdrawal would involve long and detailed discussions, as well as explicit treaty text on withdrawal and enforcement, a withdrawal clause might—perhaps paradoxically—help to build confidence in

the viability of the overall abolition agreement. In any event, it is certainly an issue that states should discuss. The recent efforts of NPT review conferences to clarify the procedures for and consequences of withdrawal from that treaty are a helpful start. These might gain momentum if the context were broadened from non-proliferation to disarmament. If nuclear-weapons states were to clearly express a genuine interest in creating conditions for nuclear disarmament, they might be more persuasive in arguing that to make disarmament feasible, states must be prevented from manipulating the non-proliferation regime by reaching the threshold of nuclear-weapons acquisition and then withdrawing.

### **Prospects for enforcement**

Discussions on enforcing a prohibition on nuclear weapons cannot escape the shadows that current conditions and recent history cast over our imaginations. Key states do not yet have the leadership or the relations with other states that would be needed to make an enforceable prohibition of nuclear weapons appear practicable. Any well-informed analyst can cite dozens of obstacles and complications standing in the way of the establishment of means to authorise and implement enforcement that would make states now reliant on nuclear deterrence feel able to relinquish their weapons. Yet it is also possible to take a broader view. Speaking to a conference on nuclear disarmament in Oslo in February 2008, former US Secretary of State George Shultz offered an important rejoinder to pessimism on this issue. Few in the early 1980s, he observed, imagined the political changes that would in a few years result in the peaceful end of the Cold War. Similarly, today, we underestimate the potential for developments that would profoundly change the prospects for abolishing nuclear weapons. If, Shultz suggested, a few leaders of nuclear-armed states stepped forward with conviction and determination to seek the prohibition of nuclear weapons, many obstacles that seem immovable today might become movable.<sup>11</sup> The imperatives that currently motivate working-level officials to impede progress towards abolition would be replaced by imperatives to find solutions that allow movement ahead. The foregoing pages have highlighted the importance of leadership by the US, Russia and China. If leaders in these states could reassure each other on key points and establish an agenda for cooperative security, they could create momentum for stabilising relations in Northeast Asia, South Asia and the Middle East in ways that could prevent further proliferation and facilitate step-by-step nuclear disarmament. Through such evolutionary change led from the top of the nuclear hierarchy, the

enforcement challenges that currently appear diffuse and overwhelming would become sufficiently defined to allow negotiations in ensuing years. Whether agreement could then be reached and implemented, no one can say, but the possibility that it might be cannot be denied.

## Notes

- <sup>1</sup> Report of the Canberra Commission on the Elimination of Nuclear Weapons (Canberra: Commonwealth of Australia, August 1996), p. 63, <http://www.dfat.gov.au/cc/CCREPORT.PDF>.
- <sup>2</sup> *Securing Our Survival: The Case for a Nuclear Weapons Convention*, pp. 109–17.
- <sup>3</sup> *Ibid.*, p. 110.
- <sup>4</sup> List adapted from Bruce D. Larkin, *Designing Denuclearization: An Interpretive Encyclopedia* (New Brunswick, NJ: Transaction, 2008), p. 99.
- <sup>5</sup> US General Kevin Chilton's remark that the US needs to retain nuclear weapons as long as anyone has enough nuclear weapons to destroy the US 'way of life' implicitly recognises this possibility. See Chapter 1, pp. 16–17 and 'US Needs Nuclear Weapons for Rest of Century: General'.
- <sup>6</sup> Though the Bush administration argued that that the deal was, in fact, good for non-proliferation, partly because it brought India into the non-proliferation mainstream.
- <sup>7</sup> For a more detailed review of NPT withdrawal issues, see George Bunn and John B. Rhineland, 'NPT Withdrawal: Time for the Security Council to Step In', *Arms Control Today*, vol. 35, no. 4, May 2005, [http://www.armscontrol.org/act/2005\\_05/Bunn\\_Rhineland.asp](http://www.armscontrol.org/act/2005_05/Bunn_Rhineland.asp).
- <sup>8</sup> Many such proposals have been submitted as working papers to NPT review and preparatory conferences, and are available on the website of the Reaching Critical Will project, <http://www.reachingcriticalwill.org/legal/npt/nptindex1.html>. See in particular 'Strengthening the NPT Against Withdrawal and Non-Compliance: Suggestions for the Establishment of Procedures and Mechanisms', working paper submitted by Germany to the Preparatory Committee for the 2005 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, NPT/CONF.2005/PC.III/WP.15, 29 April 2004, <http://www.reachingcriticalwill.org/legal/npt/prepcom04/papers/GermanyWP15.pdf>.
- <sup>9</sup> Einhorn, paper presented to the conference 'The Crisis in Nonproliferation: Meeting the Challenge'. For an account of the history of this proposal, see Bunn and Rhineland, 'NPT Withdrawal: Time for the Security Council to Step In'.
- <sup>10</sup> Pierre Goldschmidt, 'The Urgent Need to Strengthen the Nuclear Non-Proliferation Regime', *Policy Outlook* no. 25, Carnegie Endowment for International Peace, January 2006, <http://www.carnegieendowment.org/files/PO25.Goldschmidt.FINAL2.pdf>.
- <sup>11</sup> George Shultz, concluding remarks to the conference 'Achieving the Vision of a World Free of Nuclear Weapons: International Conference on Nuclear Disarmament', Oslo, Norway, 26–27 February 2008.



## CHAPTER FIVE

# Hedging and Managing Nuclear Expertise in the Transition to Zero and After

Even if the nuclear-armed states were to destroy their nuclear weapons, raze their weapons complexes to the ground and submit their fissile material to IAEA safeguards, they would still, by dint of the expertise of their weapons scientists, engineers and process workers, retain a much greater ability than other states to manufacture nuclear weapons. Some nuclear hedging—that is, retention of a capability to reverse the renunciation of nuclear weapons—would be inevitable. Postures might be relatively ‘passive’, with lead-times to nuclear-weapons re-acquisition of at least several months (rather than a few weeks), but would represent hedging nonetheless.

It is possible that hedging might be seen as an important element of an enforcement regime, at least for a transitional period. Even if states made dramatic progress in devising the reliable verification mechanisms and robust enforcement procedures necessary to enable secure nuclear disarmament, nuclear-armed states—and states that have found security through extended nuclear deterrence—might insist, at least for an intermediate period, on retaining the capacity to reconstitute nuclear arsenals. The desire to hold on to some such capacity is likely to be at least as strong in democracies as in non-democracies, with opposition parties and lobby groups in democracies liable to challenge any government that appeared ready to agree to eliminate the last nuclear weapons. It would be easy for opposition groups to exploit public wariness about disarmament by

decrying the absence of a robust capability to reconstitute nuclear forces rapidly; governments might well be inclined to pre-empt such criticisms by making reconstitution capabilities a condition of agreeing to multilateral disarmament. It is no accident that the only country to have eliminated a home-made nuclear arsenal, South Africa, made this move in secret. The states that abandoned their nascent nuclear-weapons activities after 1970 also did so without democratic debate, with the partial exception of Brazil.<sup>1</sup> Judging from past experience, nuclear-weapons laboratories and their patrons would probably also be inclined to push to retain extensive technical and human infrastructure, whatever the strategic pros and cons. Once one nuclear-weapons state insisted on hedging, others would either follow suit or refuse to complete the elimination of their arsenals.

In this chapter, we consider the problems of the transitional phases shortly before and after the last nuclear weapons in national arsenals are dismantled. We discuss the desirability or otherwise of hedging, and consider how nuclear know-how could be managed—an issue that will need to be addressed whether or not hedging is ultimately deemed to be desirable. The management of nuclear knowledge has not received much attention in the past, but it is a subject that would need to receive adequate consideration before nuclear disarmament were undertaken—not least so that after disarmament were completed, the former nuclear-armed states could not be accused by the non-nuclear-weapons states, or each other, of retaining illicit capacity in the form of expertise.

### **An internationally controlled nuclear deterrent and/or retaliation force?**

Because of the difficulties associated with the final leap from low numbers of nuclear weapons to zero and the possible danger of a break-out attempt, the international community would need to consider how it would confront a state that had illicitly retained or acquired nuclear weapons in a world that was otherwise free from them.

Several authors have suggested that, as the nuclear-armed states moved towards zero, they should hand control of some or all of their nuclear weapons over to an international body (which would require an amendment to the NPT or the subordination of the NPT to a nuclear-weapons-prohibition treaty). The concept is that the weapons thus deposited would help to deter any nuclear-armed state from seeking an advantage by refusing to give up its last few warheads, and other actors from seeking to acquire nuclear-weapons capabilities. The international body would have the authority to use its nuclear weapons, but only in the most extreme of circumstances.

The detailed model proffered by US analyst Roger Speed involves the creation of an international nuclear deterrent force in stages.<sup>2</sup> Initially, states that possessed nuclear weapons would retain them in small numbers, but would cede decisions about their use to the international authority of the UN Security Council. Authorisation of use could only be given by a majority vote of the Security Council, with its permanent members at this point retaining the power of veto. (Speed's proposal was made in 1994 and did not incorporate India, Pakistan and Israel.) At a final stage, the states possessing nuclear weapons would transfer their remaining arsenals to an international nuclear deterrent force, taking them beyond national control. The operators of the international force, reporting to the Security Council, would maintain these forces and manage their targeting.

Setting aside operational details, which would be exceptionally complex to negotiate, the central problem of this proposal is plausibility. In a world of competing nation-states, it is difficult to envisage any nuclear-armed state handing over control of its nuclear weapons to an international body. Speed argues that an international nuclear force would be retained only to 'deter and possibly retaliate against an outlaw state that has covertly hidden or developed nuclear weapons', and that for this specific function, the permanent members of the Security Council would surrender their veto powers. But regardless of whether or not the veto were retained, each disarming state—including India, Pakistan and Israel—would almost certainly demand an equal voice in any international body managing a centralised arsenal. Many non-nuclear-weapons states might balk at the idea of internationally controlled nuclear weapons. They might worry about the command-and-control arrangements for such weapons, and fear that, unlike national governments, an international body would actually use them. Others might have the opposite concern—that an international body would be so unlikely to use nuclear weapons that their deterrent value would be lost, making its possession of them pointless.

A truly internationally controlled nuclear deterrent force would only be feasible—and, indeed, desirable—if the eight nuclear-armed states had such mutual confidence that they would be willing to hand control of their nuclear arsenals to other actors and, in the case of the P5, to give up their exceptional power of veto in international-security decision-making. This would be a world in which the perceived need to hedge against uncertainties in the international-security environment had been so reduced that almost all the problems for which nuclear weapons are supposed to be a solution would have been resolved. Because this is an exceptionally distant

prospect, the hedges that the nuclear-armed states would be likely to seek instead would be national 'virtual' arsenals or 'surge' capabilities, to which we now turn.

### **Weapons reconstitution: virtual arsenals and surge capabilities**

A more likely hedging scenario than an international nuclear deterrent force would be one in which states retained some capabilities to reconstitute nuclear weapons to deter or retaliate against break-out. Famously, in 1984, US journalist and nuclear analyst Jonathan Schell made a detailed case for 'virtual' nuclear arsenals, or 'weaponless deterrence', as he called it.<sup>3</sup> In his proposal, nuclear-armed states would keep the capability to produce nuclear weapons at very short notice (for instance, in a matter of weeks), instead of the weapons themselves. To enable this, the nuclear-armed states would maintain stockpiles of fissile material, trained workers and production facilities on the point of readiness. In the event of a break-out, the 'virtually' nuclear-armed states would be able quickly to reconstitute their nuclear arsenals in order to oppose the aggressor. Many different models for a reconstitution capability can be imagined, depending on exactly which facilities, materials and personnel the nuclear-armed states were permitted to keep. These factors would affect the amount of time required to produce a (presumably small) operational nuclear force. The minimal capability required for more passive hedging postures, in which the lead time was months rather than weeks, might be termed a 'surge capability'. The exact details of any reconstitution capability would of course need to be specified in negotiations.

The existence of virtual arsenals with a short lead-time might help to deter break-out. If deterrence failed, real nuclear weapons could be reconstituted in an effort to realign the strategic balance. Short-lead-time virtual arsenals might also prevent a proliferation free-for-all, by making it less likely that the allies of erstwhile nuclear-weapons states would seek to acquire nuclear weapons. Because of their longer lead-times, however, it is not clear that surge capabilities would also have this effect.

One possible advantage of legitimising virtual nuclear arsenals or surge capabilities would be that it might make the nuclear-armed states more willing to pursue disarmament in the first place. Indeed, US Special Representative for Nuclear Non-Proliferation Christopher Ford stated in 2007 that 'the potential availability of countervailing reconstitution would need to be a part of deterring "breakout" from a zero-weapons regime'. Ford also remarked that 'this possibility has been incorporated explicitly

into US nuclear weapons planning as a way to provide a “hedge” against a technical surprise or geopolitical risk’.<sup>4</sup> The assumption of a hedging option has contributed to the willingness of the US to reduce its—still enormous—nuclear arsenal. The security logic behind reconstitution capabilities and the political motivation to make sure they existed would be even more powerful if the US were thinking seriously about joining or leading a global effort to eliminate all nuclear arsenals.

Virtual nuclear arsenals are, nonetheless, a controversial idea. There are feasibility questions: given that weapons establishments are worried even today about the loss of expertise and the difficulty of recruiting and retaining skilled staff, for how long would they be in a position to deploy the human, financial and technical resources necessary to maintain effective virtual nuclear arsenals in a denuclearising world? Might virtual arsenals be vulnerable to attack, including from the conventional arsenals of an advanced military power? For Schell’s concept of weaponless deterrence to work, it must be effectively impossible for one state to destroy another’s nuclear-weapons complex. Schell envisages that, in the event of rearmament, nuclear-weapons-production facilities could be dispersed to reduce their vulnerability. However, he also argues at other points that intrusive inspections would be required to ensure that these facilities were not being used to produce nuclear weapons. Such inspections would necessarily reveal the facilities’ location, potentially making them vulnerable to destruction by an enemy before they could be dispersed.

Furthermore, there are reasons to worry that virtual nuclear arsenals would foster instability. Schell sees virtual arsenals as a way of preventing the use of nuclear weapons by giving states some degree of genuinely flexible response to major threats. The problem with giving states this option, however, is that they might use it. For instance, during a crisis, a virtual nuclear-weapons state might try to signal its resolve by beginning to reconstitute its nuclear arsenal, which might then provoke a capable adversary, or a belligerent state’s security patron, to race to balance it. The potential crisis instability of virtual arsenals has led defence expert Michael Quinlan, for example, to conclude that as a long-term posture, having a few states with modest nuclear arsenals of low political–military salience would give more stable global security than would the existence of only virtual arsenals.

Other criticisms are political. The nuclear potency afforded to disarming states by reconstitution capabilities could undermine the principle of global nuclear equity championed by the many non-nuclear-weapons states dissatisfied with the current nuclear order. Moreover, for many

states, nuclear disarmament is not only about equity in an abstract sense, it is also a practical means of reducing the relative power of the US to intervene unilaterally or in small coalitions of its allies and friends around the world. For others, an objective of disarmament is to lessen Russian and Chinese regional assertiveness by removing the emboldening power of their nuclear weapons. In one sense, virtual arsenals would be consistent with the formal abolition of nuclear weapons, and states would no longer be able to use such weapons at very short notice. However, given that the whole purpose of the substitution of virtual nuclear weapons for real ones is to maintain some of the latter's deterrent value, a 'virtual' arrangement would probably not be seen as equitable. Furthermore, because the nuclear-armed states could reconstitute their arsenals in days or weeks, disarmament on these terms would hardly be irreversible. On the other hand, virtual nuclear arsenals could be approached as simply another step on the road to 'genuine' abolition (in the same way that the reduction of numbers of nuclear weapons from thousands to hundreds is). Viewed in this way, they might be seen as more legitimate than the possession of actual arsenals, and hence acceptable for some finite period.

Such questions as these can be resolved only through discussion and, ultimately, negotiation. Once again, there is an imperative for genuine international discussion and debate; taking nuclear disarmament seriously means acknowledging that the states that now possess nuclear weapons would probably insist on retaining, at least for some time, virtual arsenals to deter break-out or retaliate in the event of failure to enforce a nuclear-disarmament regime. These states and leading non-nuclear-weapons states should address this issue head on. To facilitate such deliberations and demonstrate their disarmament bona fides, the NPT nuclear-weapons states should task their nuclear establishments with beginning to model what sorts of reconstitution capabilities would make them most secure in a nuclear-weapons-free world, and what verification arrangements would be needed to ensure that real nuclear weapons were not being produced. The modelling should look beyond unilateral considerations (which are currently the main focus of research in the US) and explore multilaterally what sorts of reconstitution capabilities states would find tolerable in each other, and more or less stabilising. Non-nuclear-weapons states should encourage such modelling and discussions by publicly recognising that states that participate are taking an important step to comply with their disarmament obligations.

### **Managing residual know-how**

Even if reconstitution capabilities were ultimately agreed to be undesirable, it would be inevitable that inequalities between former nuclear-armed states and non-nuclear-weapons states would exist in a nuclear-weapons-free world for at least some time after nuclear weapons had been abolished. Dismantling nuclear weapons and destroying their associated infrastructure would not destroy the nuclear know-how that nuclear-armed states currently possess. It would be impossible to conclusively verify that states had not retained some sensitive documentation, just as it is impossible now to verify the extent of the distribution of the nuclear-weapon designs sold by the A.Q. Khan network. In any case, much nuclear knowledge is embodied in scientists, engineers and other workers.

As destruction of the knowledge embodied in people rather than documents would not be possible—at least, not without committing gross violations of human rights—the knowledge of former nuclear-weapons workers would need to be managed in some way. One aspect of verification that would be peculiar to the transitional period would be verifying the activities of these workers. Many scientists are likely to continue their careers in civilian research establishments, and monitoring their publications would be a useful first step. More intrusive monitoring would provide added reassurance that nuclear-weapons designers and engineers had not resumed their old careers, but this would conflict with privacy rights. What could be done about process workers trained in how to fabricate nuclear weapons and their components? Would their activities need to be monitored, and, if so, how would this be done practically, and without harm to civil liberties? Measures discussed earlier that would make it an international crime for individuals to contribute to the proliferation of nuclear weapons and which would require states in a nuclear-weapons-free world to legally oblige citizens to report evidence of a violation to an international body might help to deter individuals with sensitive expertise from participating in break-out schemes. These are issues that would require careful international examination as part of any serious movement in the direction of nuclear disarmament.

Nuclear know-how would be even more difficult to manage if reconstitution capabilities were retained. But if and when states reached the point where they decided no longer to employ cadres of nuclear-weapons experts, the problem of lingering nuclear know-how might not last indefinitely. There is evidence to suggest that ‘tacit’ knowledge—in the words of sociologists Donald MacKenzie and Graham Spinardi, ‘knowledge that

has not been (and perhaps cannot be) formulated explicitly and, therefore, cannot be effectively stored or transferred entirely by impersonal means'—plays an important role in the manufacture of nuclear weapons (which might, incidentally, be another reason why the 'nuclear weapons cannot be disinvented' mantra is misleading).<sup>5</sup> MacKenzie and Spinardi give the example of the manufacture of nuclear-weapon components. Even in an age of computer-controlled machine tools, highly skilled machinists are still needed to manufacture components of sufficient quality for use in nuclear weapons. Artisanal skills such as these can only be learnt 'on the job'; reading an instruction manual will not suffice. Were a generation of machinists to die without training replacements, future generations would, in a real sense, have to reinvent their skill.

If this concept of tacit knowledge is indeed relevant to nuclear weapons, the transitional phase for nuclear know-how could reasonably be said to last for as long as the final generation of nuclear-weapons designers, engineers and process workers remained alive; it would also imply that verifying the destruction of all documentation on nuclear-weapons design was not of paramount importance. The transitional period could be shortened if the nuclear-armed states were to wind down their nuclear-weapons programmes for some years before disarmament by not making new appointments, and retaining only a skeleton staff sufficient to ensure the safety of the few remaining weapons. After the transitional phase, the former nuclear-armed states would find it as difficult as any other state to build nuclear weapons. Reconstruction would still be possible, but some lost tacit knowledge would need to be rediscovered.

## Notes

- <sup>1</sup> For a discussion of the non-democratic pattern of nuclear rollback, see the concluding chapter of Perkovich, *India's Nuclear Bomb* (Berkeley, CA: University of California Press, 2001 edition).
- <sup>2</sup> Roger D. Speed, *The International Control of Nuclear Weapons* (Stanford: Center for International Security and Arms Control, June 1994).
- <sup>3</sup> Jonathan Schell, 'The Abolition', in Schell, *The Fate of the Earth and the Abolition* (Stanford, CA: Stanford University Press, 2000). See also Michael J. Mazarr, 'Virtual Nuclear Arsenals', *Survival*, vol. 37, no. 3, Autumn 1995, pp. 7–26.
- <sup>4</sup> Christopher A. Ford, 'Disarmament and Non-Nuclear Stability in Tomorrow's World', remarks to a conference on disarmament and non-proliferation issues, Nagasaki, Japan, 31 August 2007, [www.state.gov/t/isn/rls/rm/92733.htm](http://www.state.gov/t/isn/rls/rm/92733.htm).
- <sup>5</sup> Donald MacKenzie and Graham Spinardi, 'Tacit Knowledge, Weapons Design and the Uninvention of Nuclear Weapons', *American Journal of Sociology*, vol. 101, no. 1, July 2005, pp. 44–99. A useful parallel might be drawn (courtesy of Dr John Walker of the UK Foreign and Commonwealth Office) with experimental archaeology, in which it is sometimes necessary to essentially reinvent certain aspects of ancient or medieval building techniques, because their 'secrets' have been forgotten.



## CONCLUSIONS

The preceding pages are intended to be a contribution to the long and detailed international discussion that will be needed if nuclear weapons are to be prohibited. We have tried to define and briefly consider challenges of three broad types. Some are technical, such as the questions of how the dismantlement of nuclear warheads could be verified, and whether declared inventories of fissile materials can be monitored with high confidence. More are political-technical, for instance, whether national or multinational control over fuel-cycle facilities would give greater confidence that break-out from a nuclear-weapons prohibition could be avoided. The third type of challenge is purely political: the majority of the issues we have addressed fall into this category. Because verification cannot provide perfect assurance that all violations would be detected in a timely manner, and in any case cannot in itself prevent break-out, enforcement would be a crucial factor in determining whether a prohibition of nuclear weapons would work and whether it would make the world safer than it would be if nuclear weapons were retained and the risk of proliferation remained at least as great as today.

We conclude by addressing some of the political issues that might be raised as the various difficulties involved in securely prohibiting nuclear weapons are confronted. One simple reaction to the entire project might be 'why bother?'. Proponents of nuclear weapons say, 'Nuclear weapons preserve the peace; getting rid of them is a bad idea even if you could

verify and enforce disarmament.' Others say, 'Abolition is more trouble and cost than it's worth, and states are not going to cooperate enough to make enforcement reliable. Nuclear disarmament is not practicable enough to take seriously.' Some in non-nuclear-weapons states might make a similar point from a different angle: 'The nuclear-armed states are going to place a multitude of demands and conditions on the non-nuclear-weapons states, and then at the end they will find an excuse to keep some of their weapons anyway, so why bother supporting them in their disarmament? We should get as much nuclear technology as we can without accepting any new limits on our rights. Let the big powers worry about proliferation, but don't expect us to help with sanctions or support of military force.'

Clearly, nuclear-armed states would demand a great deal from each other and from many non-nuclear-weapons states in creating the conditions that would reassure them that they would not be worse off without their nuclear arsenals. The nuclear 'haves' would feel that they had leverage over the 'have-nots', because they possessed something that the others wanted them to give up. If non-nuclear-weapons states did not accept their demands, they would, in effect, shrug their shoulders and say 'fine, we'll keep our weapons then'. (Though this attitude would presumably change if a nuclear weapon were deliberately or accidentally detonated, provoking an international clamour for disarmament.)

Non-nuclear-weapons states might for their part have little time for the concerns of nuclear-armed states, and would resent being expected to do more to help these states feel safe enough to relinquish their weapons. Most non-nuclear-weapons states already live with the vulnerability to external aggression that the states with nuclear weapons use their arsenals to minimise. 'Welcome to the club' might be a common response from non-nuclear-weapons states to the worries of those contemplating giving up their nuclear arsenals.

But firm leaders would be needed in the non-nuclear-weapons states to enable these states to resist the temptation to regard disarmament as a problem for the nuclear 'haves' alone. Accompanying the political-psychological morality play of nuclear states' disarmament would be the reality that when the nuclear powers feel insecure, non-nuclear-weapons states can suffer the consequences. A conventional war in the Taiwan Strait would impose severe dangers and costs on Japan and much of East Asia, and cause enormous global economic suffering (although the harm done by nuclear war could be many times greater). A conventional war involving a non-nuclear Israel might well be difficult to contain; the

violence could spread throughout the Middle East, with global economic shocks resulting from interruptions in energy flows. (Though, similarly, the consequences of nuclear detonations in the region could be even more pernicious and long-lasting.) In a global society and economy, no state is an island. If nuclear disarmament resulted in acute instability in relations among major powers, all states would become more vulnerable as a result. Therefore—regardless of the fairness or otherwise of this situation—non-nuclear-weapons states would be wise to be responsive to the reasonable expectations of nuclear-armed states trying to create conditions for the secure prohibition of nuclear weapons.

Equally, nuclear-armed states are unfair, politically unwise and even dangerously insouciant if they think that nuclear abolition merits little more than fine words and the occasional gesture. We offer briefly here five reasons why the objective should be taken more seriously than it has been in the past.

By bringing the NPT into force, the nuclear-weapons states were promising eventually to eliminate their nuclear arsenals. Although some dispute this interpretation of the treaty, the nuclear-weapons states themselves explicitly reaffirmed this undertaking at the 1995 Review and Extension Conference; had they not done so, the treaty would probably have been extended only for a limited time, with its future dependent on more stringent adherence to nuclear-disarmament benchmarks. Such commitments as these must be taken seriously if a rules-based international system is to be upheld. The alternative is a breakdown of nuclear order and a more precarious effort to manage it through competition and perhaps warfare.

The expansion of nuclear energy will threaten security if it is not paired with the universal adoption of tougher verification and inspection protocols and other instruments, such as new rules for managing the nuclear fuel-cycle. Some commentators, including former US Defense Secretary Harold Brown, emphasise the need for agreements to inhibit the acquisition of capabilities to produce weapons-grade fissile material, while arguing against making the abolition of nuclear weapons a 'driving goal'.<sup>1</sup> However, there is little basis for believing that agreement on the new rules advocated by Brown and others will be obtained if non-nuclear-weapons states are not motivated to adhere to such rules. Key non-nuclear-weapons states say that motivation is undermined by the failure of the nuclear-armed few to work in good faith towards fulfilling the disarmament bargain. Seriously pursuing disarmament is therefore necessary

to prevent proliferation and make the probably inevitable expansion of nuclear energy safe. At the same time, however, non-nuclear-weapons states should realise that they will get neither the nuclear industry nor the disarmament they seek if they fail to join efforts to strengthen and enforce the non-proliferation regime.

Preventing nuclear terrorism is another major reason to pursue the measures necessary to securely and verifiably eliminate nuclear arsenals and enforceably bar proliferation. If such measures are not pursued, and nuclear arsenals and the production of fuel for them continue, the risk of proliferation to nuclear terrorists will grow with time. (The terrorism-prevention benefits of many of the arms-reduction, nuclear-fuel-cycle management and verification measures described here would accrue even if the last steps from small arsenals to zero nuclear weapons were not completed.)

The failure of the nuclear-armed states to eliminate their nuclear arsenals is likely to tempt others to seek their own such weapons in coming decades. So long as some continue to place great value on and derive power and status from nuclear weapons, others will want their own share in this currency. In addition, the nuclear arsenals of some states prompt other states to seek balancing capabilities for status, to deter coercion and to preserve their territorial integrity against the greater power. The power projection that weaker states seek to deter may not involve nuclear weapons, but the fact that the states most likely to undertake interventions in other countries possess nuclear weapons helps to provide a political justification for proliferation in the name of strategic balancing.<sup>2</sup> For these reasons, a prohibition of nuclear weapons must be pursued today to prevent nuclear competition tomorrow, even if other means of balancing power and resolving security dilemmas will also be necessary.

The ultimate reason for trying to eliminate nuclear arsenals is to reduce the danger of sudden mass annihilation that nuclear weapons are uniquely capable of producing. It is true that if the risk of major war were to increase as a result of nuclear disarmament, the benefit of avoiding the possibility of massive destruction might be overshadowed by the initiation of a period of dire insecurity. But any perception that such a risk was real would prevent the states that now possess nuclear weapons from taking the very last steps to eliminate them. Nor would they abolish their last nuclear weapons if they lacked confidence that effective and reliable mechanisms were in place to deal with unanticipated conflict among major powers.

Before an abolition process can begin, the classic 'who goes first' problem must be resolved. The failure to enforce current non-proliferation

rules and norms in respect of Iran and North Korea makes nuclear-armed states reluctant to make serious moves towards eliminating their nuclear arsenals. Doubts about whether it will be possible to agree rules that are clearly needed to reduce proliferation risks as nuclear energy expands would stand in the way of final steps towards the elimination of all nuclear arsenals, even as they should not impede further reductions and other arms-control measures. Yet key non-nuclear-weapons states are reluctant to strengthen non-proliferation rules and their enforcement without action in the field of disarmament. Recent experience shows that insisting on progress in one area before moving in another leads to paralysis. The few actors with uncertain or subversive intentions—Iran and North Korea, most dramatically—exploit this paralysis to move past the guardians of non-proliferation. The only way to remobilise the system is to move on both fronts simultaneously. This requires different strategies from those pursued by world leaders in recent decades.

Ideally, governments of both nuclear-armed and non-nuclear-weapons states would take up this combined non-proliferation and disarmament challenge in the near term. If they are unwilling to do so directly, and are chary of undertaking ambitious negotiations, they would earn political credit for themselves and advance this important international agenda by facilitating an international collaboration of government-affiliated and independent think tanks to explore the conditions necessary for the secure prohibition of nuclear weapons. Governments could encourage private foundations to initiate such a project by making available relevant nuclear-weapons and arms-control experts and military strategists to inform and appraise the deliberations of analysts from think tanks and academia. Going further, governments could then invite participants in such a collaboration to present their conclusions to NPT review meetings, national governments, the Conference on Disarmament and the UN General Assembly.

The nuclear order created in the Cold War, and founded on the NPT, is experiencing entropy just as interest in expanding nuclear energy is rising. Many observers view the 2010 NPT Review Conference as a vital opportunity for renovating the global nuclear order. Encouraging experts from a representative range of states and fields to map possible routes to a nuclear-weapons-free world would be a useful step in this enormous renovation project.

## Notes

<sup>1</sup> Brown, 'New Nuclear Realities', pp. 15-17.

<sup>2</sup> See in this regard the pointed remark of North Korean leader Kim Il Sung that 'all US military activities are nuclear in

nature because they are backed by nuclear weapons'. Katy Oh, presentation to the Institute for Defense Analysis, 25 March 2008.

## APPENDIX

# Key Suggestions and Questions

- An international consortium of think tanks should convene a high-level unofficial panel to allow experts from civil society and officials from both nuclear-armed states and non-nuclear-weapons states to explore solutions to the myriad challenges of verifiably and securely eliminating nuclear weapons. Governments could assist these explorations by facilitating the participation of their nuclear-weapons laboratories and militaries.
- To prevent further weakening of the international non-proliferation regime and to enhance the prospects of a safe and secure global expansion of nuclear industry, states must, at a minimum, quickly bring into force the CTBT and agree upon a legal instrument to end further production of fissile materials for weapons. These and other elements of the 13 Steps agreed at the 2000 NPT Review Conference are part of the pathway towards the abolition of nuclear weapons which this Adelphi Paper explores.

### *Chapter 1*

- To enable the project of nuclear disarmament to proceed, the new leaders of the US and Russia should further reduce the size, roles and political–strategic prominence of their nuclear arsenals.

- To give a better sense of how and when a global process of nuclear disarmament might be envisaged, Chinese officials and analysts should begin internal deliberations to specify what level of US and Russian reductions would be sufficient to induce China to join in a disarmament process.
- The nuclear-armed states as a group, and the US and Russia in particular, should reassure the world by agreeing not to routinely deploy nuclear weapons poised for immediate use and vulnerable to destruction if not used on warning of incoming attack.
- The US would need to show a dependable willingness to eschew unilateral or small-coalition military intervention with conventional weapons, in order for others to be persuaded to lay down their nuclear arms and enforce a prohibition on nuclear weapons. However, concerns about strategic intentions and conventional force imbalances in a nuclear-disarmed world should not be allowed to justify a Russian, Chinese or US refusal to reduce nuclear arsenals to low numbers (in the event that the ballistic-missile-defence problem is resolved).
- The US, Russia and China should explore whether and how ballistic-missile defences might stabilise the global nuclear order and help to create conditions for nuclear disarmament.
- The US should deliberate thoroughly with Japan and South Korea and its NATO allies, especially Turkey, to reassure them that US commitments to their security would be no less effective while steps towards nuclear disarmament were being taken.
- To gauge the willingness of the US, Russia, China, India, Pakistan, Israel and others to take nuclear disarmament seriously, and to elaborate the conditions that must be established for them to move in the direction of disarmament, these states should informally explore together their objections to nuclear transparency.
- The disclosure and verification process in North Korea should be valued not only for its immediate contributions to alleviating nuclear insecurity, but also as a test case for future nuclear disarmament.

- Resolving the Iranian nuclear crisis is a necessary political and security condition for allowing evolutionary steps towards regional and global nuclear disarmament.
- The international community should make the illicit proliferation of nuclear weapons and materiel an international crime.
- The challenges of achieving stability and security in a world with much lower total numbers of nuclear weapons should be discussed sooner rather than later by nuclear-armed and non-nuclear-weapons states alike to demonstrate a serious interest in nuclear disarmament.

## *Chapter 2*

- What standard of verification would be required for disarmament? Would states demand near-perfection, would they be satisfied with a 'do-your-best' approach, or could inadequacies in verification be compensated for by a more robust enforcement scheme?
- Would non-nuclear-weapons states trust the verification results achieved using information-barrier technology?
- Could transparency, especially in the form of detailed nuclear histories, compensate for the inevitably inconclusive nature of the results of technical verification? Would non-nuclear-weapons states that had had nuclear-weapons programmes in the past (but not developed actual weapons) need to be transparent about those programmes?
- Would provisions to encourage and protect civil-society monitoring be useful or necessary? If so, what political conditions would be required for it to be effective?
- Nuclear-armed states should appoint national commissions to record the histories of their nuclear-weapons programmes (even if these histories were to remain classified for the time being). States should also discuss among themselves standards for record-keeping and archiving.
- Nuclear-armed states, the US and Russia in particular, should demonstrate prototype end-to-end schemes for verifying the dismantling of declared nuclear warheads.

- Nuclear-armed states should undertake further research into disarmament verification. Three key areas for research are (i) information-barrier technology; (ii) procedures for managed access for challenge inspections; and (iii) the question of what currently classified information might in future be made available to inspectors to assist them with verification. Within the constraints of Article I of the NPT, nuclear-armed states should cooperate with non-nuclear-weapons states on these problems (as the UK and Norway have begun to do).
- All the nuclear armed-states should be more transparent about their nuclear programmes, where such transparency would not undermine stability.
- The IAEA and states party to the NPT should agree to make use of 'special inspections'.

### *Chapter 3*

- If key non-nuclear-weapons states are not willing to accept legal restrictions on the spread of enrichment and reprocessing technology, what other steps are they willing to take to build confidence in non-proliferation?
- Given the (political) problems of the enforcement process—in particular, the timelag between the detection of non-compliance and the implementation of enforcement actions—can a system of safeguards designed to detect but not prevent a violation ever build confidence in non-proliferation sufficient to permit complete disarmament?
- Would multinationalisation or internationalisation of the fuel cycle overcome the limitations of traditional safeguards?
- Can the most proliferation-sensitive activities (reprocessing, HEU production and the naval fuel cycle) ever be compatible with a nuclear-weapons-free world?
- More generally, all states should enter into constructive dialogue about how the expansion of nuclear energy can be reconciled with disarmament. In particular, they should explore (i) whether much

more intrusive and rigorous IAEA safeguards would be acceptable if implemented on a non-discriminatory basis in the context of disarmament; (ii) the potential for multinational or international control of the fuel cycle; and (iii) the balance of benefits and risks in the most proliferation-sensitive activities.

- IAEA safeguards should be enhanced. Moreover, the Security Council should act on non-compliance much faster and should adopt a more reasonable standard of evidence than proof beyond reasonable doubt to authorise enforcement actions.
- States that have or are developing naval propulsion reactors should begin to devise and assess the feasibility of options for placing the naval fuel cycle under IAEA safeguards.

#### *Chapter 4*

- Could nuclear-armed states reconcile the tension between the probable need for conventional arms control and other power-balancing measures and the need for robust conventional military capabilities to deter or defeat the most threatening forms of non-compliance with a nuclear-weapons prohibition?
- Given the possibility of ambiguities in cases of alleged non-compliance and disagreements among key states over evidence and appropriate responses, by what means could inspecting agencies and enforcing states assure themselves and the broader international community that enforcement would be timely, fair and effective?
- Given the role of the UN Security Council, and the fact that its current veto-wielding permanent members all possess nuclear weapons, would it be feasible to empower a different body or group of states to enforce a nuclear-weapons prohibition? How would the new body relate to the Security Council in cases where non-compliance was entangled with other threats to international peace and security?
- If the Security Council was to be the principal enforcement body, would the current P5 retain veto powers? What would be the implications if they did or did not?

- How could India, Pakistan and Israel—nuclear-armed states without permanent membership in the Security Council—be integrated into mechanisms for enforcing a nuclear-weapons prohibition? What form of participation would each be likely to demand as a condition of agreeing to eliminate its nuclear arsenal?
- Experts and officials from nuclear-armed states should explore, perhaps in collaboration with think tanks, the pros and cons of automatic enforcement mechanisms for responding to non-compliance with a nuclear-weapons prohibition. They should also explore whether a prohibition convention should include a right to withdraw, and if so, under what conditions.

### *Chapter 5*

- As the nuclear-armed states brought nuclear-weapons numbers closer to zero, should an international authority be given control over a small stockpile of nuclear weapons? If so, how would such an arrangement work in practice? Who would authorise the weapons' use? Under what circumstances would use be permitted? What would the command and control arrangements be? Would the system be credible enough to deter effectively?
- Would the existence of virtual nuclear arsenals or surge capabilities in place of physical arsenals be an acceptable end point of the disarmament process? If not, would it be acceptable as an interim measure?
- States should begin a discussion about the principle of virtual nuclear arsenals. To facilitate more detailed negotiations later, the nuclear-armed states should begin exploring what would be required for virtual nuclear arsenals to be employed in practice, and the possible effects of such arsenals on strategic stability. Non-nuclear-weapons states should encourage such exploration by publicly recognising that it is a useful step towards disarmament.
- What measures could be taken to build confidence that former nuclear-weapons scientists, engineers and process workers were not using their know-how for proscribed ends?

---

## **SECTION 2**

---

Responses



LAWRENCE FREEDMAN

## Nuclear Disarmament: From a Popular Movement to an Elite Project, and Back Again?

With the publication of the Adelphi Paper by George Perkovich and James Acton, *Abolishing Nuclear Weapons*, the study of nuclear disarmament reaches a new maturity. The paper provides the intellectual ballast to the grand project now gathering political support and stimulating research to take the idea of nuclear abolition beyond a visionary dream to a practical possibility. It reflects a change of sentiment, as the view takes hold that there has been unwarranted complacency over our ability to live indefinitely with “the bomb,” and it revives the dialogue over arms control in advance of the 2010 review conference of the Non-Proliferation Treaty (NPT). The last review conference, in 2005, was a lackluster affair, widely viewed as a failure. Since then, there have been struggles to hold the line with the current crop of nuclear states, as North Korea and Iran—despite the efforts of diplomats and the occasional threats—edge toward nuclear status. In addition, the nuclear business is about to get busier. After a fallow period, concerns about global warming and high energy prices have led to governments rediscovering the benefits of the peaceful uses of nuclear energy even as they are being urged to reject the military uses.

If nuclear capabilities were confined to a few, by-and-large-stable-and-not-too-reckless great powers, that would be one thing. But we have passed that point. Hence the widespread view that a determined effort to hold the line is not enough: There must be a determined effort to roll back the nuclear age. At the very least, the recognized nuclear powers need to agree to go to the review conference with proposals for conspicuous

measures that would go some way toward meeting their obligations under the NPT's Article VI "to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament." In the past, this has been handled by the nuclear powers insisting that their demonstrated faith has been very good indeed and pointing to various measures as moves in the right direction even if in practice they barely do more than tinker at the margins of nuclear relationships. The problem is not that the nuclear powers are in breach of a binding promise to disarm; the legal requirement was never more than best efforts. It is more the impression of cynical disdain, as the nuclear powers insist that the non-nuclear-weapon states strictly follow treaty obligations while showing indifference to their own. Solemn undertakings delivered by junior officials and backed by no more than lists of relatively minor activities and discussions will no longer suffice.

The downturn in NATO's relations with Moscow, from which nuclear issues have not been entirely absent, has provided an inauspicious backdrop for the paper's publication. It does not, however, invalidate the exercise, for this is bound to be a long-term endeavor to be undertaken irrespective of the twists and turns of geopolitics. If and when great power relations do recover, the best analysis will be needed to identify the way forward, ensuring that rhetoric never leaps too far ahead of practical realities while negative assumptions about what is possible can be challenged by pointing out advances in knowledge and technique. *Abolishing Nuclear Weapons* benefits by not being a tract or a polemic, by not being dogmatic or possessed of the sort of zealous certainty that denies alternative views. It identifies problems and takes them as far as it can go for the moment while noting the research needed to move them to the next stage.

### **The Need to Engage Public Opinion**

The paper encourages the view that nuclear disarmament can be achieved through a calm and steady process dependent upon commonsensical commitments and compromises among the major players, with due regard for the interests and concerns of the non-nuclear-weapon states. In this respect, it reflects a striking feature of the current push for abolition: This is an elite-level debate. During the Cold War, when conditions appeared as unripe as they could be in terms of superpower relations, the pressure for disarmament came from political movements such as the Campaign for Nuclear Disarmament and scientific lobbies such as Pugwash. It was routinely opposed by policy elites. Even left-of-center parties were wary of getting too closely associated with disarmament campaigns, sharing

elite anxiety about fundamental strategic judgments becoming subject to a rowdy mass movement. At any rate, supporting these campaigns risked accusations of jeopardizing national security and consequential electoral defeat. The role of Communist parties in these movements added to the suspicions. Lip service was paid to disarmament ideals, but in practice multilateral activity in this area tended to be geared toward taking the sting out of the arms race, finding something for superpowers to talk about, and reducing anxieties about surprise first strikes. In the end, arms control—a term deliberately chosen as a contrast to disarmament—was about managing the balance of terror rather than eliminating it.

The end of the Cold War and the immediate reductions in nuclear arsenals, in particular short-range systems, was reassuring. Cliches about a generation “living under the shadow of the bomb” disappeared from fashionable literature and commentary. The movements turned their attention to opposing unpopular wars, notably Iraq; denouncing globalization; or proposing action to deal with climate change. Fears of a carbon summer took over from those of a nuclear winter. To the extent that disarmament has come back in vogue, it is because of other dangers, notably those associated with the risks of nuclear weapons becoming entangled with failing or rogue states, or with terrorists. For the major powers to hold on to nuclear weapons as strategic props when the security role of these weapons is increasingly marginal and when their impact, should they be acquired by malign groups or states, would be catastrophic, can be presented as at best complacent and at worst reckless. That the elder statesmen who are now leading the abolitionist movement recognize this fact provides the backdrop for the sort of analysis that Perkovich and Acton have now provided. The January 2007 op-ed article by Henry Kissinger, George Shultz, Sam Nunn, and William Perry in the *Wall Street Journal* provided long-term advocates of radical disarmament with an opening. Governments may still have their doubts about the feasibility of the project, but they are becoming loath to distance themselves from the aspiration.

How far, however, can this be taken as an elite project? The destination having been set out, the aim now is to work out what is necessary to get there. This soon takes on the form of a geopolitical engineering enterprise. All the working parts of the international system are examined to see how they need to be tweaked or transformed to contribute to the ultimate goal. Consideration is given to the vital interests of the key players as well as to the areas where they might reasonably make compromises. Barriers are to be cleared by judicious treaty language here, a technical fix there, and a confidence-building measure to follow. In all of this, popular opinion

appears rather distant, as nothing more than a supposedly approving chorus. Yet governments must be accountable to their electorates. If this undertaking is going to be treated with the seriousness it deserves over an extended period, public opinion will need to be engaged.

Obviously public opinion manifests itself in different forms in countries with different political systems and cultures. Its influence can be felt even in countries where formal democratic mechanisms are either nonexistent, as in China, or increasingly circumscribed, as in Russia. It can turn up in Internet blogs or street demonstrations. In both these cases, expressions of popular feeling are often nationalistic. This is not unusual. For example, however much A. Q. Khan might have been a villain to the international community as a promoter of proliferation, in Pakistan he remained something of a hero, which put the government in a difficult position when it was obliged to deal with him after his network had been exposed. In Israel, a strong and vocal lobby will always argue against taking political risks when it comes to matters of national security. If popular opinion becomes animated, it is as likely to serve as a brake on disarmament progress as an accelerator.

So while it would be nice to think that this project can be carried forward by a multinational group of reasonable people making demonstrable progress at a steady pace and without breaking ranks, over an extended period there are bound to be problems. Governments change, as do their priorities. As things stand now, if governments start dragging their feet, it is hard to imagine vocal demands and public demonstration to get the process back on track. If nationalist politicians start to insist that their country is being duped into putting national security at risk, it is just as likely that demands to slow down would follow. As long as talk of abolition remains the diplomatic equivalent of easy-listening elevator music, and as political leaders remember to assert their belief in a world without war and weapons—and, while they're at it, no more poverty and disease either—few will pay attention. Only as the talk becomes serious will public debate open up, and properly so. Depending on the political system, dissent from the official line may be vigorous and open or cryptic and furtive. In all cases, the course of the debate will be influenced by the interaction with whatever happens to be on the public agenda at the time and the passing concerns of the moment.

### **New Challenges at Low Numbers**

Of course, as the authors acknowledge, there is an alternative scenario that would instantly capture popular attention, and that is the actual use of a

nuclear weapon. In a strange way, a sort of confidence that the weapons will not be used provides a degree of comfort that time is available for an orderly progression to abolition. The case for abolition, though, is that it is hard to believe that the past 60 years of self-restraint can continue for the next 60 years. A natural assumption is that nuclear use, even on a relatively small scale, would trigger immediate demands for disarmament. Certainly, we can barely begin to imagine the horror and the fear that would follow a nuclear detonation in an urban area. The grim, eloquent images would remind people of the imperatives of disarmament, and the shock would undoubtedly lead to calls that this sort of thing never be allowed to happen again. But the actual response would depend a lot on context. If this were an act of terroristic nihilism, the short-term priorities would be to hunt down the perpetrators and improve security; long-term abolition would not offer much help. If nuclear weapons were used by states in anger, the global community's response would depend on what transpired next. Did the belligerents collapse, awed by the enormity of what they had wrought, or did one appear to achieve a form of victory through nuclear use? If the latter, seeking to shore up deterrence might prove to be a more appropriate response than seeking to abandon the weapons altogether.

One of the most difficult questions to address, of course, is whether such terrible events become more likely as the number of nuclear weapons gets closer to zero. The essence of the early arms control theory was that disarmament was naïve. Not only would fewer weapons not necessarily mean more peace, but fewer weapons could even make things more dangerous by unsettling the nuclear balance. At some point, a first strike might start to look attractive as a way of imposing unilateral disarmament on the other side; a small advantage in warhead numbers, irrelevant at times of big inventories, might just start to provide additional political muscle. Because even a single weapon can cause serious havoc, there can be no safety in small numbers. With large numbers of weapons, the danger is unquestioned and inescapable, encouraging caution where there might otherwise be temptation. So there is a potentially dangerous crossover point when numbers really start to matter. It is at this point that the smaller nuclear powers would also be required to be part of the arms control process, as they no longer have the excuse that their inventories are dwarfed by the large powers. So for that reason, among others, the negotiations and the processes will be getting more complicated.

At some point the lesser nuclear powers would be expected to join the discussions, if only to provide reassurances that they would not exploit the new situation to create more favorable nuclear balances. As the United

States and Russia commit to major reductions, they would insist that the others identify the points at which they might be prepared to make comparable reductions. A more inclusive process would not, however, necessarily address the issue of more delicate nuclear balances, when small numbers multiply the impact of any aggressive first strike. One possible answer might be to obtain pledges not to use nuclear weapons first or, better still, not to use them at all. The trouble with such pledges, of course, is that they are easily reversed. It is hard to imagine any country entering a crisis relying upon the pledges of an adversary with whom relations have already taken a sinister turn. The entrenched norm of non-use is valuable and worth reinforcing at every opportunity. As this norm has become embedded, nuclear use tends to be ruled out, without debate, as a matter of course. But it is still no more than a norm, and with a single cataclysmic event, what is normal today can become abnormal tomorrow.

There is no reason to suppose that this point would be dangerous just because the numbers had fallen below some threshold level. Nuclear options would come into play only when international relations were already at a breaking point. Nonetheless, those who rely on extended deterrence are going to be more concerned at the reliability of past commitments at this stage, assuming that the international situation in other respects had not changed dramatically. It is no longer the case, as it was during the Cold War, that nuclear threats (at least not threats by Western states) are required in order to deter conventional superior opponents. Western conventional strength now provides deterrence in itself. But it does not solve the problem of a non-nuclear-weapon state facing a nuclear threat and seeking to draw on the strength of a powerful ally to provide a degree of deterrence. Without a benign political environment, progress toward nuclear abolition may be slow. It may be that with such an environment, great projects can be agreed and set in motion. The process will, however, remain vulnerable to a change for the worse in the political setting.

What this argument does do, however, is emphasize, first, the importance of measures intended to reduce the salience of nuclear weapons in international affairs and to reduce the risks of proliferation to unruly states or groups or of accidental use. These concerns are not incompatible with reductions, and the two approaches might be mutually reinforcing. Second, it draws attention to the extent to which the perceived risks of further disarmament will be seen to grow substantially as the process gets closer to zero. The steps that must be taken move from being merely courageous politically into the realm of the extraordinarily bold. Core issues cannot be

fudged. Normal diplomatic ruses—procrastination, creative ambiguity—will not suffice. There must be no possible doubt that one state might hang on to some nuclear advantage after others have disarmed. The agreement and the process would have to be both transparent and definitive.

The problem, therefore, is not with the stability of abolition once it has been achieved. Perkovich and Acton argue convincingly against the fatalism based on the reality that nuclear weapons cannot be disinvented. The lead time for a successful reconstruction of a nuclear arsenal would be long, and the penalties of disclosure of such an attempt would be severe. The problem may be less the stage after abolition than the ones leading up to it.



FRANK MILLER

## Disarmament and Deterrence: A Practitioner's View

*Abolishing Nuclear Weapons* is an important, thoughtful, and challenging paper. Its treatment of the technical issues associated with verifying both the abolition of nuclear weapons and the peaceful nature of civilian nuclear programs is a significant contribution to the debate.

The paper disappoints, however, in its discussion and analysis of the political issues surrounding nuclear weapons abolition. In some way, I realize this is an unfair criticism, as the authors, George Perkovich and James Acton, stipulate early on that they do not intend to explore anything other than technical issues in any depth. That said, the paper proceeds to put forth assertions and propositions that place those political questions front and center ... only to leave the reader futilely seeking further argumentation.

Three issues in particular require discussion:

- The rationale for abolition
- The role nuclear weapons play in interactions between the great powers
- The dichotomy between why nations have nuclear weapons today and the world the authors envision as bringing about abolition

Additionally, there are some deterrence and operational issues that bear mention.

### **A Rationale for Abolition?**

At the outset, the authors indicate that the primary reason for abolishing the nuclear weapon stockpiles of the five nuclear-weapon states and the other nuclear-armed powers is halting nuclear proliferation. “[T]he problem [is] of states resisting strengthened non-proliferation rules because they say they are frustrated by the nuclear-weapons states’ refusal to uphold their side of the NPT bargain....”<sup>1</sup> While it is true that such protests are often made by the professional rhetoricians (many times without their capitals’ knowledge, by the way) in the Conference on Disarmament and in Non-Proliferation Treaty Review Conferences, a dispassionate look at the facts suggests that the nuclear-weapon states are indeed fulfilling their NPT commitments. First, even using as a baseline the number of nuclear weapons that existed at the time the NPT entered into force (let alone the size of the U.S. and Soviet arsenals at the height of the Cold War), the nuclear-weapon states have been steadily reducing their nuclear forces and stockpiles. The U.S. nuclear arsenal today, for example, is 90 percent smaller than it was in 1972, and, it will be reduced by an additional 15 to 30 percent (relative to its current size) by 2012. Second, “the nuclear arms race,” whose end is called for by Article VI of the NPT, was, for all intents and purposes, halted in the late 1980s. While all this was occurring, two new nuclear nations emerged (India and Pakistan), North Korea repudiated its treaty obligations and developed and detonated a weapon, Iran is on the brink of developing a weapon, and two other emerging nuclear weapon programs (Iraq and Libya) were terminated by superior force and skillful diplomacy. Additionally, the actions of regimes motivated by deterring U.S. conventional military forces has nothing at all to do with the U.S. nuclear arsenal. Nor do the actions of states such as Pakistan, which are motivated by regional considerations. Finally, it is important to note that rogue states and would-be nuclear terrorists seek to disrupt international stability; their desire for nuclear weapons derives directly from their own nefarious agendas and are detached completely from any reductions in the arsenals of the nuclear-weapon states. (Indeed, there is a case to be made that these states’ nuclear capabilities would serve to deter rogues and terrorists from using nuclear weapons should they actually obtain them.) It is not immediately evident therefore that proliferation is linked to the existing arsenals of the five nuclear-weapon states or to the fact that four of the five continue to move toward fulfilling their NPT

obligations. In fact, the history of the past few decades seems to indicate that hard-core proliferators pursue nuclear-weapon programs independent of other states' reductions in their arsenals. Thus the prima facie case for abolition remains to be made. How and in what way would the elimination of all nuclear weapons by the five states make the world a safer place?

### **Nuclear Weapons Have Moderated Great Power Interactions**

Answering that question clearly and unequivocally must be a sine qua non for the nuclear abolition movement. In this regard, however, the authors note in passing that the argument that "prohibit[ing] nuclear weapons 'make[s] the world safe' for conventional war" ... "is not a fair demand. It is motivated by the assumption that nuclear weapons would never fail to deter major conventional war, and it neglects the consequences if deterrence fails and nuclear weapons are detonated." Deterring conventional aggression, however, is and has always been a key rationale for the existence of nuclear weapons. Since the inception of the U.S. nuclear arsenal, its primary goal has been to deter enemy attack on U.S. vital interests or those of its allies. Put more starkly, the U.S. nuclear arsenal was developed to prevent a conventional third World War from occurring on the plains of Europe. NATO's role was always to deter *both* conventional *and* nuclear attack. Noting that since nation states emerged, the great powers of Europe regularly went to war with each other until 1945 (and that even the enormous devastation caused by World War I was not sufficient to prevent World War II), one must ask what changed the situation so that peace has prevailed since then? The nature of governments has not changed; rather, the stakes of going to war became too great. No longer could an aggressor look to his military's genius to defeat the enemy quickly and decisively; nuclear weapons gave the attacked party the capability to turn an aggressor's victory into massive defeat. The fact is that possession of nuclear weapons has moderated the behavior of the great powers toward one another. This does not suggest that deterrence can never fail, or that if it did nuclear weapons would not be used without horrendous consequence. But it does suggest that more attention needs to be paid to how the great powers have acted since 1945 and why. The devastation in Europe during World War II is a stark reminder that nuclear weapons are not the only cause of massive destruction and loss of life. If the authors do not believe in nuclear deterrence as the way to avoid such devastation, they need to explain what would take its place.

### Political Issues Are More Difficult to Resolve Than Technical Ones

This lack of explanation is made all the more pointed by the following statements in the paper:

- “An eventual nuclear-abolition project could only succeed if it were accompanied by changes in broader military relations that convinced states that now rely on nuclear deterrence that nuclear weapons would not be necessary to deter large-scale military interventions.”
- “Conventional arms-control and confidence building measures would probably need to be implemented in the regions abutting Russia and China, and in South Asia.”
- “The eight nuclear-armed states will not be able to collectively envisage a prohibition of nuclear weapons until conflicts cent[er]ing on Taiwan, Kashmir, Palestine, and (perhaps) the Russian periphery are resolved, or at least durably stabilized.”
- “It is difficult to imagine China, Russia, France, the UK and the US genuinely embarking on a course of nuclear disarmament in the absence of a significant reconciliation of their interests and approaches to regional and global security.”

These sentences point to the heart of the problem. Nuclear weapons exist because nation states retain the option to use military force in world affairs. Nuclear weapons compensate for conventional military inferiority and moderate against the use of force by one great power against another. The problem lies not in the weapons, but in the nature of humankind. If one could actually implement the ideas listed in the bullets above, the question of nuclear-weapon abolition would become enormously easier. All of this points to the oft-ignored NPT Article VI commitment for all nations: “Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, *and on a Treaty on general and complete disarmament under strict and effective international control*” (emphasis added). The political problems that prevent abolition are daunting; they need to be analyzed and not assumed away.

## Two Warnings With Respect to De-alerting and to Mirror-imaging

It would be difficult for one who has been a practitioner in the nuclear policy field for several decades to let pass without notice two other comments in the paper.

The first refers to the so-called de-alerting debate. The authors note that “quick-use forces could exacerbate instability in crises, and are vulnerable to inadvertent use.” There is some theoretical truth in the argument about instability. But it is far more difficult to prescribe corrective action that does not contain within it the seeds of crisis instability. For more than twenty years, a small element of the arms control community has worried about alert intercontinental ballistic missiles (ICBMs), and in particular Russian ICBMs on alert, concerned that they are particularly susceptible to accidental or inadvertent launch. To the degree that one worries about inadvertent launch, the best answer has always been to improve Russian warning systems to make an accidental launch impossible; the moribund U.S. effort to establish a Joint Warning Center with Russia attempted to help fill this need. Critics of this approach call for taking steps to disable the U.S. Minuteman force in the hope that Russia would follow suit with its ICBMs. This approach ignores the fact that Russia has far more warheads on its ICBMs than the United States has in its Minuteman force and, as a result, even if the United States were to eliminate its entire ICBM force, Russia would probably still maintain ICBMs on alert. And, to the degree one worries about “hair-trigger” responses, the prospect of taking only a portion of the Russian ICBM force off alert should raise major worries, because the remaining alert forces would logically be on even higher alert. Those who back de-alerting also tend to favor finding a way to impede the ability of ballistic missile submarines to launch their missiles (*not* a position taken by the authors); it is difficult to conceive of a more destabilizing approach to dealing with the issue of an accidental or inadvertent launch. I do not suggest to settle this ongoing debate here; I mean only to point out that the issue is sufficiently complicated that it defies easy solution. Because it is not germane to the paper’s main thrust, raising it is, in my opinion, a distraction.

They also argue that: “As long as each state had survivable nuclear forces capable of threatening each other’s capitals and leadership centres... conventional-force imbalances need not be less bearable than they have been historically.” This statement presumes that both sides’ vital interests are the same and that therefore both are equally deterred by the same threats. The history of the practice of deterrence policy suggests that mirror imaging is not a sound basis for deterrence: What might deter a U.S.

government may be quite different from what might deter a hostile power, particularly one with a nondemocratic form of government that views the world through a very different lens. Because this argument is not central to the paper's thrust either, it, too, is a distraction.

### **My Bottom Line**

In sum, despite the useful technical contributions on verification, the paper remains incomplete. It raises important political issues but does not provide answers. And because the political issues are more resistant to solution than the technical ones, the community must await a more complete treatment of this important subject.

**Note**

<sup>1</sup> Inherent in the line of argument that the abolition of arsenals by the five recognized nuclear-weapon states will halt nuclear proliferation, too, is the idea that the NPT is a favor granted (temporarily) by the non-nuclear-weapon states to the nuclear-weapon states and, therefore, that it is not generally in the interests of the non-nuclear-weapon states either to belong to the treaty or to abide by its

constraints. In reality, a treaty that prevents one's neighbors from developing nuclear weapons is manifestly in any state's national security self-interest. For this reason, all non-nuclear-weapon states party to the treaty need to abandon this appealing but clearly false rhetorical stance and to take a strong stand in favor of the continued viability of the NPT and against the proliferation of nuclear weapons.



JONATHAN SCHELL

## The Power of Abolition

The project of abolishing nuclear weapons is a puzzle with a thousand pieces. Achieving it is like solving Rubik's Cube: The art is to know which pieces have to be put in place first, which later. Which steps toward the goal are *conditions* for achieving further ones? Which steps will *enable* which others? Which obstacles are showstoppers? Which can be worked around? Is a detailed vision of the endpoint necessary to guide the first steps, or can the first steps grope forward without such guidance? If so, will the endpoint emerge only through a kind of grand improvisation? Is a practical vision of the endpoint possible at all? Would embrace of the goal make "the best" the enemy of "the good"? Or would it in fact be indispensable to the progress of the good? For example, is abolition the only way to stop proliferation, or can proliferation be stopped while some states hold on to nuclear arsenals and resolve to keep them indefinitely? What about regional political crises and tangles? Are they fatal obstacles to abolition, or might abolition provide a key to solving them? What about great-power tensions? Must these be dissipated first, or, on the contrary, should their existence be a further goad pushing the world away from nuclear annihilation? Is denuclearization thus possible only for nations living in harmony, or can it to be robust enough to include rivals, even enemies? Or is there some middle course, combining steps toward disarmament with reductions of non-nuclear tensions? Hanging in the balance is not only the question of what is the right path to abolition but also whether abolition is even possible—or desirable.

### The Hows of Abolition

In *Abolishing Nuclear Weapons*, George Perkovich and James Acton have carved out a portion of these questions to address. They tell us at the outset that they will investigate “how complete nuclear disarmament could be achieved safely and securely.” They will not discuss “whether it should be tried.” The emphasis is thus on conditions that must be met if abolition is to be acceptable to the existing nuclear powers. (The 186 non-nuclear-weapon states have each, of course, already achieved “abolition” within their own borders, in keeping with the requirements of the Non-Proliferation Treaty, or NPT.) The editorial delimitation was in one respect wise. Discussions of abolition have usually been broad-brush affairs—satellite views, so to speak, of the subject. By zooming in on one section of the problem, the Adelphi Paper affords a level of specificity rarely found in discussions of abolition. The result is a rich trove of findings, questions, and conclusions.

The discussion of “first steps,” such as further reducing the U.S. and Russian arsenals, de-alerting all nuclear arsenals, and querying the lesser nuclear powers’ willingness to join the process, is quite familiar. The new element here is to examine these proposals as steps toward abolition. Yet because the authors believe it is too early to commit themselves to that goal, we may wonder why states would wish to take steps toward a destination to which they are as yet unable to dedicate themselves. Their incentive would seem weak.

The paper forges into new territory when it takes up the issues of inspection of abolition, its enforcement, and the possible role of hedging or “‘virtual’ arsenals.” Especially welcome is the introduction of political considerations into discussions that are too often purely technical. After all, it is concrete, existing countries, not countries in general, that will have to embrace abolition if the goal is to descend from the realm of rhetorical flourishes to reality. Thus, the authors pose the question—for the first time, as far as I am aware—of what political reward India might require if it were to agree to an enforcement mechanism for abolition. They conclude that the compensation might be accession to permanent membership in the United Nations Security Council, with its privilege of the veto power. India, they persuasively argue, would be unlikely to permit the existing nuclear double standard to persist in new form by submitting itself to the veto of five other former nuclear powers while lacking one itself.

Also refreshing is recognition that abolition depends on consensus and strong resolve by the world’s existing great powers, especially the United States, Russia, and China (the Indians would, of course, add themselves to this list), which not only are the world’s chief possessors of nuclear

arsenals but also the most influential negotiating partners in efforts to solve nuclear-related regional crises. Curiously, though, the authors do not consider the problem of enforcement should one of these great powers itself violate an abolition agreement. That exercise, it seems to me, would only have strengthened one of their main conclusions: that agreement among these powers is a necessary condition both for embarking on abolition and for preserving it. For if the violator were, say, Russia, there is simply nothing the United States or any other country could do to stop it—except, of course, return to nuclear armament. The discussion of what Israel would require to move toward its already-declared goal of achieving a nuclear-weapon-free Middle East likewise injects politics into the discussion. A further strength of this general approach is the authors' use of recent or current experience, such as the international efforts to roll back Iran's nuclear program, to shed light on possible verification or enforcement crises under an abolition regime.

### **The Whys of Abolition**

The very editorial restriction that has permitted this welcome and original profusion of detail, however, may have weakened the article in other ways. The emphasis is almost entirely on obstacles. With discussion set aside of "whether" and why abolition should be pursued, it becomes very difficult to imagine that the obstacles might be overcome. In this context, the obstacles have a way of hardening into preconditions, which multiply dauntingly. Only if the current efforts to disarm North Korea succeed, the article states, can "possessors of nuclear weapons ... look over today's horizon and imagine that the elimination of all nuclear arsenals could be feasible." Likewise, if Iran continues to "defy the rules" in its current negotiations, "there is no reason for anyone to have confidence that rules to guide and secure a nuclear-weapons-free world would be enforced." So, too, removal of threats to Israel's existence "is a necessary political and security precondition for allowing evolutionary steps towards regional and global nuclear disarmament." Framed in this way, the obstacles grow into a dense bramble patch in which the abolition project seems likely to remain stuck indefinitely. If the United States and the other nuclear powers cannot even look over the horizon to envision abolition until a host of current crises are resolved, how can anyone imagine that the world will ever actually arrive at the goal?

The picture would change radically if, at each step, the reasons for choosing abolition—the whys of the matter—were set forth and kept constantly in mind. Consider the plight of Israel, at present the Middle East's sole

nuclear power. Israel's arsenal provides a steady incentive (not the only one, but a major one) for Iran and other countries in the Middle East to acquire nuclear weapons. Pakistan already has the bomb, and its "father," A. Q. Khan, was recently surreptitiously peddling its makings throughout the region. Pakistani scientists are known to have had conversations with Osama bin Laden about nuclear technology. In these circumstances, the danger is growing for Israel not just of military defeat but—what is incomparably worse—of nuclear annihilation. Thus a full consideration of Israel's safety, very much including its existence, requires more than a listing of the conditions that must be met if it is to give up its arsenal. What is needed is a comparative exercise that weighs the dangers if the region or world remain on their current path of proliferation and balances them against the admittedly large and real dangers of a nuclear-weapon-free world.

Or consider the situation of the United States. Most observers agree that the only major military danger to the United States arises from nuclear weapons and other weapons of mass destruction that might be imported onto our soil. In this respect, the September 11 attacks constituted the handwriting on the wall. At the same time, it is by no means clear that there is any sensible mission for America's own nuclear arsenal other than deterring the nuclear threats posed by Russia and China. But those threats, of course, would be removed by abolition. Considerations such as these have been key in leading former Secretary of State George Shultz and his co-authors to urge the United States to follow in the footsteps of Ronald Reagan by advocating abolition.

In short, when the whys of abolition are figured in, every specific equation of risk shifts dramatically. At each step, the dangers are then matched against the benefits. The overall anatomy of the dilemma then also looks different. The Adelphi Paper concentrates mostly on the conditions that must be met if the nuclear powers are to disarm (while also examining, though less exhaustively, what disarmament steps those nuclear powers must take to win agreement from the non-nuclear-weapon states on the kind of stringent verification and enforcement measures an abolition agreement would entail). There is very little recognition, however, that not only the steps toward the goal but even current regional nuclear crises, such as those over the North Korean and Iranian programs, might become tractable in the context of a credible global commitment to abolition led by the great nuclear powers, including above all the United States. Some critics of this view suggest that because it is not America's nuclear arsenal but its conventional superiority that North Korea and Iran most fear, a commitment to abolition would have no influence. They also argue that

the mere example of disarmament would have little sway on proliferators, who are more influenced by local anxieties. While it is surely true that the conventional balances must be addressed, these objections overlook the raw power that would be generated by a concert of all nuclear-armed states, backed by every non-nuclear-weapon state, resolved to stake their security on abolition just as firmly as many now stake it on nuclear arms. It would not be a matter of disarming first and then waiting around to see who followed the example—of ending the hypocrisy of the nuclear double standard and then hoping to see virtue rewarded. It would be a matter of launching a global campaign to exert moral, political, economic, and even military pressure against the few holdouts that dared to argue that they alone among the world's nations had a right to these awful weapons. Today, for example, the United States, China, and Russia are disunited in their approach to Iranian violations of the NPT, with the United States taking a tough line and Russia and China taking a more permissive approach. But it is unimaginable that a Russia and China that were themselves planning to do without nuclear arms would permit an Iran or any other nation to develop them. Indeed, great and small powers alike would be united in the cause. In this respect, the disarray of current negotiations, though a useful point of comparison, offers a poor analogy to negotiations in a world on its way to abolition.

Broadly speaking, two approaches to abolition are possible. One is to conclude with the authors that abolition “is too far beyond the horizon” for a decision now, leaving the goal hostage to a variety of conditions that must be met along the way. The other, which I favor, is to canvass the difficulties in advance, make a broad judgment that a world without nuclear weapons, though hardly without dangers, would be incomparably safer and more decent than a world with them, and then proceed. Embrace of the goal should come first, and the steps would then follow. As each obstacle arose, the resources of a united world community, propelled by the prospect of at last living without the horror of nuclear destruction hanging over its head, would be marshaled to meet the challenge. For a commitment to abolition would not only be desirable; it would also be powerful.

### **Harnessing the Power**

If we ask what initial commitment would be enough to immediately check proliferation, we can imagine many answers. It might begin with a clear declaration by an American president, after full agency review, congressional hearings, and extensive public debate, that abolition of nuclear

weapons was the policy of the United States. Or else, the first step might be taken in tandem with Russia. Either way, the agreement of all other nuclear powers would be immediately sought. Part of the agreement among these powers would be a concerted policy to stop nuclear proliferation at once. Countries that already had renounced nuclear weapons should be included in the process without delay, inasmuch as the goal is not just disarmament of the armed but creation of a nuclear order that would embrace all nations. The initial goal thus would be a serious, credible, global commitment to nuclear abolition. Once stages had been outlined, steps, including those recommended in the Adelphi Paper, would commence immediately. While those were being implemented, the difficult final steps would be worked out in detail, not to discover whether they were workable but to make them happen. The process would by no means end with abolition, a term susceptible of many definitions—technical, legal, political, and moral, especially when the latent nuclear capacity of nations, which can never be entirely erased, is considered. The effort should continue with steps “below zero” nuclear weapons to fortify the new order. The final step would be a formal legal ban on nuclear weapons, whose mere possession would be defined as a crime against humanity.

In short, the project should be less like *The Odyssey*, a voyage from one adventure to the next with the outcome uncertain each time, and more like D-Day—a clear plan to reach the goal with provisions made in advance to surmount each obstacle based on a commitment to ultimate success.

It’s true that the concluding chapter of the Adelphi Paper does after all articulate reasons for wanting abolition. Those named are: fulfilling the nuclear powers’ NPT commitments to full nuclear disarmament; making the expansion of nuclear energy safe by banning nuclear-weapon technology; preventing nuclear terrorism; ending the incentives for proliferation; and—the big one—reducing “the danger of sudden mass annihilation” (p. 110). But these reasons come too late in the argument to be brought to bear on the detailed discussions of specific decisions that form the main substance of the paper. Had they been included earlier, it seems to me, many preconditions for abolition would have turned back into mere obstacles, even as the sources of the global will to overcome them would have been placed on view.

**BRAD ROBERTS**

## On Order, Stability, and Nuclear Abolition

Congratulations to George Perkovich and James Acton for their valuable effort to bring some new content to the debate about nuclear disarmament. Their “thought experiment” in the real-world requirements of nuclear abolition brings home a powerful message about the obligations that would fall on many states, and not just those in possession of nuclear weapons, to make such a world viable. I am grateful for the invitation to join the conversation they are seeking to energize. I wish to focus this comment on two key elements of their analysis. The first relates to the linkage between order and abolition. The second relates to the linkage between stability and the movement toward abolition.

### **On Order and Abolition**

First, let us review the international political conditions that might—just might—make abolition feasible. The paper lists the following:

- In the Middle East: an acceptance by Israel that it will be secure without nuclear weapons, resolution (or durable stabilization) of the Palestinian conflict, Iranian acquiescence to international demands that it remain non-nuclear, and creation of a zone free of weapons of mass destruction

*The views expressed in this chapter are exclusively the author's personal views and should not be attributed to any institution with which he is affiliated.*

- In South Asia: resolution (or durable stabilization) of the Kashmir conflict and acceptance by India and Pakistan that nuclear weapons are not necessary to deter large-scale war
- In East Asia: resolution (or durable stabilization) of the conflict over Taiwan and acceptance by Japan and others in the region that China's rise is not threatening
- In major power relations: confidence among the five nuclear-weapon states recognized by the Non-Proliferation Treaty (NPT) that their conventional military power is sufficient to deter threats to their vital interests; a cooperative U.S.–Russia–China approach to strategic military stability, including substantial U.S. deference to Russian sensibilities on missile defense; Russian willingness to settle disputes around its periphery on terms acceptable to others; Russian and Chinese confidence that they need not fear the offensive potential of U.S. conventional military power; and U.S. assurances that it will not act unilaterally or with small “coalitions of the willing” in any circumstance
- Among U.S. allies: a relaxation of the need for a nuclear-backed security guarantee from the United States and confidence that its conventional power projection would be sufficiently swift and decisive to defend them and their interests in a time of need

Whether this is a definitive list is debatable. The fact that it is daunting is not. For a moment, I wondered why the authors bothered to write any chapters beyond their first. After all, it seems as if they are arguing that nuclear abolition will be possible only when the lion lies down with the lamb, “peace breaks out,” and nuclear swords are turned into kilowatt-hours because of their utter irrelevance in a new and different world.

In fact, of course, the authors do not anticipate the end of conflict. They recognize that conflicts may be stabilized but not resolved, that confidence may rise but not yield full trust, and that some states cheat. Thus they argue that disarmament in an imperfect world requires effective collective security. And what would effective collective security responses to threatened or actual breaches of the nuclear peace require? They highlight the following: a “significant reconciliation of interests and approaches” among the major powers; a willingness on their part to put international stability ahead of the single-minded pursuit of national advantages; the creation of

compliance processes that enjoy broad international legitimacy; and the availability of non-nuclear means of punishment (that would be seen as credible by the targets of deterrence).

The effort to build the institutions, processes, and norms of collective security is much more than a thought experiment. This effort is now roughly a century old. The record to date can hardly be seen as encouraging for rapid achievement of the type of world the authors invite us to envision. After all, most of the failures of nonproliferation through the nuclear era are directly tied to divergent interests among the major powers or to their ineffectiveness as guarantors of countries that perceived the risks sufficient to seek nuclear deterrents. In dealing with the threat of weapons of mass destruction in particular, the record of the United Nations Security Council is not particularly distinguished. The moment of hope reflected in the "New World Order" envisioned by President George H. W. Bush in 1991, built around collective enforcement of global norms, has given way to mounting skepticism as the Security Council has failed to prevent or reverse proliferation by India, Pakistan, and North Korea; has proven ineffective at curtailing Iran's programs of concern; and has publicly fallen out over its roles and objectives vis-à-vis Iraq. Can a viable nuclear-free world be built on this track record? Would a renewed disarmament effort somehow break this pattern and bring the needed discipline to the major powers? Do their interests in fact coincide in nuclear abolition? In the quest for a world ready to permit the final moves to nuclear disarmament, these conditions seem especially difficult to fulfill.

But let us grant that political circumstances might change and that collective security institutions could be made to work as envisaged and that others might accept their compliance role as legitimate. Would these institutions then be ready and able to meet the unique tests that might come in a world where abolition has taken hold incompletely? In analyzing this particular problem, the paper paints too benign a picture, in my view. It focuses too much on the problem posed by the cheating state that has hidden the proverbial atomic bomb in the basement and too little on the problem posed by a state that openly brandishes its bombs and then sets out on some bold ambition of coercion or aggression. The question of how to deal with a nuclear-armed renegade gets little more than one paragraph in the discussion of enforcement. How would the major powers do their jobs as global sheriffs against a nuclear-armed challenger? Would their publics be willing to do so without nuclear weapons of their own? Could deterrence of such a challenger be effective by conventional means alone? Could defeat of such a state be done in a sufficiently rapid and decisive

way by conventional means to safeguard the lives of those millions who might perish in a longer war? More thinking is needed on such questions.

In sum, the international political conditions that could enable abolition do not currently exist. They seem to require major, and in some ways fundamental, reorientations in the roles and responsibilities of most of the actors in the international system. These observations leave me skeptical that the conditions that would make abolition feasible are in any way proximate. This is not to argue that we should not work to bring them into being. After all, we want to live in a world in which most of the conflicts have been eliminated, or at least stabilized, and where major powers act in concert to maintain the peace. It would be (and has been) a worthy use of U.S. power to bring such a world closer.

### **On Stability and the Movement Toward Abolition**

That brings me to my second focus. The paper speaks alternately of the near-term steps toward the “near horizon” and the more distant steps to the “far prospect” of actual abolition. How many steps might there be in between (if the latter indeed proves possible)? Might they prove to be small steps or large steps? Because I assess the international political conditions enabling abolition as not proximate, I must conclude that the landscape between the near horizon and the far prospect is rather large. And I anticipate that the terrain will sometimes be easy to traverse but will other times require some great leaps and even some backtracking and indirect travel. I would expect also that experience along the way will significantly color beliefs about the desirability of disarmament and the means to achieve it. Hence I feel that the paper has given this part of the journey short shrift. From my perspective, a number of problems stand out in this particular part of the landscape as being worthy of deeper study. Four are highlighted here.

First, the major powers will confront new problems of instability if and as they reduce their reliance on nuclear weapons and adapt their strategic postures to new circumstances. As numbers come down, both the United States and Russia will worry increasingly about how quickly and competitively the other might try to send them back up, and each has different capacities to reassure itself that it would not be taken advantage of in this manner. If and as the numbers come down, imbalances in remaining capabilities will become more prominent; the United States will worry increasingly about Russia’s tactical nuclear weapons, while Russia will worry increasingly about emerging imbalances with states along its periphery that possess intermediate-range nuclear capabilities. If and as

the numbers come down, Russia and China will worry more about imbalances at the conventional level of war (for which they compensate by nuclear means). They are already keenly concerned about being able to offset growing U.S. advantages in non-nuclear strategic strike and also missile defense. Stability in relations among the nuclear-weapon states at lower numbers will not be achieved simply by cutting to lower numbers.

Second, deeper reductions in the two largest existing nuclear arsenals will have an impact on the behaviors of other states. The authors touch on the incentives that this might create for new states to enter the nuclear club, as the cost of entry to peer status would have been reduced. Such reductions may also motivate existing members of the nuclear club to new nuclear status. For example, China's possible "sprint to parity" (by building up its arsenal to match that of the United States and Russia in a numerical sense) is a rising worry today for policy makers in both Washington and Moscow. Some in Asia also express concern about what level of nuclear prowess India might ultimately deem necessary to its desired political status. As the authors rightly argue, mitigating this problem will require bringing nuclear-armed states other than Russia and the United States into the formal reduction process. So far at least, this has proven far easier to say than do. Determining how it might be done requires a deeper understanding than has been evident so far of how leaders in these countries are trying to adapt force structures in response to increasingly complex security environments.

Third, new stability problems will emerge if and as the newest proliferators increase their arsenals and their strategic reach. Most states preach the virtues of minimum deterrence, but most also have found the search for a survivable deterrent to be long and arduous. In the coming decades, states such as India, Pakistan, and Iran may assemble arsenals of warheads numbering in the hundreds and delivery systems capable of global reach, adding tremendous complexity to the web of deterrence. The occasional search for unilateral advantage seems likely to add tremendous fragility to that web.

Fourth, if the decades ahead are anything like the decades past, we can expect to see the emergence of one or more states committed to a revolutionary ideology, a challenge that would take on a particular new and ominous hue if that state also has nuclear weapons. Such a development could well make the "rogue state" problem look easy in comparison. After all, so far at least, our experience with "rogue states" is that they have sought to commit aggression against their immediate neighbors and to use violence against their own citizens. How different a world would we

face if a revolutionary regime were to emerge, one committed to the use of nuclear threats, and perhaps also nuclear attacks, to broadly remake international borders or advance an ideology of purported global import, or simply to wage civil war? Some in al-Qaeda have articulated just such a vision—the creation of a nuclear-armed caliphate that would exploit its status as a “nuclear superpower” to first purify the *umma* and then remake the global order. Whatever the ultimate fate of such a state, the experience would likely be hugely decisive in shaping the next nuclear order.

This list is illustrative of the potential problems of consequence for nuclear order somewhere beyond the “near horizon” but before the last step to the “far prospect.” But it is not a prediction. Some such problems might prove easy to manage by negotiation. Other problems beyond those anticipated here would undoubtedly emerge. As argued above, we cannot know now precisely how many and what type of steps might lie along the landscape I am trying to sketch out here.

Recognizing that the challenges of nuclear order in this interim period are unique and consequential for what is to follow has at least a couple of important implications.

One implication is that there will be some challenges in this interim period for which nuclear deterrence remains relevant. This implies that nuclear-armed states, especially those that guarantee the security of other states, must have capabilities in place that are effective for deterrence. Four of the five recognized nuclear-weapon states have established modernization plans that aim to tailor deterrence capabilities to future requirements as they are perceived. The fifth is the United States, which remains committed to caretaking a nuclear deterrent that was built in another time for another purpose and to standards of security and reliability better suited to bygone days. Many advocates of abolition have deemed any modernization of the U.S. deterrent as inconsistent with the long-term goal of abolition. It is useful to recall here the concept of nuclear order framed by William Walker: an agreed balance of restraint and deterrence. We know well what restraint the abolition vision requires, but we know far less about what deterrence that vision requires. Failures of deterrence in the decade(s) ahead could be as decisive, if not more so, to the disarmament prospect as successes in restraint. Some new foundation must be found that aligns U.S. force modernization with medium- and long-term objectives. Perkovich and Acton have done a nice job of pushing the envelope of thinking on the role of deterrence in the interim period ahead, and I only encourage further thinking.

A second implication relates to the argument with which the authors begin their paper: “[I]f it is to be sustainable and acceptable to the majority of states, any new nuclear order must be equitable and not perpetuate the disparity between the states that possess nuclear weapons and those that do not.” This seems true of the “far prospect,” but what about in the landscape between there and the “near horizon”? Can there be a durable but nonequitable nuclear order in the interim period? Elsewhere in social and political relations, the only basis for an unequal distribution of rights is an unequal distribution of responsibilities. This is to imply that the only possible basis for a continued international acceptance of unequal nuclear rights in the interim period is improved performance by the nuclear-weapon states of their responsibilities as stewards of the principles and purposes of the United Nations Charter. Their failure to act responsibly—and to be seen to be so acting—would make even less likely the ultimate fulfillment of the international political conditions of disarmament. Their ability to act responsibly will depend critically on their confidence that they have the means available to stand up to nuclear-armed renegades.

Toward the end of their paper, the authors ask: “Why bother?” Why bother to try to flesh out a vision of what abolition requires if initial sketches suggest it might well be impossible? Why have the debate at all? My answer is twofold. First, the debate about nuclear abolition is a reminder of the responsibility of all states to lend their power as stakeholders in international order to the resolution of conflicts and to the effective functioning of collective security mechanisms. Abolition without order would be a recipe for disaster. Second, the debate about next steps and last steps can help illuminate the landscape in between and the distinct challenges to nuclear order that might erupt there. If we expect to live in that world for some time to come, more needs to be done to tailor strategies of restraint and deterrence to the requirements of order in that new landscape.



HARALD MÜLLER

## The Importance of Framework Conditions

*Abolishing Nuclear Weapons* is certainly the most comprehensive and well-thought-out paper on nuclear abolition I have read. Even so, I have two major “macro-arguments” on which, it appears to me, the authors have not put enough emphasis, even though traces of both can be sensed in their narrative. The first one is the overwhelming need to create and maintain cordial great-power relations. This is an extra-disarmament, extra-proliferation political consideration that affects the mere possibility of moving toward abolition in any promising way.

The second is the path-dependency of the process of disarmament. The actors in a disarmament process will change the conditions of the basis on which they act as they go along. The last steps will occur—if and when the path up to then has been successfully walked—in a vastly different environment from the one in which the journey started. Neglecting this social dynamic in the disarmament process leads, on the one hand, to overconfidence in predicting or prescribing specifics of the end stage from today’s vantage point. On the other hand, it tends to define obstacles for this last phase, which, by the time it arrives, might have gone away.

These two thrusts of criticism address various elements of the Adelphi Paper’s framing, premises, and suggested ways around obstacles.

### **The Need for Great-Power Concert**

We can conceptualize an abolition process in three stages: The first would revive the basic principles and instruments of nuclear arms control and

multilateralize them as appropriate in order to establish stability and predictability among the nuclear-armed states; create upper levels for their weapons holdings; install, step by step, transparency to enhance confidence that such upper levels are indeed observed; and keep, throughout this initial process, trust in states' second-strike capabilities. The second stage would reduce arsenals to very small numbers, possibly around one hundred or slightly below. Sophisticated strategies of deterrence and nuclear use would shrink to "existential deterrence." Transparency would apply incrementally to the entirety of the nuclear weapon complex. The risk of sudden attack would be further reduced by significant measures of de-alerting (of which we might see some in the first phase as well). The third and last phase, then, would mean going from there to true abolition.

Throughout the process, progress would depend on two prerequisites: first, a basic—and increasing—confidence among the nuclear-armed states that there was no malevolent intention of one against another within their group. The phrase we have heard frequently over the past ten years—that the great powers are enemies no more—must obtain actual meaning and be bolstered by tangible changes of policy and strategy. Second, progress would depend on the capability of the international community to deal with spoilers—either the case of a single nuclear-armed state that does not abide by its undertakings or, alternatively, a non-nuclear-weapon state embarking on a nuclear weapon program. In either case, the process toward abolition could be continued only if the nuclear-armed states (and non-nuclear-weapon states with, or close to, great-power status) were to maintain political unity in effectively confronting the rule-breaker and take determined steps to prevent the process becoming derailed. (If the rule-breaker were a nuclear-armed state, the others would have to rally unity against it). These steps might, *in extremis*, include joint military action.

Obviously, neither prerequisite can be met if there is deep conflict among the great powers or if they have reason to distrust the intentions of their peers. That would be the case if the great powers were engaged in a serious power competition, based on the fear that their rivals would not accept either their equal status or even their vital security interests. Given that we are probably in the course of a power transition from the transatlantic area to Asia, this risk is particularly high.<sup>1</sup> In such an environment, nuclear weapons would probably be seen as necessary to protect national security against unpleasant surprises and probably also as instruments to bolster strategic positions around the world. It is also obvious that the unity of purpose in dealing with rule-breakers could not prevail. Great powers would eagerly look around for allies, and would-be

proliferators might be ideal bridgeheads to use against great-power competitors. By the same token, an attempt by one of them to bring the rule-breaker to terms through force might be counted as geopolitical gain but also would provoke opposition to such action to preserve the integrity of the spoiler. In other words, the security environment heavily affects the circumstances under which compliance and enforcement policies, as discussed in the Adelphi Paper, could succeed.

It is thus urgent to provide a security environment, one that is strategic as well as institutional, to prevent the repetition of great-power rivalry in the classical sense. One such environment is the Great Power Concert, modeled after the Concert of Europe, which kept peace among the great powers in Europe for more than a generation after the Napoleonic wars.<sup>2</sup> The concert relies on relatively simple principles:

- All participating powers recognize each other as equal.
- All renounce military strategies resting on superiority and overwhelming offensive power.
- All respect the vital interests of all others and avoid intruding on them. These vital interests include a secure regional environment for each of them.
- All practice permanent consultations on issues of common and global concern.
- All renounce the unilateral use of force.
- All agree that the network of consultation is immediately intensified when crises loom.
- None seeks unilateral advantages in such crises.

In contrast to the classical concert, and with a view to help prevent crises, all participating powers would have to agree to respect the integrity of smaller powers that abide by international law. This is, of course, essential to preclude incentives for smaller powers to acquire nuclear weapons.

The historical concert was successful for a generation because the leadership of the major powers agreed on the rules, practiced them in a dense process of conferences and ambassadorial consultations, and showed

moderation and restraint when it counted most—in international crises, including those that were caused by internal upheaval in smaller states. They carefully avoided stepping on the toes of their peers and developed a considerable degree of empathy for the ways in which their partners defined their vital interests. All this proved possible in a group of states with very different constitutions, ranging from the relatively liberal (Great Britain) to the thoroughly autocratic (Russia).

Today, international relations are a long way from this model. The foreign policies of the Bush administration have destroyed to a large degree the basis for such a concert, which was clearly possible in the years following the end of the Cold War. If any further proof were needed, it was provided by the Russian-Georgian conflict. It is essential that as the first steps are taken in the narrower field of nuclear disarmament, great efforts be made simultaneously to move toward political cooperation among the great powers. It is unlikely that this could be done in the United Nations Security Council anytime soon because of the intrinsic difficulties of bringing its membership up to date, so the best way to proceed might be by enhancing membership of the G8, at least by adding China and India, making the consultation process more permanent, and enlarging the agenda.

These considerations might have consequences for a couple of points made in the Adelphi Paper. For instance, it obviously affects the considerations on “societal verification.” While it is right for information stemming from nongovernmental actors to be used by the International Atomic Energy Agency—something that is already granted through the 1992 decision of the Board of Governors—it is quite a different thing to try to institutionalize it. The status of nongovernmental actors is different in full democracies, semi democracies and undemocratic states. To obtain the assent of China or Russia to institutionalize a verification system that recognizes nongovernmental actors is a nonstarter. Burdening the disarmament process from the beginning with such systemic antagonism would obviate the chance to establish the urgently needed concert. It is thus much better to keep things as they are.

### **The Disarmament Process and Path-Dependency**

In social and political affairs, outcomes are not just the product of initial conditions. They depend very much on the process that leads from here to there. The social and the political are in a permanent evolution. As conditions change, so do the structures of opportunity. New options, unthinkable at the beginning, become a serious possibility. The dynamics of such a process were apparent in the last phase of the Cold War. When

the Soviet Union admitted observers to its military maneuvers in a politically binding way for the first time in the Stockholm Document of 1986, every expert noted that this was a momentous change but none predicted, at the time, that it would end in German unification. Yet the process that followed created, step by step in the interplay between political and arms control changes, the conditions in which unification became not only a real opportunity, but the right thing to do and, eventually, a necessity. This process was unusually short considering the seminal change it brought. We conceive of the disarmament process in notably longer horizons—a generation or longer. It is all the more problematic, therefore, to try to be very specific about the last few steps. This concerns various considerations in the Adelphi Paper with particular weight on two points: the issue of “virtual arsenals” and the proposed study by research institutes on the conditions needed for a nuclear-weapon-free world.

Virtual arsenals, if meant as a fixed end state of disarmament, are a bad idea. The concept is a response to the current concerns of today’s nuclear-armed states. Yet no one today could have any idea whether these concerns will exist in the final phase. By fixating on virtual arsenals as an end state, two little monsters would be created that would ultimately prevent abolition. First, virtual arsenals reinforce the mentality that nuclear war is possible at any time. This mental state is poisonous for the development of a “security community,”<sup>3</sup> a relationship between the major powers in which the idea of a struggle for primacy—which necessarily involves the permanent risk of war—is replaced by one of joint stewardship for world security, in which war between great powers is considered unthinkable. The belief in the possibility of war means strong hedging against other players cheating. This, in turn, necessitates maintaining the ability to move very quickly from virtual to real arsenals and could precipitate a race in hedging moves that, step by step, would destroy the social fabric of trust on which abolition must be based. Hedging races can become highly unstable if parties suspect that their rivals are one turn of the screw closer to usable weapons. The risk of a first strike might loom larger in this dynamic than it ever did during the Cold War. Second, virtual arsenals need arsenal-keepers, as the Adelphi Paper rightly notes. As is known all too well, these keepers are not disinterested technical experts, but rather form a social entity with its own interests—and these interests are contrary to abolition. The keepers would demand more resources, push for the hedging race, and probably favor a return from virtual arsenals to real ones. Based on what we know from past and present nuclear complexes,<sup>4</sup> this would be a predictable feature of the final phase if virtual arsenals are part of the picture.

Virtual arsenals, thus, should never be conceived as the end state. One may explore whether they would be a useful transitory stage on the way to a more genuine zero. This would certainly require a clear and unambiguous plan for how virtual arsenals would be built down at the end.

The suggestion to create a study project conducted by a group of research institutes on the conditions of a nuclear-weapon-free world is, for reasons that should by now be obvious, an impossible task and probably not a very good idea, even though as the director of a research institute with related expertise I sympathize with it. We would work on the basis of our present environment. All of us in research institutes are creative, so we would probably draft more daring and foresightful schemes than anybody else would. Nevertheless, we would still be the captives of our experience and present conditions. This, in turn, might lead to ideas and prescriptions that reflect our cautiousness—something that might be quite appropriate under present circumstances but that would work as a barrier under future circumstances that could be markedly different. At best, any thoughts would be pushed aside as hopelessly obsolete; at worst, they would be used by foes of disarmament progress to block the way forward.

### **Conclusion: What Next?**

I take “What next?” to be a question directed not at the political practitioner but at the expert and research institute manager with a view to developing the knowledge and ideas that are needed to help the abolition process advance. I see four major issues where some work might be useful to help policy makers find ways forward:

- Exploring the relationship between establishing a solid, universal verification system for a Fissile Material Cut-Off Treaty (FMCT) and preparing the basis for nuclear archeology of fissile material production in countries that lack adequate safeguards. This might also present an inroad into the difficult problem of how to deal with existing stocks in a FMCT.
- Devising ways to handle tactical nuclear weapons, especially addressing the double difficulty of taking into account the security concerns that induce Moscow to rely more on substrategic weapons while recognizing the anxieties of a group of NATO members (Turkey, the Baltic States, and Poland) that want to stick to existing defense arrangements to alleviate their own concerns.

- Developing suitable “capping” concepts for the arsenals of the smaller nuclear-armed states that help to create a multilateral framework for future nuclear-arms reductions while addressing their national security concerns.
- Devising limits to missile defenses (including space weapons) that respect the need for secure second-strike capabilities for the time being, and exploring the technical, legal, and economic possibilities of moving from national to universal missile defense.

For the midterm, I see the possibility of looking far ahead but without spoiling the process by fixing strategies that should be subject to continuous adaptation because of changing circumstances. I would build on the authors’ idea of an investigation by research institutes but would try to change the approach. I suggest that two standing groups be established (at best their structure would be double-tracked): one on verifying a nuclear-weapon-free world, and one on compliance and enforcement. The groups would remain in place for the whole abolition process (probably with changing membership) and would work on “rolling texts” that would be changed as appropriate, given changing conditions. This kind of arrangement would permit permanent work to proceed on blueprints that point into the future, while avoiding the risk of freezing a concept bound to particular, obsolete historical circumstances.

## Notes

- <sup>1</sup> Ronald L. Tammen, Jacek Kugler, Douglas Lemke, Allan C. Stam III, Carole Alsharabati, Mark Andrew Abdollahian, Brian Efirid, and A. F. K. Organski, *Power Transitions: Strategies for the 21st Century* (New York: Seven Bridges Press, 2000).
- <sup>2</sup> Carsten Holbrad, *The Concert of Europe* (London: Longman, 1970).
- <sup>3</sup> Emanuel Adler and Michael Barnett, eds., *Security Communities* (Cambridge: Cambridge University Press, 1998).
- <sup>4</sup> Janne Nolan, "The Next Nuclear Posture Review?" in Harold Feiveson, ed., *The Nuclear Turning Point: A Blueprint for Deep Cuts and De-Alerting of Nuclear Weapons* (Washington, D.C.: Brookings Institution Press, 1999); Hugh Gusterson, *People of the Bomb: Portraits of America's Nuclear Complex* (Minneapolis: University of Minnesota Press, 2004).

BRUNO TERTRAIS

## Advancing the Disarmament Debate: Common Ground and Open Questions

### **A Refreshing Approach**

The Adelphi Paper, *Abolishing Nuclear Weapons*, is an extremely important contribution to the debate on nuclear disarmament. Until now, most publications devoted to a serious discussion of abolition originated in either the world of nongovernmental advocacy organizations or the world of technical experts. They tended to focus *either* on explaining *how* the technical challenges of verification could be met, *or* on explaining *why* abolition was urgently needed.

*Abolishing Nuclear Weapons* is a conceptual breakthrough in this debate, in that it combines political and technical expertise to lay down the conditions under which total nuclear disarmament could become a reality—and addresses the issues in a way that is both logical and realistic. The second sentence of the text captures the approach taken by the two authors: “How might the security conditions which would permit nuclear weapons to be safely prohibited be created, and how might measures to implement such a prohibition be verified and enforced?”

*Abolishing Nuclear Weapons* is also a remarkable piece of work in that it avoids falling into the “advocacy trap” that has led previous studies and reports on the issue to easily dismiss important counterarguments, thereby condemning such texts, most of the time, to political irrelevance. Instead, *Abolishing Nuclear Weapons* tackles head-on the most difficult strategic challenges of nuclear abolition. One of its strongest messages is that

“States will not begin to make the changes necessary for abolishing nuclear weapons if there is not a shared sense that the goal is realistic.” It wisely avoids the temptation of presenting artificial roadmaps or timetables.

While clearly stating why abolition, in the authors’ view, is desirable, it does so in a dispassionate way, putting responsibility almost equally on nuclear-armed states and non-nuclear-weapon states. It is refreshing to read in a paper that tends to view abolition as being both feasible and desirable that “non-nuclear-weapon states would be wise to be responsive to the reasonable expectations of nuclear-armed states trying to create conditions for the secure prohibition of nuclear weapons” or that “non-nuclear-weapons states should realise that they will get neither the nuclear industry nor the disarmament they seek if they fail to join efforts to strengthen and enforce the non-proliferation regime.” And while the authors emphasize the need to “move on both fronts simultaneously” (nonproliferation and disarmament), they seem to recognize that if something has to “go first” to create a virtuous circle, it has to be the resolution of Iran and North Korea issues, if only because those two states exploit the current paralysis of the international community for their own benefit.

The paper makes a good case for the pivotal role of China, which stands in between the two nuclear superpowers and the nascent Asian arsenals. And it is to be commended for characterizing the Iran issue as being “deeply damaging to the objective of global nuclear disarmament,” when most supporters of abolition tend to focus their wrath on the United States.

*Abolishing Nuclear Weapons* gives excellent and often detailed replies to some of the classic counterarguments of those who claim that abolition is not feasible. This includes, for instance, the “nuclear weapons cannot be disinvented” argument. The authors argue correctly that “the problem of lingering nuclear know-how might not last indefinitely.” They deal efficiently with the question of what to do with “nuclear knowledge.” One can only support their conclusion that, at the end of the day, the most important challenges of abolition are more political than they are technical or political-technical.

The paper also recognizes that if nuclear weapons are to be traded away, some other reliable means have to be set up to foster a sense of security equal to what the possession of nuclear weapons—rightly or wrongly—provided. The authors have it right when they state that, in particular, countries such as Russia and China would need assurance that in a non-nuclear world, the relative U.S. military power would not increase. They are also on the mark when they explain that nuclear abolition

will be unrealistic as long as some critical issues such as Taiwan, Kashmir, and Palestine remain unresolved. As is well recognized, the American debate about the future of security guarantees needs to involve countries currently protected by the U.S. nuclear umbrella. And one can only applaud the paper's contention that given the regional and perhaps global costs of any large-scale conventional war, it would not be in the interest of non-nuclear-weapon states for any countries that have given up their nuclear weapons to feel less secure.

Likewise, the paper deals upfront with the challenges of getting rid of the last nuclear weapons: Before doing so, it argues, "states would want to feel confident that the risk of even a 'small' break-out was lower than the risk of keeping a small number of nuclear weapons and suffering a failure of nuclear deterrence."

*Abolishing Nuclear Weapons* is forward-looking in many respects, particularly in tackling the verification challenges (and noting correctly, for instance, that a verifiable nuclear-weapon-free world may imply banning nuclear-powered vessels), or those related to the difficulties of enforcement. On this point, it remains realistic: "it would probably not be possible for a consensus to be reached on establishing robust automatic-enforcement measures against non-compliant actors." The authors avoid easy (and unrealistic) fixes such as a decision to transfer the last nuclear weapons to an international authority. And they realize that, whatever legally binding elimination regime would be devised, it might be impossible to avoid allowing for some form of withdrawal clause.

Many proposals made by the authors make good sense and are hard to object to, even by skeptics of nuclear disarmament (a group that includes this commentator). Among them: creating an intergovernmental group to discuss the conditions of nuclear disarmament; setting up an expert working group on transparency; or making proliferation to non-state actors an international crime.

### **Is Nonproliferation Linked to Disarmament?**

There are, of course, some weaker points.

While the paper states clearly that it does not focus on whether nuclear disarmament should be achieved, it does offer arguments on why it should, and those arguments are not always convincing. It states that "a nuclear order cannot be maintained and strengthened over time on the basis of inequity." But leaving aside the existence of other "unequal" situations (in many key international institutions), a case could be made that the Non-Proliferation Treaty (NPT) offers equity of rights and obligations.<sup>1</sup>

Likewise, the question of the meaning of Article VI of the NPT is not treated in an entirely satisfactory way. The paper argues against “double standards,” but forgetting the “general and complete disarmament” part of Article VI could also be viewed as a case of a double standard. The paper states correctly that “states would not have agreed to extend the treaty indefinitely ...if the nuclear-weapons states had tried to claim that they were not obliged to pursue nuclear disarmament.” This is surely true, but it is largely a straw man. The nuclear-weapon states do not challenge the existence of an obligation to pursue nuclear disarmament. Their arguments generally revolve around the following points: The disarmament obligation contained in Article VI does not contain any deadline; Article VI also contains a conventional disarmament obligation that is hardly met by non-nuclear-weapon states; nuclear-weapon states do comply with the nuclear provisions of Article VI (by having put an end to the arms race, for instance); and because the main object of the treaty is nonproliferation, any alleged “noncompliance” with Article VI cannot be put on a par with real, incontrovertible violations of the treaty by some non-nuclear-weapon states.

### **Security, Influence, and Nuclear Weapons**

Another straw man is created when the authors seek to demonstrate that the benefits of nuclear weapons possession are overstated. They claim that those possessing such weapons assume that they “would never fail to deter major conventional war.” Those making such a broad claim (the key word being “never”) would be fools, but who are they? Nuclear-armed states assume that maintaining nuclear deterrence is a safer means to ensure the absence of major conventional war than taking the risk to disarm.

On the contrary, the benefits of *not* living with the threat of nuclear destruction may be overstated: Countries as diverse as Germany, Japan, Bosnia, and Rwanda have experienced extreme levels of destruction by non-nuclear means. (To be sure, this part could lead to further discussion: for instance, some recent technical studies have shown that even a relatively small-scale nuclear exchange might have global effects.)

The paper focuses on the security rationales for building and maintaining nuclear weapons. It does not give enough treatment to the political rationales—among them influence and prestige—and to the ways and means to “compensate” for these perceived benefits. One of the reasons India went nuclear is that it sought a shortcut to great-power status. Therefore, to devalue the nuclear-weapon route for other regional powers, serious reform of the United Nations Security Council may be needed as a prerequisite to nuclear disarmament.

The analysis becomes very idealistic when it suggests that “reassurance” would be a key for non-Western countries to forgo the great equalizer that nuclear weapons provide them. The means through which such reassurance could be given raise eyebrows: Washington would commit itself to “abide by international law as understood by other major powers in determining whether, when and how to use military force.” This raises serious questions. First, such reassurance would surely not be enough: Why should non-Western countries believe the United States? Second, even the use of U.S. military power in full compliance with the UN Charter may be a problem for such states. Third, the interpretation of “international law” by countries such as China and Russia is often incompatible with the most common Western (including non-U.S.) interpretations. The authors do not make their case any stronger when they add that the United States would have to “eschew unilateral or small-coalition military intervention” for other purposes. (When would a coalition be big enough? The support of a large majority of key states in a given region could be enough to legitimize intervention, but there is no reason to believe that it would be an acceptable criterion for Beijing, Moscow, or other states.) It is slightly counterbalanced by the recognition that the real key here would be the establishment of truly cooperative relations among Washington, Moscow, and Beijing—a daunting task, to be sure, but at least the logical consistency of the argument is made stronger once that point is made. (After all, who would have thought 70 years ago that relations among Britain, France, Germany, and Italy would become so cooperative that the mere idea of war among them is now outside the realm of the conceivable?)

The same degree of idealism seems to be at work when the authors call for “greater sensitivity to Russian concerns” on such issues as missile defense or NATO enlargement. On missile defense, this assumes a degree of sincerity in Russian rhetoric that many in the West doubt truly exists. As for NATO enlargement, some in Europe and the United States question the wisdom of acceding to the demands of a country whose leader regards the breakup of the Soviet Union as the biggest tragedy of the twentieth century; rather than bringing more stability, such a move could just as likely bring more instability.

### **Some Open Questions**

Several areas warrant further work or at least a dialogue involving experts of various origins, personal preferences, and sensitivities.

First, what is the strength of the causal link between disarmament and nonproliferation? The introduction says it quite clearly: A primary

motivation for renewed interest in abolition is the “belief” that it will be impossible to curtail proliferation without serious progress toward disarmament. There are two problems with this well-known argument. The first appears in the text itself: It is a “belief” as much as it is a fact, and perhaps more so, in the sense that nuclear reductions by four of the five NPT-recognized nuclear powers in the past 20 years have not seriously affected either nuclear proliferation dynamics or the nonproliferation debate. The second problem is that there is little evidence that leaders of states advocating nuclear disarmament consider it a top political priority. When they have a face-to-face meeting with the head of a state or government that has nuclear weapons, how often do they mention disarmament? The answer probably is almost never. In some cases, notably in the foreign ministries of some non-aligned countries, nuclear disarmament advocacy seems almost like a *raison d’être* of some bureaucratic constituencies.

Second, are there “key disarmament steps” that, if taken by nuclear-weapon states, would create a consensus for strengthening the nonproliferation regime? Taking the rhetoric of non-nuclear-weapon states at face value, the nuclear-weapon states would need to do more in terms of disarmament to gain support for strengthening nonproliferation norms. However, government officials of nuclear-weapon states become skeptical of that argument, having made important gestures in the past 20 years. Yet they are always being asked to do “a little more” for proof of their goodwill before non-nuclear-weapon states agree to further reinforcement of the nonproliferation regime. (For instance, the fulfillment by the nuclear-weapon states of a large part of the agenda contained in Decision 2 of the 1995 NPT Conference, “Principles and Objectives for Nuclear Non-Proliferation and Disarmament,” has hardly been recognized.) In other words, how can the “virtuous circle” that the authors call for be initiated? And how can the “perceptions gap” be bridged between, on the one hand, those in the nuclear-weapon states who honestly believe that they are fulfilling their disarmament obligations and, on the other hand, those in the non-nuclear-weapon states who equally and honestly feel betrayed?<sup>2</sup>

A third area for further work is the question of the links between nuclear status and the quest for permanent membership in the UN Security Council and, more generally, the causal relationships between the reform of international governance and the path toward a nuclear-free world.

Finally, the role of ballistic missiles and defenses in a nuclear-free world might deserve a broader and deeper discussion. Specifically, the potential stabilizing or destabilizing role of such non-nuclear offensive and

defensive strategic systems in a nuclear-free world merits consideration. Even before that discussion can take place, though, deciding when to tackle the question—after the elimination of nuclear weapons, before that, or simultaneously—would need to be settled.

## Notes

- <sup>1</sup> For instance, there is arguably a balance of obligations between Articles I and II, or even within Article VI.
- <sup>2</sup> Some may argue that few of the “13 Steps” included in the final document of the 2000 NPT Conference have been fulfilled. However, the 1995 “Principles and Objectives” may be a more appropriate

point of reference: They were a key part of the bargain that led to the decision to extend the treaty indefinitely, and they were called a “program of action,” which clearly committed the parties (whereas the 13 Steps were more of a catalog of principles to be observed than a politically binding action agenda).

ACHILLES ZALUAR

## A Realistic Approach to Nuclear Disarmament

In *Abolishing Nuclear Weapons*, George Perkovich and James Acton engage in a fascinating “thought experiment”—a “*Gedankenexperiment*” in the parlance of the German philosophers and scientists, most notably Albert Einstein, who employed and popularized this useful technique. According to the Stanford Encyclopedia of Philosophy, thought experiments are a “device of the imagination used to investigate the nature of things.”<sup>1</sup> Here we are challenged to investigate how nuclear weapons could be prohibited in ways that would leave the world more secure, that is to say, what would be the implications if states were to seek to implement the nuclear disarmament obligation contained in Article VI of the Non-Proliferation Treaty (NPT)? The authors fear, with reason, that failure to demonstrate progress toward the fulfillment of this legally binding obligation will continue to undermine the nonproliferation regime.

They are to be commended for challenging the assumption that nuclear disarmament is futile because nuclear weapons “cannot be disinvented.” It is the knowledge necessary to manufacture such weapons that may never disappear. Mankind is constantly learning how to manage knowledge, and it could make a conscious decision not to use it to manufacture certain categories of weapons. As Perkovich and Acton point out, “mass-scale gas chambers” also cannot be “disinvented”—but neither can they be tolerated. As we acquire technologies that could be even more destructive—to make genetically enhanced biological weapons, for instance—we will

*The views expressed in this chapter are exclusively the author's personal views and do not necessarily reflect the positions of the Brazilian government.*

have to dedicate a proportional effort, in the political, ethical, and juridical realms, to set boundaries on the use of such knowledge.

### **Revisiting the NPT Bargain?**

Perkovich and Acton admit they cannot answer every possible objection or foresee every contingency that could arise over the desirability and feasibility of abolishing nuclear weapons. Their intention is, rather, to mobilize international expertise, both in “nuclear-armed states” (their terminology, which encompasses the five NPT-sanctioned nuclear-weapon states plus Israel, India, and Pakistan) and non-nuclear-weapon states, with a view to exploring the major technical, political, economic, and strategic conditions necessary to make a prohibition of nuclear weapons effective. In a draft of the Adelphi Paper they suggested that this expertise could gather in a forum—an Intergovernmental Panel on Nuclear Disarmament—that would play a role similar to that of the Intergovernmental Panel on Climate Change in mobilizing expertise to understand global warming and options to abate it. The final version assumes governments will be reluctant to create such a panel, in part because nuclear disarmament challenges are explicitly more political than those involving climate change. The authors less ambitiously urge governments and “private foundations to initiate an . . . international collaboration of government-affiliated and independent think tanks to explore the conditions necessary for the secure prohibition of nuclear weapons.” Governments, the authors suggest, “could then invite participants in such a collaboration to present their conclusions to NPT review meetings, national governments, the Conference on Disarmament and the UN General Assembly.”

It is useful to reflect on the implications of the challenge presented by Perkovich and Acton both to states that have nuclear weapons and those that do not.

In law and diplomacy, as in warfare, one is often loath to concede terrain that has been arduously gained. This becomes a problem in sections of the paper in which the authors call on non-nuclear-weapon states to support policies that would increase monitoring and perhaps limitations on their access to nuclear technology in order to motivate the nuclear-weapon states to genuinely move to abolish their nuclear arsenals. The authors could be read as if they were inviting the non-nuclear-weapon states to renegotiate what they have already achieved in the context of the NPT: an acknowledgment by the five NPT-sanctioned states of their obligation in principle to get rid of nuclear weapons. Without this commitment, the discrimination embedded in the NPT regime would be intolerable, and the

world today might be dealing with many more nuclear-armed countries than is the case.

In the past, there was an argument about whether the obligation to negotiate nuclear disarmament is valid in itself—if it is a “stand-alone” obligation—or if it is somehow contingent on a second obligation contained in Article VI, “a treaty on general and complete disarmament.” This debate was decided by the Advisory Opinion of the International Court of Justice on July 8, 1996, in an important decision that deserved analysis in the paper. The court determined—by unanimous vote, including the vote of the judges from the five NPT nuclear-weapon states—that “there exists an obligation to pursue in good faith and bring to a conclusion negotiations leading to nuclear disarmament in all its aspects under strict and effective international control.”<sup>2</sup>

The argument that the nuclear disarmament obligation is somehow conditioned on hard-to-imagine improvements in conventional weapons control has been, therefore, laid to rest, with the concurrence of the highest juridical experts of the nuclear-weapon states themselves. At the political level, again with the concurrence of the nuclear-weapon states, the 2000 NPT Conference acknowledged, in the famous “13 Steps” toward implementing Article VI of the NPT, “an unequivocal undertaking by the nuclear-weapon states to accomplish the total elimination of their nuclear arsenals leading to nuclear disarmament.”

So Perkovich and Acton would certainly understand if non-nuclear-weapon states were cautious in accepting an invitation to engage in a panel or other forum that could result in an open-ended investigation of the feasibility of abolition. The nuclear-weapon establishments of the states possessing such weapons are nothing if not technically competent and ingenious in devising arguments against abolition. They have been successfully blocking a treaty banning nuclear-weapon tests since the 1950s. Such an investigation of the abolition challenge, of course, would have to bring in technical people from the nuclear-weapon establishments.

If the panel were to become bogged down by clever objections to the several contingencies of abolition in an uncertain future, the nuclear-armed states could then claim that the issue had been debated in a competent panel, that there was no consensus, and that, therefore, there should be no nuclear disarmament until all objections are solved. This could be seen as backtracking from the commitment in principle to nuclear disarmament, a dangerous development for the credibility of the nonproliferation regime.

Skepticism about the uses to which some people in nuclear-weapon states might put an international panel on nuclear disarmament should

not detract from the merit of the Adelphi Paper itself. It is important, indeed crucial, that specialists and academics debate the requirements for a nuclear-weapon-free world. When the discussion moves to the political level, however, and engages the representatives of states, it is necessary to frame it properly—so as not to transform a debate on how to achieve nuclear disarmament into an argument on whether that would be a worthy goal.

### Alternative Nuclear Futures

While debating nuclear disarmament, we should not seek to compare the world as it is today—in which no nuclear weapons have been used in warfare for 63 years—with a *Gedankenexperiment* in which we try to imagine all the possible directions world security could take for several decades or longer. Of course, in some of the possible scenarios we envisage for a nuclear-weapon-free world, there could be breakouts, security crises, wars among major powers, even surprise attacks by countries or terrorists using nuclear weapons that were reconstituted in secret. The goal of a guarantee of absolute security forever—the end of history—is, alas, a chimera.

We should rather compare *Gedankenexperiment* with *Gedankenexperiment*. An alternative experiment would be to suppose a “business as usual” scenario for the next several decades, in which:

- There is no serious progress toward nuclear disarmament.
- Nuclear-weapon states keep a high profile for their weapons, asserting that they are necessary to destroy “targets able to withstand non-nuclear attack,” or “to retaliate against chemical and biological weapons,” or to have “in the event of surprise military developments,” or “to protect vital national interests,” or “to safeguard the security of allies,” or as a “hedge against unforeseen contingencies,” or any other creative mission statements devised by the nuclear-weapon establishments.
- High-profile nuclear arsenals seem to confer not only deterrence capability but also great-power status and influence to the countries that retain them, with perks such as permanent membership in the UN Security Council.
- Given “n” nuclear powers that benefit from an enhanced status and greater ability to deter, there is at any given time an “n+1” state

that seeks and eventually acquires nuclear weapons for the same reasons, prompting another state to become the next nuclear candidate (this assumption has held true since 1945).

- The legally binding obligations and the solemn promises of the nuclear-weapon states, such as entry into force of a Comprehensive Test Ban Treaty (CTBT), implementation of Article VI of the NPT, the Advisory Opinion of the ICJ and the decisions of the 1995 and 2000 NPT Conferences, are not acted upon, thereby weakening the credibility of the regime.

In other words, under this “business as usual” scenario, the nonproliferation regime muddles through, managing crisis after crisis as each emerges.

I cannot prove it, but I would assert as self-evident, along with the Canberra Commission Report—a document that contains a comprehensive analysis of the dilemmas of nuclear abolition—that, in such a world, “the proposition that large numbers of nuclear weapons can be retained in perpetuity and never used—accidentally or by decision—defies credibility.”<sup>3</sup>

Which *Gedankenexperiment* predicts the lowest risks and costs, and the highest benefits: the “path to nuclear abolition” or “muddling through”? As much as I, with Perkovich and Acton, would prefer the former, it is likely that, in the presence of high uncertainty, the “status quo bias”<sup>4</sup> of the latter would prevail.

Fortunately, we do not have to make this perilous choice. Perkovich and Acton suggest a way out when they note that the challenges of going from one hundred weapons to zero (the nuclear abolition scenario) would be considerably greater than the challenges of going from, say, tens of thousands to one hundred. If combined with a firm political commitment toward the implementation of Article VI of the NPT, moving first from thousands of nuclear weapons with high profile (today) to a few hundred with low profile (an intermediate step toward abolition, if we so decide) would present many of the benefits and none of the alleged dangers and risks of the abolition scenario.

Committing to this agenda of reducing the total number of nuclear weapons globally to the hundreds and taking them out of the foreground of international politics would represent positive change in the direction of the NPT’s ultimate objective. In fact, the change would be so enormous that its consequences would ripple throughout the international system, without the risks that some fear from the tidal wave of going to absolute zero. It would, moreover, provide the international community with a

“to-do list” that would take at least a decade—a decade in which the loss of credibility of the nonproliferation regime could be reversed.

If one models the situation as a trade-off between the implementation of commitments and perceived risks, it is easy to see that the current situation is not Pareto-optimal, that is to say, it is possible under any reasonable assessment to improve implementation, short of total abolition, without increasing risks, and arguably reducing them. Proponents of nuclear abolition and of nuclear deterrence could march together, reaching outcomes that are best for both and leaving their differences for a later stage, closer to, but short of, abolition, when the debate would have to be renewed.

### **Practical Steps Toward Abolition**

One could start with ratification of the CTBT—a no-brainer except for the weapons labs and possible proliferating countries—and firm statements by nuclear-weapon states, with no “ifs,” “ands,” or “buts,” to the effect that they retain nuclear weapons only to deter the use of nuclear weapons by others. This entails, again, a firm no-first-use commitment by all the nuclear-armed states. The next step would probably be a Fissile Material Cut-Off Treaty (FMCT), which could place a cap on the nuclear arsenals, in exchange, probably, for stricter controls on nuclear materials worldwide.

An FMCT with a strong verification regime—any other kind would not be worth the paper it is written on—would also introduce nuclear-weapon states to the pain and costs of nuclear safeguards, thereby rendering the nonproliferation regime more equitable. The experience of negotiating and implementing an FMCT would greatly help pave the way for a future nuclear abolition treaty. Many of the problems of such a treaty are probably impossible to imagine, let alone solve without taking this intermediate step and learning from it.

The universal acceptance of the premise that nuclear weapons are only for deterrence against nuclear attack would greatly simplify the current political debate. As the political salience of these weapons is reduced, we could gradually decouple the nuclear disarmament debate from the global balance of power. Doing that could be signaled, for instance, by opening up permanent membership on the UN Security Council to states that do not possess nuclear weapons.

An objection sometimes is made from inside nuclear-weapon establishments to the effect that “the nuclear policies of the nuclear-weapon states have no impact on the decision-making process of the non-nuclear-weapon states,” in particular in their decision to abide by or evade the norms of the nonproliferation regime. We could answer by proposing

yet another *Gedankenexperiment*. Imagine that nuclear weapons had been acquired by several rival Eurasian powers but that the United States had none. Would the strategic calculus of the United States be affected by the nuclear policies of the nuclear-armed countries in Europe and Asia? The question provides its own answer.

Reduction of arsenals to a “minimal deterrence” posture—with all of the arsenals in the low hundreds (and some maybe down to a few dozen) and, most importantly, with a lower political salience—would lead us to a different stage, in which, as the Canberra Commission acknowledges, a “political judgment will be needed on whether the level of assurance possible from the verification regime is sufficient” to take the next steps toward abolition. The leadership and public opinion of nuclear-weapon states would have to be convinced, then, that “a nuclear-weapon-free world would be, fundamentally, a safer place.”<sup>5</sup>

The abolition debate has already been won, as a matter of principle, in the NPT and the ICJ decision; but as a matter of implementation, it cannot be won today. Non-nuclear-weapon states will be reluctant to renegotiate the disarmament commitment, much less make additional “concessions”—in the form of restrictions to their “inalienable right to develop research, production, and use of nuclear energy for peaceful purposes without discrimination” (Article IV of the NPT)—in exchange for commitments they already received. But it is a debate that may be won, as a matter of implementation, if and when we achieve and become used to a “minimal deterrence/low salience” stage. As the saying goes: “We will cross that bridge when we come to it.”

I will now comment on some of the specific points made in the paper.

### **Verification Challenges**

Perkovich and Acton set the bar quite high: They decide to explore the natural desire that perfect verification be created for a prohibition of nuclear weapons. The issue, as they acknowledge, is hard to fathom from today’s perspective.

We don’t know, for instance, if in twenty to thirty years’ time the long-foreseen civilian “nuclear renaissance” will have panned out or fizzled; whether an FMCT will have been negotiated and implemented, providing us with fresh questions and answers about safeguarding the fuel cycle in today’s nuclear-weapon states; and whether reprocessing will become commonplace, exceedingly rare, or even forbidden.

Warhead authentication, tagging, and dismantlement are discussed in the paper in some detail. The authors go on to the vexing issue of verifying

past production of nuclear materials—something that, if we desire “perfect” verification, would entail checking production records and inventories from the past several decades. Even then, it would be impossible to attain absolute exactness, as the authors point out: There is “material unaccounted for” sufficient for hundreds of weapons; tons of fissile material were evaporated during nuclear testing; other tons were transformed into civilian fuel and burned in reactors. A complete historical record of the nuclear fuel produced and used by the nuclear-weapon states may never be possible to compile, even for the nuclear-weapon establishments themselves.

The solution to this quandary may lie in the conjunction of three factors. The first is the “signature” of a clandestine nuclear arsenal or of hidden stocks of weapons-grade material, both in human terms (whistle-blowers, financing, procurement networks) and environmental terms (the presence of detectable isotopes in the atmosphere and in nuclear installations). The second is the experience and access that would be gained inside nuclear-weapon states as they apply safeguards to their nuclear fuel-cycle facilities to comply with an FMCT. And the third, as the authors point out, is the experience of South African disarmament. Through a combination of access to records, inspections, and interviews with technical staff, it was possible to gain sufficient judgment that South Africa was and is in compliance with its nonproliferation commitments.

What is needed is not a complete historical record—although understanding the history of the programs is certainly important—but methods to verify the correctness and completeness of the “initial declaration” of nuclear facilities and materials. This initial declaration has been made by all non-nuclear-weapon states with significant programs that are parties to the NPT, and in all but one case it has been verified by the International Atomic Energy Agency (IAEA).

The exception, of course, is North Korea, where the IAEA detected discrepancies while checking the declaration. The system, in other words, proved robust and capable.

Keep it simple, sir: with inspectors, no nuclear weapons; without inspectors, there may be nuclear weapons. As the authors point out, “there appear to have been no instances of a state managing to build and operate a secret fuel-cycle facility of any significance without at least arousing the strong suspicions of a state with advanced intelligence assets.”

Yet in the end, as Perkovich and Acton suggest, it may be that “technical means of verification alone cannot provide sufficient assurance in a prohibition of nuclear weapons; ... societal verification is required to fill the gaps.” They suggest using national laws that would allow or even require

citizens to denounce treaty violations, or prosecute anyone who engages in the illicit manufacture and research of nuclear weapons. The existence of a free press, an independent judiciary, and opposition parties could enhance confidence.

The Brazilian experience is illustrative. The Constitution approved in 1988—a full decade before Brazil became a member of the NPT—forbids the manufacture or possession of nuclear weapons. Budget funds cannot be allocated to such activities, and a president who secretly orders a nuclear-weapon program could even be impeached. In the transition to a nuclear-weapon-free world, similar amendments to the constitution of each nuclear-weapon state could be envisaged.

### **Implications for the Civilian Nuclear Industry**

Perkovich and Acton choose to address in this section what they define as a “circular problem”: Non-nuclear-weapon states are reluctant “to consider any new rules if the nuclear-weapons states do not undertake a yet-to-be-defined plan for nuclear disarmament,” while nuclear-weapon states “will not agree to eliminate their nuclear arsenals if they are not confident that proliferation will be prevented through the enforcement of stronger non-proliferation rules.” In a context of nuclear renaissance, they argue, it has become even more necessary to break this circle.

This is the way, indeed, in which the problem has been defined by many analysts, particularly in the English-speaking world. However, this description of the issue does not ring true to outside observers. Both nuclear disarmament and improvements in safeguards implementation are endeavors that stand on their own merits. Each presents specific challenges, but it is hard to imagine a quid pro quo between them. The pros and cons of nuclear disarmament relate to security issues; the pros and cons of nuclear safeguards relate to issues of expense, confidentiality, and technological secrets.

Arguments must be won, I would argue, in the specific confines of the NPT, the Conference on Disarmament, and the like, in the case of disarmament; and inside the IAEA, in the case of safeguards. Of course, positive momentum on one side could create a positive climate on the other; but the elements of a grand bargain do not seem to be present.

When some analysts address this “circular problem,” their proposals are more ambitious than a mere increase in the efficacy of IAEA safeguards. They go back to one of the holy grails of the nonproliferation debate: the multinationalization (joint ownership by several countries) or even the internationalization (ownership or management by an international

organization) of the nuclear fuel-cycle. Perkovich and Acton correctly point out that multinationalization, while difficult to implement, would not address many of the problems of denuclearization. Multilateralization is probably impossible for the foreseeable future, as the nuclear-armed states as well as the non-nuclear-weapon states that already control the fuel-cycle would not accept it for their own facilities. These are, as someone said, “impossible solutions in search of a problem.”

By challenging Article IV of the NPT—which, according to the unanimous doctrine and practice of states, acknowledges the preexisting national right of non-nuclear-weapon states to develop the nuclear fuel-cycle for peaceful purposes—such proposals could undermine the nonproliferation regime.

That is not the same as saying it would be a good idea if all 191 states had fuel-cycle facilities. But the less one challenges the right to peaceful use, the less one forces states on the threshold of fuel capability to decide in favor of acquisition. It is much better to make nuclear fuel commercially available under safeguards, free of political considerations, and let states make their own choices. Given the technological and financial challenges involved in the fuel-cycle, the vast majority will continue to buy fuel in the market. Moreover, each new fuel provider will crowd the market even more.

Perkovich and Acton briefly address the issue of naval reactors, which, they assert, could make nuclear disarmament impossible. This is not evidently the case: IAEA safeguards agreements foresee “special procedures” through which well-defined amounts of nuclear fuel may be withdrawn from safeguards for a well-defined period of time. Making these procedures tamper-proof, by using seals and containment measures, seems like less a major political issue than a technical problem that could be solved by specialists.

### **Enforcement Challenges**

The question of what the Security Council or other enforcement body might do in the event of a nuclear breakout, or of a major power war in a nuclear-weapons-free world, is the political equivalent of an elephant cemetery, where great debates come to die after an exhausting march. Perkovich and Acton correctly refuse to fall into this trap.

Making the world free of nuclear weapons does not mean eternal safety from all risks. It means eliminating some risks, such as the ones described above in the “business-as-usual” scenario, while accepting other risks. The risk of a nuclear breakout is addressed by the hedging of deterrence options in the form of virtual arsenals, which would restore deterrence (more about hedging later).

The risk of “making the world safe for World War III,” as some say, requires, again, political judgment. How likely is it that major powers, in the absence of a nuclear deterrent, might slip again into a conflagration similar to or worse than that of 1939–1945? Perkovich and Acton think that before taking the last step toward nuclear abolition, it is necessary to achieve a permanent settlement of the issues involving Taiwan, Kashmir, Palestine, and perhaps a few others (“the Russian periphery”). These flash points, they argue, could inflame the world.

Solving these issues in a manner satisfactory to all parties is certainly excellent advice. But by conditioning nuclear abolition on the solution of a specific list of issues, we will probably be faced with moving goalposts. Let us suppose that we have solved conflicts and tensions in the Taiwan Strait, Kashmir, the greater Middle East, and the Caucasus, as well as in the Korean Peninsula and a few other flashpoints that Perkovich and Acton do not mention. In the most wildly optimistic scenario, that would take several decades. Are we to believe that, by then, no new tensions will have arisen?

Another question is whether certain states that rely on nuclear weapons (or would like to) as the “great equalizer” against invasion and regime change would not consider that nuclear abolition would bring too much of an advantage to great conventional powers, in particular the United States. Perkovich and Acton suggest that, “There is a tension between the US interest in and obligation to use its power to defend international norms and its allies and friends, and concerns that other states have about US military power projection and interventionism. Reassurance from the US that a world without nuclear weapons would not increase the threat of US interventions need not be a precondition for taking many steps towards nuclear disarmament, but Russia and China would be more halting participants to the degree that such reassurance was not provided.”

They are quite right. Nuclear deterrence, real or virtual, plays certain roles—positive or negative—in the contemporary world order. Eliminating this role once and for all would require a rebalancing of the world order, a debate that transcends the technical discussions of the nonproliferation regime. The world might become more cooperative, rules-based, multilateral, and predictable; or it could become more confrontational, hierarchical, unilateral, and uncertain. If the former is true, nuclear elimination might be feasible; if the latter, we might have to stop for a while on the threshold of nuclear abolition, without quite taking the last step.

In both cases, at least the norms of the nuclear nonproliferation regime will be essential for our safety and survival, which makes the ideological rejection of the NPT, the IAEA, and the UN, which are detectable in some quarters, even more self-destructive.

Perkovich and Acton are also to be commended for not using the *deus ex machina* of Security Council action to make their preferred ideas mandatory to all states. Too many recent proposals have relied on the fiat of the Security Council to evade the obstacle of political and practical unfeasibility.

The Security Council is not a world legislator; it is the political body empowered by the Charter of the United Nations to take action in case of specific threats to international peace and security. It is seen by many as overloaded and overworked as it is; seeking to charge the Council with overriding negotiations among sovereign states is to pay it a disservice. Proposals that cannot be implemented may exhaust political energy that could otherwise be available to negotiate and implement practical measures.

The authors do touch quickly on the question of the role of the Security Council in a nuclear-weapon-free world. They think that nuclear disarmament would require the major powers to achieve a “significant reconciliation of their interests and approaches to regional and global security.” These interests, however, are not static; they will certainly evolve with time, as issues of energy, food, climate, technology, and even political, cultural, and religious tension evolve in currently unpredictable ways.

In the absence of nuclear deterrence, what may prevent major power wars is not the absence of tensions. It would be, rather, the strength and legitimacy of international order and the functioning of rules and mechanisms that allow major states to settle their differences by peaceful means. That, in turn, is conditioned on a variety of factors, among which are economic integration, mutually shared values, and strong institutions for diplomacy and problem-solving—in short, the whole set of norms that distinguish a Hobbesian state of nature from what Hedley Bull calls the “anarchical society,” the society of nations.

A strong United Nations, a strong Security Council, and a strong IAEA should certainly be part of this set of institutions if a nuclear-weapon-free world is to function well. They would have, however, to be evolving institutions, adapted to current and future circumstances, and to distributions of power that are quite unlike those that prevailed in 1945 (when the UN was established), 1957 (IAEA), or 1968 (NPT).

### **Hedging**

By addressing the issue of “hedging”—the capacity “to reconstitute nuclear arsenals” that would be enjoyed by states that have eliminated their nuclear weapons and that would allow them to answer to a nuclear breakout—Perkovich and Acton make a valuable contribution to the

abolition debate. They recall Jonathan Schell's proposal for "weaponless deterrence," under which states that had given up their nuclear weapons would retain the ability to rebuild their arsenals from scratch in a matter of weeks.

Nuclear abolition, in this framework, is not a movement toward an ideal world in which nuclear weapons are inconceivable. It could, rather, be viewed as a transition from physical to virtual nuclear arsenals. The authors quote Christopher Ford, the then-U.S. nonproliferation official, on the "potential availability of countervailing reconstitution" as "part of deterring 'breakout' from a zero-weapons regime." At the same time, they argue that such a situation might be more "instable" and "inequitable" and therefore unacceptable for non-nuclear-weapon states.

This issue certainly merits further discussion, if not now, then after the "minimal deterrence/low salience" stage is reached. At that point, "'virtual' arsenals" could be seen as preferable to the status quo.

In fact, virtual arsenals would be inevitable if we were to embark on this road. Unless societies revert to an agropastoral mode of production, every advanced industrial nation will retain, in the future as today, at least a theoretical capability to build nuclear weapons. Virtual arsenals, in this sense, exist today in many non-nuclear-weapon states, and "technological deterrence" may have played a role in nipping some regional nuclear races in the bud.

After abolition, such capability would as a matter of course be more advanced in the states that currently possess nuclear weapons. By virtue of the experience acquired by their physicists and engineers and transmitted to students, they would continue to enjoy a certain advantage over states that never had nuclear weapons. Yet this advantage, I believe, is smaller than the authors seem to think. Nuclear weapons, at least in their Hiroshima-Nagasaki state of the art—destructive enough for most conceivable purposes—are old technology. Pakistan can build them. North Korea can build them. Dozens of other countries can, too. The reason they do not is not for lack of technological ability, but because of the vitality and strength—such as they are—of the nonproliferation regime, broadly understood.

As generations succeed each other, "tacit knowledge" of nuclear weapon-making would begin to fade, as the authors point out. And with it, so would the inequity of the nuclear order. History, however, would not stop; an eventual nuclear breakout would probably be answered by other breakouts and the restoration of deterrence.

But history's path would be less dangerous than today's slippery slope toward a proliferated world. As Perkovich and Acton remind us, "So long as a few continue to place great value on and derive power and status from nuclear weapons, others will want their own share in this currency.... [P]rohibition of nuclear weapons must be pursued today to prevent nuclear competition tomorrow."

## Notes

- <sup>1</sup> <http://plato.stanford.edu/entries/thought-experiment>, accessed May 12, 2008.
- <sup>2</sup> In a separate 7 to 7 vote, decided by the president of the court, the International Court of Justice also determined that “the threat or use of nuclear weapons would generally be contrary to the rules of international law applicable in armed conflict,” but that “the court cannot conclude definitively whether the threat or use of nuclear weapons would be lawful or unlawful in an extreme circumstance of self-defense, in which the very survival of a state would be at stake.” Three of the seven dissenting judges asserted that the use of nuclear weapons would be unlawful under any circumstances, while four asserted that it could be lawful under certain extreme circumstances. “Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion,” ICJ Reports, 1996, p. 226.
- <sup>3</sup> *Report of the Canberra Commission on the Elimination of Nuclear Weapons*, August 1996, p. 22.
- <sup>4</sup> William Samuelson and Richard Zeckhauser, “Status Quo Bias in Decision Making,” *Journal of Risk and Uncertainty*, vol. 1, no. 1, March 1988, pp. 7–59.
- <sup>5</sup> *Report of the Canberra Commission*, p. 61.



SCOTT D. SAGAN

## Good Faith and Nuclear Disarmament Negotiations

George Perkovich and James Acton have written an important, but flawed, contribution to the global debate about nuclear disarmament. It is important because it breaks more new intellectual ground, and digs deeper into the subject, than any previous study on the topic. The authors present particularly novel and subtle analyses of two specific issues that will need to be addressed if we are to move safely toward a nuclear-weapon-free world: the challenge of effective verification of very small nuclear arsenals or zero nuclear weapons; and options to enhance the International Atomic Energy Agency (IAEA) safeguards system and promote international control of the nuclear fuel-cycle to prevent proliferation in the future.

The paper is flawed, however, in two related ways. First, by focusing almost exclusively on the disarmament endgame, the authors take attention away from what the nuclear-weapon states actually committed to do under Article VI of the Nuclear Non-Proliferation Treaty (NPT) and whether they have upheld that commitment. Under Article VI, the nuclear-weapon states did not commit themselves to *achieve* complete nuclear disarmament; instead, all NPT member states committed “to *pursue negotiations in good faith* on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament.”<sup>1</sup> Have the nuclear-weapon states pursued negotiations in good faith? As I will show in this essay, it is important to focus on what constitutes a “good-faith effort” in disarmament negotiations in order to understand the past failures of NPT

Review Conferences and to help produce a more cooperative and safer nuclear future. Second, the authors' important analysis of international control over the nuclear fuel-cycle fails to place this issue in the context of the same commitment of the non-nuclear-weapon states under Article VI. Instead, like virtually all scholarly and diplomatic discussions of the issue, this Adelphi Paper conceives of nuclear fuel-cycle control as a debate over how best to create acceptable constraints on the so-called inalienable right given under Article IV for NPT member states to pursue peaceful nuclear energy production. The final section of my critique therefore presents a reconceptualization of this issue, calling for negotiations about international control of the fuel-cycle as an obligation of the states that don't possess nuclear weapons to meet their Article VI commitment to work in good faith toward nuclear disarmament.

### **To Pursue Negotiations in Good Faith**

What is the origin of the NPT's phrase "to pursue negotiations in good faith"? What is the common legal understanding of "good faith" behavior? How have different governments interpreted Article VI over time? During the negotiations that led to the NPT in 1968, neither the United States nor the Soviet Union wanted to include any linkage between the NPT and other arms control and disarmament negotiations, preferring a simpler treaty and one whose prospects for success could not be damaged by failures in arms control negotiations.<sup>2</sup> However, a number of non-aligned nations—most prominently, India and Sweden—called for linking specific nuclear disarmament and arms control agreements to the NPT, even proposing to make the ratification of the Comprehensive Test Ban Treaty (CTBT) a prerequisite for the entry into force of the NPT.<sup>3</sup> Facing a potential stalemate, the Mexican government proposed the compromise solution: to require all states "to pursue negotiations in good faith" toward nuclear disarmament.<sup>4</sup> Fearful that the NPT might otherwise fail, Moscow and Washington (and the majority of the nonaligned movement, with the exception of India and Pakistan) agreed to accept the Mexican compromise language in the final version of Article VI. Agreeing to pursue negotiations was acceptable for the United States, because it did not commit the superpowers, as U.S. Ambassador Gerald Smith stated, "to achieve any disarmament agreement, since it is obviously impossible to predict the exact nature and results of such negotiations."<sup>5</sup>

Although the Vienna Convention on the Law of Treaties requires that every treaty be interpreted and performed "in good faith," there is no consensus in international law about how to define "good faith." This

phrase, as David Koplow nicely notes, is “one of those excruciatingly ambiguous terms in the lawyer’s vocabulary.”<sup>6</sup> In American domestic law, however, some accepted general principles have emerged as guideposts for what constitute a “good-faith” effort, and also what constitutes “bad-faith” behavior. The common law of contract in most, if not all, American jurisdictions imposes a duty on contracting parties to perform their contractual obligations in good faith, but the courts have not articulated an operational standard defining precisely what that means.<sup>7</sup> *The Restatement of Law of Contracts*, however, does offer a detailed explanation of good-faith commitments and violations of good-faith performance:

Good faith performance or enforcement of a contract emphasizes faithfulness to an agreed common purpose and consistency with the justified expectations of the other party; it excludes a variety of types of conduct characterized as involving ‘bad faith’ because they violate community standards of decency, fairness or reasonableness. ... A complete catalogue of types of bad faith is impossible, but the following types are among those which have been recognized in judicial decisions: evasion of the spirit of the bargain, lack of diligence and slacking off, willful rendering of imperfect performance, abuse of a power to specify terms, and interference with or failure to cooperate in the other party’s performance.<sup>8</sup>

An assessment of whether the United States has met its Article VI obligations in recent years should therefore start by examining commitments made at earlier NPT Review Conferences, making assessments about “the justified expectations of the other party” and judging whether the Bush administration practiced “evasion of the spirit of the bargain” in its negotiations at the 2005 NPT Review Conference.

### **The 1995, 2000, and 2005 NPT Review Conferences**

At the 1995 NPT Review Conference, the member states agreed to a permanent extension of the NPT and also agreed on a set of “Principles and Objectives for Nuclear Non-Proliferation and Disarmament,” noting that “the achievement of the following measures is important in the full realization and effective implementation of article VI:”

(a) The completion by the Conference on Disarmament of the negotiations on a universal and internationally and effectively verifiable Comprehensive Nuclear-Test Ban Treaty no later than

1996 ...; (b) The immediate commencement and early conclusion of negotiations on a non-discriminatory and universally applicable convention banning the production of fissile material for nuclear weapons or other nuclear explosive devices ...; (c) The determined pursuit by the nuclear-weapon States of systematic and progressive efforts to reduce nuclear weapons globally, with the ultimate goals of elimination of those weapons, and by all States of general and complete disarmament under strict and effective international control.<sup>9</sup>

At the 2000 NPT Review Conference, delegates from both nuclear- and non-nuclear-weapon states agreed to a more extensive final document outlining thirteen “practical steps for the systematic and progressive efforts to implement Article VI of the Treaty,” including to: “without delay and without conditions ... achieve the early entry into force of the Comprehensive Nuclear-Test-Ban Treaty”; “preserving and strengthening the ABM [Anti-Ballistic Missile] Treaty”; “increased transparency by the nuclear-weapon States with regard to their nuclear weapons capabilities”; and “the further development of the verification capabilities that will be required to provide assurance of compliance with nuclear disarmament agreements for the achievement and maintenance of a nuclear-weapon-free world.”<sup>10</sup> U.S. Ambassador Norman A. Wulf announced that “the elements of the final document are a demonstration of common ground—the acknowledgment of shared attitudes not only about the ends, but also about the means of the nuclear non-proliferation regime” and proclaimed that “there is no doubt that the United States will seek to move forward on the nuclear disarmament agenda set forth in the final document.”<sup>11</sup>

Between the 2000 NPT Review Conference and the 2005 NPT Review Conference, however, the Bush administration came into office and withdrew from the ABM Treaty; signed the Moscow Treaty with Russia, which contained no verification provisions; and announced that it would not seek Senate ratification of the CTBT. At the 2005 NPT Review Conference, many governments complained about the failure of the United States (and other nuclear-weapon states) to meet the specific 13 Steps outlined earlier. Such complaints came not only (and predictably) from the Iranian delegation,<sup>12</sup> but also from allies of the United States and many neutral parties. The representative of the non-nuclear-weapon states in the European Union, for example, called on the nuclear-weapon states to adhere to “the commitments made by relevant states at the 2000 Review Conference.”<sup>13</sup> The representative of the New Agenda Coalition (Brazil, Egypt, Ireland,

Mexico, South Africa, Sweden, and New Zealand) similarly called on the United States to “reconsider its approach to the CTBT” and stated that the 1995 “Principles” and the “13 practical steps” agreed to in 2000 “form the basis of the international community’s expectation, both in legal and moral terms, that the nuclear weapons states are making progress toward nuclear disarmament.”<sup>14</sup>

The Bush administration’s position, however, both during and after the 2005 NPT Review Conference, was that the 13 Steps were obsolete and had no legal status. In May 2005, Assistant Secretary of State Stephen G. Rademaker told a reporter that “we think the 13 Steps reflect a statement of views that were relevant to the year 2000” adding that “those of us who actually care about the future of the nuclear nonproliferation regime need to focus on the real problems of today, not a historical discussion of problems that were identified five years ago.”<sup>15</sup> In their official speeches at the 2005 NPT Review Conference, Bush administration spokesmen consistently maintained that the United States was in full compliance with Article VI and failed to even mention the 13 Steps agreement.<sup>16</sup> Indeed, Ambassador Christopher Ford later complained that discussions of the 13 Steps were “disarmament compliance fetishism” and argued:

The 13 Steps amount to no more than any other political declaration by a convocation of national representatives: their statement of belief, at that time, regarding what would be best. There is nothing wrong with such statements. ... But one should not confuse such exhortations with legal obligations or mistake them for definitive treaty interpretive criteria.<sup>17</sup>

This position is undoubtedly correct with regard to the legal standing of the 13 Steps statement; NPT Review Conference final reports are not signed by heads of state or ratified by legislatures and do not therefore have the same legal status as do international treaties. And no Bush administration official went so far as to call for a public renunciation of Article VI. Yet the behavior of the administration at the 2005 NPT Review Conference—especially the refusal to discuss the 13 Steps agreed upon earlier—did violate the good-faith criteria of “consistency with the justified expectations of the other party” and fit the American Law Institute’s criteria of bad faith as an “evasion of the spirit of the bargain.” I am not arguing that individual U.S. diplomats acted in bad faith, but it is worth repeating the American Law Institute’s statement that “subterfuges and evasions violate the obligation of good faith in performance even though the actor believes his conduct to be justified.”<sup>18</sup> Just as importantly, given the history of the links between

the CTBT negotiations and the NPT, the refusal of the Bush administration to request reconsideration of the CTBT by the Senate and the subsequent failure to pursue any further negotiations designed to strengthen the treaty and make it more acceptable to the United States, can reasonably be seen as cutting against the Article VI commitment “to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race.”

The authors’ focus on challenges to final disarmament is good, but it should not lead analysts to ignore the need for movement on practical steps, including the CTBT, to restore momentum toward disarmament at the 2010 NPT Review Conference. The place to start, I would argue, is to acknowledge directly that the United States has not met all of the objectives it sought to achieve in the 2000 13 Steps agreement and to revisit the issues to craft a new consensus about what immediate steps can be taken now. The good news is that many non-nuclear-weapon states are willing to engage in such cooperative discussions. As Deepti Choubey notes after extensive interviews with diplomats and government leaders from around the globe, “most officials conceded that some steps [of the 13 Steps] need to be updated.”<sup>19</sup> The bad news is that there will be precious little time for a new U.S. administration to develop its own positions and lay the diplomatic groundwork necessary for a successful reengagement before the 2010 NPT Review Conference.

### **Rethinking the Article IV–Article VI Link**

Article IV of the NPT simply states: “Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with Articles I and II of this Treaty.”<sup>20</sup> The expected global expansion of the use of nuclear power, however, will lead to increases in the demand for enriched uranium and reprocessed plutonium, and many proposals have been developed at the IAEA and elsewhere for reducing the danger that states could start their own nuclear fuel production facilities and thereby move closer to developing nuclear weapons if they later chose to withdraw from the treaty. Mohammed ElBaradei has been particularly forceful in warning of the security risks inherent in such a world of multiple “virtual nuclear weapons states.”<sup>21</sup>

The authors correctly note that many non-nuclear-weapon states fear that any effort to create multinational fuel-cycle facilities (plants owned and operated by multiple states) or international facilities (plants owned and operated by an international organization) could cut against their

“inalienable right” as specified in Article IV. (It should always be remembered, however, that even this “inalienable right” is in reality conditional upon the non-nuclear-weapon state in question being “in conformity” with Articles I and II. It is too often forgotten, in the debate over the Iranian nuclear program, for example, that a state in violation of its Article II commitment “not to seek or receive any assistance in the manufacture of nuclear weapons” has at least temporarily sacrificed its rights under Article IV.)

The authors label the various proposals for multilateral or international fuel-cycle facilities “the radical approach” to managing nuclear fuel production in the future. Their subtle analysis does identify many technical problems with these schemes, including the difficulty of providing credible guarantees of fuel supply; the danger that future rogue actors (such as A. Q. Khan) would be trained at international plants; the continuing risks of construction of clandestine fuel-cycle facilities; and the enduring problem that the costs of international or multilateral ownership could prove prohibitive. They also conclude with a useful, and I think accurate, recognition of the political necessity for equal treatment for nuclear-weapon states and non-nuclear-weapon states under any revised fuel-cycle regime: “non-nuclear-weapon states are unlikely to agree to new rules or arrangements for limiting access to fuel-cycle capabilities unless all states play by the same rules.”

What is missing here is the conceptual change of framework that is needed to encourage the non-nuclear-weapon states to take more responsibility for designing both a new fuel-cycle regime and simultaneously contributing to the eventual elimination of nuclear weapons. Perkovich and Acton actually recognize the strategic necessity but fail to follow through on the need for a new conceptual framework. They conclude the discussion of sensitive fuel-cycle facilities by noting the following: “if no acceptable form of regulation can be established for the proliferation-sensitive activities that many states which today promote disarmament are seeking to conduct, the abolition of nuclear weapons may not prove possible.”

If that is true, however (and I think it is), then the non-nuclear-weapon states also need to recognize that entering into negotiations about international control of the nuclear fuel-cycle is actually part of *their* Article VI commitment “to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race.” While it will certainly be critical for the nuclear-weapon states to renew and reenergize their commitment to work toward nuclear disarmament before the 2010 NPT

Review Conference, if we are to move safely toward the common goal of nuclear disarmament it will also be necessary for the states that do not possess nuclear weapons to understand the reciprocal nature of Article VI commitments and the necessity for negotiating serious constraints on the spread of enrichment and reprocessing facilities.

### **A Final Observation**

*Abolishing Nuclear Weapons* is, despite these lacunae, a major contribution to the debate about the global nuclear future. Perkovich and Acton have done us a great service by mapping out the road toward abolishing nuclear weapons and identifying obstacles on the highway, dangerous turns just around the corner, and major gaps in our knowledge of the distant terrain ahead. Indeed, the publication of this Adelphi Paper should be seen in itself as a positive, personal example of American and British cooperation to honor national commitments to work in good faith toward the eventual goal of nuclear disarmament.

## Notes

- <sup>1</sup> NPT (1968), Article VI. (emphasis added).
- <sup>2</sup> On the negotiation history, see Mohamed Shaker, *The Nuclear Non-Proliferation Treaty: Origin and Implementation 1959–1979*, vol. 2 (London: Oceana Publications, 1980), pp. 555–648; and Christopher A. Ford, “Debating Disarmament: Interpreting Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons,” *Nonproliferation Review*, vol. 14, no. 3, November 2007, pp. 401–28.
- <sup>3</sup> Shaker, *The Nuclear Non-Proliferation Treaty*, pp. 568–9.
- <sup>4</sup> *Ibid.*, p. 571.
- <sup>5</sup> As quoted in *ibid.*, p. 567.
- <sup>6</sup> David A. Koplow, “Parsing Good Faith: Has the United States Violated Article VI of the Nuclear Non-Proliferation Treaty?” *Wisconsin Law Review*, vol. 301 (1993), pp. 367–8.
- <sup>7</sup> Steven J. Burton, “Breach of Contract and the Common Law Duty to Perform in Good Faith,” *Harvard Law Review*, vol. 94, no. 2, December 1980, p. 369.
- <sup>8</sup> *Restatement (Second) of the Law of Contracts*, Section 205, Comment (c). Restatements of the law are produced by the American Law Institute and are considered authoritative statements of predominant common law doctrine across jurisdictions; they are treated by courts as persuasive but not binding interpretations of the law.
- <sup>9</sup> “Decision 2: Principles and Objectives for Nuclear Non-proliferation and Disarmament,” May 11, 1995, pp. 9–12, in *Final Document, Part I, Organization and Work of the Conference* (NPT/CONF.1995/32, Part I, Annex), 1995 Review and Extension Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons. Official Record, New York, 1995, <http://www.un.org/Depts/ddar/nptconf/2142.htm>. Also see Thomas Graham Jr., “NPT Article VI Origin and Interpretation,” in Michael May, ed., *P-5 Nuclear Doctrines and Article VI*, Stanford University, CISAC Conference Report, 2008, pp. 45–62, <http://se1.isn.ch/serviceengine/FileContent?serviceID=ISN&fileid=A1922900-22FC-9098-0396-D4BF15BE9B64&lng=en>.
- <sup>10</sup> *Final Document*, 2000 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, April 24–May 19, 2000 (NPT/CONF.2000/28), Part I and Part II, pp. 14–15. October 10, 2008, <http://www.reachingcriticalwill.org/legal/npt/2000FD.pdf>.
- <sup>11</sup> Norman A. Wulf, “Observations From the 2000 NPT Review Conference,” *Arms Control Today*, November 2000, [http://www.armscontrol.org/act/2000\\_11/wulf](http://www.armscontrol.org/act/2000_11/wulf).
- <sup>12</sup> Islamic Republic of Iran, “Concluding Statement by H. E. Dr. M. Javad Zarif, permanent representative of the Islamic Republic of Iran to the UN, at the 2005 NPT Review Conference,” New York, May 27, 2005, <http://www.reachingcriticalwill.org/legal/npt/RevCon05/GDstatements/Iranfinalstate.doc>, pp. 2–3.
- <sup>13</sup> Statement by Minister Delegate for Foreign Affairs of Luxembourg, Nicolas Schmidt, on behalf of the European Union, New York, May 2, 2005, <http://www.reachingcriticalwill.org/legal/npt/RevCon05/GDstatements/Luxembourg-EU.pdf>, p. 10.
- <sup>14</sup> Statements by Ambassador Tim Caughley, New Zealand, on behalf of The New Agenda Coalition—Brazil, Egypt, Ireland, Mexico, South Africa, Sweden and New Zealand, New York, May 18, 2005, <http://www.reachingcriticalwill.org/legal/npt/RevCon05/GDstatements/NZ-NAC.pdf>.
- <sup>15</sup> Stephen G. Rademaker, “Zeroing in on Non-Compliance,” *Arms Control Today*, vol. 35, May 2005, [http://www.armscontrol.org/act/2005\\_05/Rademaker](http://www.armscontrol.org/act/2005_05/Rademaker).
- <sup>16</sup> See Stephen G. Rademaker, “U.S. Statement at the 2005 NPT Review Conference,” May 2, 2005, <http://www.reachingcriticalwill.org/legal/npt/RevCon05/GDstatements/U.S.pdf>; and “2005 Non-Proliferation Treaty (NPT) Review Conference: U.S. Objectives,” Bureau of Arms Control, Washington D.C., April 21, 2005, [http://www.nti.org/e\\_research/official\\_docs/dos/doso22105.pdf](http://www.nti.org/e_research/official_docs/dos/doso22105.pdf).
- <sup>17</sup> Ford, “Debating Disarmament,” p. 411 and p. 413.
- <sup>18</sup> *Restatement (Second) of Law of Contracts*, Section 205, Comment (d).

<sup>19</sup> Deepti Choubey, *Are New Nuclear Bargains Attainable?* (Washington, D.C.: Carnegie Endowment for International Peace, October 2008), p. 13, [http://www.carnegieendowment.org/files/new\\_nuclear\\_bargains.pdf](http://www.carnegieendowment.org/files/new_nuclear_bargains.pdf).

<sup>20</sup> NPT (1968), Article IV.

<sup>21</sup> Mohamed ElBaradei, "Addressing Verification Challenges," Statements of the Director General: Symposium on International Safeguards, October 16, 2006, <http://www.iaea.org/NewsCenter/Statements/2006/ebsp2006no18.html>.

TAKAYA SUTO AND HIROFUMI TOSAKI

## Abolishing Nuclear Weapons: A Japanese Perspective

The recent heightened expectation for the prospect of abolishing nuclear weapons stems from the momentum created by two op-eds written by four former high-ranking U.S. officials advocating a world free of nuclear weapons. Along with those articles have come clear indications of the further promotion of nuclear disarmament by President-elect Obama, as well as a spate of concrete proposals put forth by major countries and preeminent think tanks advocating the need to work toward the abolition of nuclear weapons. However, these facts do not necessarily guarantee that the project will be successful. Numerous proposals for abolishing nuclear weapons have been raised repeatedly in the past, and they have failed. Now the world community has an opportune moment to carry out specific actions toward abolishing nuclear weapons, and we must not fail again. The Adelphi Paper, *Abolishing Nuclear Weapons*, by George Perkovich and James Acton addresses in a realistic and objective manner many of the issues that have been considered especially difficult to solve. This approach should contribute greatly “to encourage a conversation about the abolition of nuclear weapons.”

Abolishing nuclear weapons has been Japan’s long-cherished goal, and the promotion of nuclear disarmament and nonproliferation has been one of the pillars in Japanese foreign and security policy. As the only country to have experienced nuclear devastation, Japan bases its nuclear disarmament policy on the strong beliefs that the atrocities of nuclear bombs

must never be repeated, that nuclear weapons must be eliminated, and that Japan has a unique responsibility to urge the international community to make faster progress toward disarmament. At the same time, its policy toward the nuclear conundrum has to be reconciled with the reality that Japan is geopolitically situated in the unstable security environment of Northeast Asia, as well as with the reality that nuclear weapons exist in international society and in fact have played a role in maintaining international order and stability.

### **Regional Concerns**

Northeast Asia is one of the most critical regions with regard to nuclear issues. Every state that has direct security stakes in the region has been closely engaged with nuclear weapons. The United States, Russia, and China are all parties to the Nuclear Non-Proliferation Treaty (NPT), while North Korea possesses nuclear weapons in violation of the NPT. Although neither Japan nor South Korea possesses any nuclear weapons, both are under the U.S. nuclear umbrella. On top of all this, the security environment of this region has remained volatile, even since the end of the Cold War. The possibility of major armed conflicts erupting in the Korean Peninsula and the Taiwan Strait has long been worrisome. Additionally, several unsolved territorial disputes exist in Northeast Asia, and the relationships among regional countries are not necessarily amicable. Furthermore, a rising China has continued to modernize its military force, including its nuclear capabilities, while its intentions remain unclear. In the medium to long term, the United States and China may vie for hegemony and influence in the Asia-Pacific region, resulting in confrontation.

The role of nuclear weapons in the Northeast Asian security environment cannot be lightly dismissed. Maintaining order and stability by deterring the use of military force is of prime importance, considering the confrontational or competitive relationship among the key countries. Moreover, simply eliminating nuclear weapons, without establishing an alternative security arrangement or framework that does not depend on nuclear threats, would increase the volatility of the region because conventional forces provide weaker deterrence than nuclear weapons. The result could be a possible heightening of the “security dilemma” as well as increased likelihood of an armed conflict caused by miscalculations or misperceptions. Specifically, one country might think it could achieve its (limited) objectives by force if it did not fear massive destruction by a United States, possessing only conventional forces.

### **Balancing Order and Justice**

The image of nuclear weapons as assuring order and stability continues to exist in the international community at large as well as in Northeast Asia. Although the abolition of nuclear weapons may very well be “justice”—ending the double standard between nuclear “haves” and “have nots,” and achieving a world free from fear of catastrophic destruction—blind pursuance of this cause could disturb order and stability. It would be questionable to pursue justice in this way as it may turn out to be hazardous if nuclear weapons are abolished without giving heed to order and stability.

However, in the nuclear age, order and stability are provided under the sword of Damocles. The logic of nuclear-armed states that deep reductions and the subsequent abolition of nuclear weapons cannot be initiated without the assurance of security and “strategic stability” is prone to be used as a pretext for maintaining the status quo under the premise that the present order and stability would continue. But there is no guarantee that this premise would hold indefinitely. Nor is there a guarantee that nuclear deterrence would continue to function in today’s increasingly complicated security environment as it did when it rendered the Cold War “the long peace.”<sup>1</sup> Nuclear weapons in the hands of North Korea, other rogue states, or non-state actors could easily destabilize Northeast Asia and the wider international community. It also cannot be ruled out that “good nukes” that contribute to international order and stability could suddenly change themselves into “bad nukes.” Moreover, no matter how “good” or “bad” a particular nuclear-armed state may be, a single use of these weapons could cause hundred of thousands of casualties and destruction of a city.

### **Practical Steps Toward Abolition**

The top priority in advancing nuclear abolition in Northeast Asia is the dismantlement of North Korea’s nuclear arsenal. Japan, the United States, and China should concurrently launch intensive bilateral or trilateral strategic dialogues to increase transparency and mutual understanding in security policies, nuclear policies, missile defense issues, deterrence postures, and so on. Strategic dialogue and triologue are also needed to encourage the rapidly rising China to proceed not to a confrontational relationship with the United States and Japan but to a relationship based on cooperation. Establishment of a pluralistic and stable Northeast Asian security framework that does not rely so heavily on nuclear and other military powers would be a positive step. Of course, the rapid progress of regional nuclear disarmament is not easy. However, discussions like

those we suggest could decrease opacity and increase predictability. That could enable the regional countries to reduce their dependence on nuclear weapons, which would then augment nuclear disarmament.

The effort to construct an enduring security framework that preserves order and stability without depending on nuclear weapons should be sought not only by Northeast Asian states, but also by the international community as a whole. As advocated by Perkovich and Acton, several measures—such as a highly intrusive verification process; multinational or international ownership of fuel-cycle facilities; strict enforcement mechanisms applicable even to major countries; and virtual nuclear arsenals and international control on nuclear weapons as a hedge against violations—are indispensable in the process of abolishing nuclear weapons. And perhaps what their article implies is that without a transition to a new international security framework, such measures, let alone abolition of nuclear weapons, cannot be realized. The root cause of why past abolition attempts have failed could very well have been the inability to establish a new security framework to supersede the existing one.

At present, one cannot fathom concrete and detailed images regarding either the necessary mechanics for abolishing nuclear weapons or the new security framework that would be required. That said, it is unrealistic to seek perfect verification measures or enforcement mechanisms from the outset. Such measures should be constructed and implemented step-by-step and improved incrementally, leading to a more effective system. Additionally, discussions and processes geared toward abolishing nuclear weapons should be seen as conducive to the formulation of a new security framework.

Therefore, international discussions on abolishing nuclear weapons should be undertaken on two levels: One at a high political level to influence decision makers of both nuclear-armed and non-nuclear-weapon states—a forum to reaffirm the political will to abolish nuclear weapons while keeping the formation of new security framework as a possibility. The other level consists of experts and specialists, who would discuss concrete measures to overcome impediments to abolishing nuclear weapons. In the meantime, proceeding with actual measures toward nuclear disarmament—particularly visible efforts by the nuclear-armed states—are certainly important and should not be overlooked.

### **Nonproliferation and the Civilian Nuclear Industry**

Japan can play a major role as one of the countries to lead such discussions and endeavors, particularly if, among various issues, the peaceful

use of nuclear energy is a focus. As the non-nuclear-weapon state that has actively promoted nuclear energy while faithfully complying with nonproliferation obligations, Japan can provide a model that could enable other non-nuclear-weapon states to develop peaceful nuclear energy programs that maintain a high degree of nuclear safety and security while complying with nonproliferation obligations. Japan has also contributed by developing proliferation-resistant technologies. In Japan, a serious debate is taking place concerning effective, nondiscriminatory conditions for assuring international nuclear fuel supplies.<sup>2</sup>

International debate on nuclear fuel supply assurances has been prompted by Iran's failure to comply with United Nations and International Atomic Energy Agency (IAEA) demands that it suspend its enrichment and reprocessing-related activities. While it is imperative to prevent would-be proliferators from gaining access to the most sensitive technologies for producing fissile materials, a criteria-based approach for nuclear fuel supply assurances is more desirable than one that is discriminatory.

The key challenge here is to determine the conditions for supplying nuclear fuel. For nuclear nonproliferation, acceding to the additional protocol as well as the IAEA comprehensive safeguards agreement and voluntarily renouncing enrichment and reprocessing activities should be included in the condition. But several potential consumer countries may oppose severe conditions, arguing that article IV of the NPT guarantees "the inalienable right...to develop research, production and use of nuclear energy for peaceful purposes" and also claiming the principle of nondiscrimination. At the same time, failure to agree on strict supply conditions would impede the original goal of nonproliferation. Either way, it is unlikely that determined proliferators such as North Korea and possibly Iran would participate in such an international approach, necessitating separate political settlements. Additionally, why should countries with leading civil nuclear technologies, such as Japan, which for years have abided by their nuclear nonproliferation obligations in good faith, be "punished" for activities by certain non-complying countries, resulting in the divestiture of the rights relating to the nuclear fuel cycle, such as enrichment and reprocessing? Japan is expected to propose constructive proposals addressing these issues.

As the only country that has experienced nuclear bombings, Japan has the responsibility to lead the effort to elevate to an international norm that nuclear weapons must be eliminated. Japan's standing is bolstered because the country continues to comply fully with nuclear nonproliferation obligations and has strived to promote realistic and progressive nuclear

disarmament. Japan acknowledges the realities of the region and of the international community, including the fact that under the current security environment, nuclear weapons have, to a certain extent, contributed to maintaining international order and stability. At the same time, Japan will continue proactively to participate in international efforts to construct a more stable security order under a desirable security framework that does not rely on nuclear weapons.

## Notes

- <sup>1</sup> John Lewis Gaddis, *The Long Peace: Inquiries into the History of the Cold War* (New York: Oxford University Press, 1989).
- <sup>2</sup> For example, the committee for strengthening nuclear nonproliferation, commissioned by the Japanese Cabinet Office and headed by Takaya Suto, is now elaborating on the Japanese proposals for the nuclear fuel guarantee approach.



JAMES E. DOYLE

## Eyes on the Prize: A Strategy for Enhancing Global Security

George Perkovich and James Acton are to be commended for completing a vital task. They have successfully outlined a broad range of potential challenges to nuclear disarmament and the specific questions, both technical and political, that states must address if they are to pursue the elimination of nuclear weapons in earnest. The authors have thus created an invaluable reference for those who are serious about this crucial undertaking.

I hope the points I make below add to the rich foundation provided by the authors. As for my own thoughts in this debate, I support the elimination of nuclear weapons as instruments of national security strategy. Their “abolition,” however, is an idea, as yet undefined in detail and, although I do support it as a long-term goal, I am a much stronger advocate of rapidly transforming the role nuclear weapons play in today’s world, the nature of the infrastructure that supports them, and the manner in which they are deployed and operated. Doing so can provide near-term security benefits for the international community and facilitate the eventual elimination of nuclear weapons as they exist today.

Therefore, my analytical efforts, and my comments on *Abolishing Nuclear Weapons*, are motivated not by the abstract goal of abolition but by the achievement of more specific nuclear security objectives, including decreasing the chances that nuclear terrorism could occur; that nations will ever use nuclear weapons in conflict; and that nuclear weapons will further proliferate.

*The views expressed in this chapter are exclusively the author’s personal views and do not necessarily reflect the positions of the Los Alamos National Laboratory or the U.S. Government.*

## Uncomfortable Assumptions

The authors stake out very difficult ground for themselves by hypothesizing from the vantage point of today's world what might be necessary for nations to give up their last nuclear weapons at some point perhaps twenty to fifty years in the future. This approach has limitations because there are too many unknown factors and unforeseen events that could make elimination either more or less possible. It also takes the focus off the real prize—improved global nuclear security—and concentrates instead on the endgame of nuclear-weapon abolition, which is not clearly defined, may not be desirable, and if it occurs, would do so under circumstances we cannot now imagine. What we can imagine is changing the roles nuclear weapons play and the manner in which they are deployed.

The essay also seems to proceed uncritically from the view that many nations naturally view nuclear weapons as a solution to a whole raft of national and international security problems. If this were so, many more states would possess them. Nuclear disarmament has been pursued for more than sixty years and has been enshrined as a law-backed international goal because most states and people view nuclear weapons not as a solution but as a problem.

The view that the ideology of nuclear weapons is incompatible with basic human values and the positive development of human civilization is as old as nuclear weapons themselves. It has always been acknowledged that an international security system based on the willingness of nations to commit mutual suicide in order to protect themselves is a suboptimum solution to the security dilemma. It is fraught with great risk to the world's nations and peoples, and we should be ceaselessly striving for more rational and humane ways to achieve security.

The authors of *Abolishing Nuclear Weapons* do not address this most critical of reasons for reducing and eventually eliminating nuclear weapons. Instead, the unstated assumption seems to be “while nuclear weapons may not be a perfect means to security, we are stuck with them and we better not seek to change the roles they play too seriously until we are certain that better means can be created or that the nature of international politics can be changed.” Like many others, I disagree that this is the proper armchair from which to explore alternatives to an international system that relies on nuclear weapons as the ultimate guarantee of security.

The title of chapter 1, “Establishing the Political Conditions to Enhance the Feasibility of Abolishing Nuclear Weapons,” clearly implies, for example, that some fundamental aspect of our political landscape or of reality itself must be changed before real strides toward the elimination

of nuclear weapons are feasible. This is a theme that is carried throughout the essay. The premise is that no reasonable mind would proceed toward nuclear disarmament unless the nature of the “political reality” were first changed.

This is where the essay’s commitment to predict what future conditions might be necessary to eliminate nuclear weapons becomes obstructionist. The most important point is that there are strong practical reasons for taking steps now to reduce the risks created by the existence of nuclear arms. These steps are in the national security interests of many states and of the United States and Europe in particular. They may be consistent with the goal of eliminating nuclear weapons and, indeed, significantly increase the likelihood of achieving that goal, but they are not dependent upon achieving it. To pursue these objectives, addressed in detail below, there is no need to change the nature of politics or military relations. To the contrary, the pursuit of international security and well-being would be advanced by immediately taking some specific steps short of nuclear abolition.

### **The Increasing Risks of Nuclear Deterrence**

The famous January 2007 article by William J. Perry, George P. Shultz, Henry A. Kissinger, and Sam Nunn, “A World Free of Nuclear Weapons,” strongly advocates that governments take concrete steps now toward the elimination of nuclear weapons. These former leading statesmen have been joined by Mikhail Gorbachev, former president of the USSR, and the Seven-Nations Initiative (Norway, Australia, Chile, Indonesia, Romania, South Africa, and the United Kingdom) to pursue the eventual elimination of nuclear weapons. As pointed out by the authors of *Abolishing Nuclear Weapons*, others recently supporting this objective include British prime minister Gordon Brown, Indian prime minister Manmohan Singh, and four former UK defense and foreign ministers.

In their essay, Perry, Shultz, Kissinger, and Nunn assert that nuclear deterrence is “increasingly hazardous and decreasingly effective.” In essence, they reject the prevailing belief within national security establishments that nuclear weapons still provide powerful security benefits in the evolving international security environment. Theirs is an unprecedented challenge to the existing nuclear order, and their arguments deserve serious analysis. In many ways, they are consistent with traditional critiques of the risks of nuclear deterrence. But they also go deeper to demonstrate why nuclear deterrence is more unstable in the current environment than in the Cold War and why continued nuclear proliferation is likely to exacerbate rather than attenuate these instabilities, increasing the risks yet further.

Nuclear deterrence is increasingly hazardous because a large surplus of nuclear weapons and materials left over from the Cold War is, in some cases, not adequately secured. In addition, an entirely new threat in connection with these weapons and materials has emerged in the form of extremist groups that are willing to carry out catastrophic terrorist attacks. Several states that are acquiring nuclear weapons or increasing existing arsenals are located in conflict-prone regions and have limited financial and technical resources to devote to nuclear security.

Nuclear deterrence is decreasingly effective because the conditions that enabled mutual deterrence during the Cold War have changed. In today's world, nuclear-armed states share disputed borders, have limited experience with nuclear weapon safety and security, and have vulnerable early warning and nuclear weapon control capabilities. Moreover, nuclear deterrence cannot effectively reduce the chance of nuclear terrorism. The more states acquire nuclear weapons for "deterrence," the more they will also risk providing weapons and materials to terrorists who wish to carry out a nuclear attack. These realities refute the view held most notably by Kenneth Waltz that nuclear weapons provide concrete benefits for states and will have a stabilizing influence on the international system.<sup>1</sup>

The authors of *Abolishing Nuclear Weapons* do not give enough emphasis to the transformed nature of the security environment and the implications of that transformation for traditional nuclear strategies. Strategic thought on nuclear arms evolved within a global security environment that no longer exists. That security environment was defined by a single primary state adversary, whose threat of nuclear attack against the United States and its allies could be successfully deterred by a reciprocal threat of nuclear retaliation.

Today, a terrorist nuclear attack is thought to be much more likely than an exchange of nuclear weapons with another state. The interest and efforts of terrorist networks to acquire nuclear weapons are well known, and their willingness to conduct a nuclear attack, if they possess the capability, is not in doubt. The al-Qaeda terrorist network has not been deterred from committing attacks against the United States, Great Britain, several other North Atlantic Treaty Organization (NATO) countries, Pakistan, and Israel. All of these states possess nuclear arms or are in alliance with nuclear powers.

In early 2008, the U.S. Defense Intelligence Agency director, Lt. Gen. Michael Maples, said in congressional testimony with National Intelligence Director Mike McConnell that al-Qaeda had regenerated at least some of

its robust research and development effort and was once again trying to develop or obtain chemical, biological, radiological, and even nuclear weapons to use against the United States and other enemies. This assessment was shared by Russian officials. That means that while nuclear weapons continue to offer some security benefits to their possessors, their existence in the age of global terrorism also creates a very real security liability for all states.

Threats from a growing terrorist movement are undeterrable by existing means. The key uncertainty in the new security environment is not whether the United States and its allies will be attacked by terrorists but whether the terrorists will acquire the means to move from conventional to nuclear explosives, thus making their inevitable attacks of strategic consequence. Here, the significant trends run in a negative direction. More nuclear weapons materials are being produced; more knowledge relevant to the construction of a nuclear weapon is being dispersed; and terrorist organizations are gaining the capability to mount increasingly sophisticated attacks involving larger numbers of militants.

The threat of nuclear terrorism is likely to be an enduring condition of the global security environment for at least thirty to forty years. This is because there is no prospect of ending the allure of political extremism and terrorist violence as a means for sub-state actors and movements to fulfill their objectives. Unfortunately, the trend in terrorist violence is toward larger, more spectacular attacks with devastating consequences, an outcome that would be possible with even rudimentary nuclear weapons. There is also no prospect of making the global inventory of nuclear weapons and weapon-usable nuclear materials completely secure from terrorists who are intent on acquiring them, especially considering that the inventory is so large and dispersed—and still expanding. Finally, should terrorists acquire the means to carry out a nuclear attack, the chances are low that feasible defensive capabilities can be developed.

### **Denial Versus Deterrence**

The implications of the new security environment should change the criteria states use to evaluate the risks and benefits for all their nuclear weapon policies. The primary criteria should now be: “How does this aspect of nuclear posture or force structure affect the possibility that terrorists could acquire a nuclear weapon or the fissile materials to build one?” The effect of a policy or force structure decision on nuclear deterrence still needs to be considered because other states possess nuclear weapons, and

it is critical that the disincentives to use them remain as strong as possible. But because terrorists are not influenced by the logic of deterrence, this question is not as vital as it was during the Cold War.

To prevent nuclear attack by terrorists and sub-state actors requires denying them the ability to acquire nuclear weapons and materials. The priorities and requirements of a denial strategy are vastly different from those of a nuclear deterrent strategy.

A denial strategy places priority on achieving absolute minimal stock-piles throughout the world and preventing their spread to other states. Inherent in a denial strategy is the need for the most effective security possible for these weapons and materials. However, as mentioned above, absolute security can never be achieved. In fact, there are no international legal standards for protecting nuclear weapons and materials. Methods for securing nuclear weapons and materials are left to the discretion of each state, with the result that security varies enormously, from excellent to appalling. Not only are there no binding standards, there is no central information repository: Neither the International Atomic Energy Agency (IAEA) nor any other organization is empowered to monitor security for nuclear materials or to compile comprehensive, up-to-date information on physical security procedures worldwide. Nor are there any enforceable penalties for a nation whose nuclear assets are poorly secured.

This problem is particularly acute if the countries that are newly acquiring nuclear weapons have technical and financial constraints, internal political instabilities, large cadres of extremists within their borders, or a history of interactions with extremists or black marketers. Unfortunately, one or more of these characteristics is shared by most nations that are seeking nuclear weapons now, such as North Korea and Iran, and by those that might seek such weapons in coming years, among them Saudi Arabia, Syria, Egypt, South Korea, Taiwan, and Indonesia. If nuclear weapons and weapon-usable nuclear materials are permitted to spread to countries that are unable to secure them, and if no international authority has the right to enforce the highest security standards, the chances that some of these materials will fall into the hands of terrorists would increase dramatically.

### **Transforming Nuclear Strategy**

The authors could have made a stronger argument for how vastly reduced nuclear arsenals and other steps on the path to zero can strengthen a denial strategy and reduce the risks of nuclear terrorism. Indeed, the elimination of all nuclear weapons and nuclear materials that are directly usable in making weapons could ultimately guarantee the success of a denial

strategy, because terrorists would then not have the opportunity to steal these materials.

However, some states, not unreasonably, see their nuclear arsenals as deterring a significant risk of aggression by potential adversaries, and concerns regarding nuclear terrorism are not sufficient incentive to give up their arsenals. In addition, as long as some states possess nuclear arms, others will want them to deter a nuclear attack, even if the chances of an attack are extremely low. The authors could have pointed out that this core deterrence function could be performed by nuclear forces and supporting infrastructure that are sized and postured in a manner that minimizes their vulnerability to terrorists. Such criteria would require fundamental changes to the configuration of current nuclear arsenals.

By focusing instead on the abstract goal of zero, the essay loses sight of the more attainable and beneficial goal of reaching an alternative global nuclear security structure that is both more stable and less prone to nuclear terrorism. This could be a structure in which nuclear weapons still exist but play a greatly diminished role in national security strategies and are operationally deployed, if at all, in a configuration that reduces the chances that they could be stolen by terrorists or used by accident or miscalculation. Numerous specific proposals for actions are consistent with this vision. In fact, there is a fairly strong international consensus, first expressed at the 1995 NPT Review Conference, on the core list of actions needed to change the nature of nuclear weapons in the world, to reduce the chances of their further spread to other states, and to improve the likelihood that they can ultimately be abandoned as instruments of national strategy. Recommended steps often include:

- Declare that the sole purpose of U.S. nuclear weapons is to deter and, if necessary, respond to the use of nuclear weapons by another country
- Commit to not resuming nuclear testing and to ratifying the Comprehensive Test Ban Treaty
- Negotiate a verifiable global fissile material production ban
- Negotiate further reductions in U.S. and Russian arsenals to fewer than 1,000 warheads each, including deployed, spare, and reserve warheads

- Declare all warheads above this number to be in excess of military needs, move them into secure storage, and begin dismantling them in a transparent manner
- Provide the highest possible standards of security for all stocks of weapons and weapons materials
- Place excess military fissile materials under IAEA or other international verification; convert the fissile material from dismantled nuclear weapons into materials available for the manufacture of low-enriched uranium and mixed-oxide nuclear reactor fuel; and offer these materials to discourage the proliferation of uranium enrichment and plutonium reprocessing capabilities
- Build a global regulatory authority that has a mandate for monitoring security standards for nuclear weapons and fissile materials and for providing assistance to improve those standards
- Develop verification capabilities necessary to ensure compliance with nuclear disarmament agreements
- Withdraw U.S. nuclear weapons from Europe and negotiate a treaty among all nuclear powers that nuclear weapons will not be based outside their national territories

Transformation in nuclear strategy and deep reductions in nuclear arms (possibly leading to zero) becomes feasible when powerful nations define it to be in their self-interest and then apply the full range of their military, economic, and political power to achieve it. Of the actions recommended above, the United States since 2000 has either objected to several core elements or has expended no effort to achieve them. Other nations, too, have paid only lip service to some of these goals, not pursuing them as high-level policy objectives. In the post-9/11 environment, there are strong, practical, security arguments for doing so now. If tangible diplomatic energy were applied toward these objectives, the shape of the debate and the perception of what is possible in terms of creating an alternative nuclear security structure would change immediately.

It is not necessary for all states to simultaneously embrace the abolition of nuclear weapons to realize the benefits of some of the objectives listed above and advocated by many observers, including those mentioned in

these comments and by the authors of *Abolishing Nuclear Weapons*. How much further down the path to an alternate nuclear security structure could we be if the United States and other states had aggressively sought, rather than opposed, ratification of the CTBT, negotiation of a Fissile Material Cut-Off Treaty (FMCT), additional reductions in nuclear arsenals, the strengthening of negative security assurances, and a changed posture of operationally deployed nuclear forces?

The power of leadership and diplomatic coercion that could be brought to bear by a coalition of powerful states should not be underestimated. One might look at the recent U.S. initiative to exempt India from non-proliferation export controls as an example of how decades of consistent policy by many states can be transformed in a very short time. Once the United States defined the nuclear trade exemption for India to be in its interest, it not only changed more than thirty years of American policy and law, but it also successfully lobbied dozens of other countries to accept a new approach to India.

A similar dynamic might make the transformation of nuclear forces and postures more attainable than many might think. Many states might be willing to begin implementing steps toward an agreement to prohibit nuclear weapons without absolute confidence that it would be enforced. After all, the vast majority of nations do not possess or seek nuclear weapons. They are likely to support a serious experiment at nuclear disarmament even if it is ultimately unsuccessful. The only way to know is to try.

### **Specific Comments**

Without detracting from the overall contribution that *Abolishing Nuclear Weapons* makes to the international dialogue, I do want to respond to some of its specific arguments. Several relate to the conditions the authors place on real steps toward zero, such as the claim that “in order to persuade others to put down their nuclear arms... the US would have to display a willingness to eschew unilateral or small-coalition military intervention.” It would also need “to prevent or end egregious violations of international laws and norms.” To the contrary, many states might not give up their nuclear weapons or nuclear option unless they had confidence that the United States or other powerful states, alone or in a coalition, would continue to act against such violations.

The authors also state, “The eight nuclear-armed states will not be able to collectively envisage a prohibition of nuclear weapons until conflicts cent[er]ring on Taiwan, Kashmir, Palestine, and (perhaps) the Russian periphery are resolved, or at least durably stabilized.” I disagree. There

is nothing, including these disputes, preventing states from “envisaging” nuclear disarmament. The question is whether they are willing to take steps consistent with nuclear disarmament even while these disputes remain unresolved. The answer here is clearly yes. China has so declared many times, and because the UK and France are not involved in the listed disputes, these conflicts are unlikely to be a key factor in determining their arsenal size or force posture. Even the United States could arguably maintain its security commitment to Taiwan with conventional deterrence or merely the ability to respond in kind if attacked with Chinese nuclear weapons. This could be done with an arsenal a fraction of the size possessed by the United States today.

Finally, the suggestion that key international elements would insist on “perfect” verification before adopting a prohibition on nuclear weapons amounts to a foregone conclusion that prohibition is unattainable. The history of arms control and international diplomacy clearly demonstrates that “perfect” verification cannot exist. Nevertheless, many treaties and agreements have been reached and successfully maintained without it. This is partly because technical verification is only one of the means by which states develop confidence in treaty compliance. A nuclear weapon ban would require the highest standards of verification achievable, relying on multiple means, but verification measures can never be “perfect.”

On a related topic, the authors correctly highlight the potential for societal verification of a nuclear weapon ban and identify it as an area for further research. This kind of informal, unofficial verification should be viewed as a necessary but insufficient layer in a multilayered verification system to provide confidence in states’ compliance with a nuclear arms ban. Other layers would include the specific transparency, monitoring, and inspection procedures agreed to as the core means of verifying a nuclear disarmament treaty. An additional layer would be the national technical means and all-source intelligence analysis that each state party to the treaty would employ for its own confidence and potential use to raise or resolve compliance issues. Verification approaches might also include multilateral assessment of a nation’s bona fides and behavior with regard to treaty obligations.

Integrated throughout each of these layers of verification should be a defined set of indications and warning (analogous to the Cold War concept of monitoring an adversary’s actions to get the earliest possible warning of plans or preparations for attack) that could be constantly checked for

evidence of noncompliance or breakout. In the area of established verification procedures, indication or warning of noncompliance might be found as the result of discovering an unauthorized activity during an on-site inspection or data exchange. Verification efforts at the level of national all-source intelligence capabilities might detect some physical action or series of internal communications that indicate a country was violating or planning to violate its treaty obligations. At the level of societal verification, a domestic nongovernmental organization might report evidence that government officials were telling nuclear facility managers they would not be penalized for failing to cooperate with nuclear arms inspectors.

### **Conclusions**

The current historical juncture still provides a window of opportunity to conduct a great strategic experiment. The strategy should not necessarily be the abstract goal of abolishing nuclear weapons; it should be improved global nuclear security. Waypoints between the current role of nuclear weapons and their elimination are likely to yield improved security, to be more achievable, and to be even more stable than some notions of zero. The United States and its allies can greatly reduce their nuclear arsenals and the role nuclear weapons play in their national security strategies without compromising their security. These steps could further de-emphasize the utility of nuclear weapons; strengthen the taboo against their use; prevent nuclear terrorism; and reiterate a commitment to the ultimate goal of nuclear disarmament consistent with treaty obligations. That, in turn, would help determine how much, if any, extra diplomatic and strategic leverage would be generated for inducing and compelling other states to take similar measures or to abandon efforts to acquire nuclear weapons. It would also provide a sense of whether such steps could begin to positively transform the nature of international strategic discourse. Given the other transnational global security challenges inevitably facing the international community in the twenty-first century, it is an opportunity that cannot afford to be missed.

## Note

- <sup>1</sup> Kenneth Waltz, *The Spread of Nuclear Weapons: More May Be Better*, Adelphi Paper, no. 171 (London: International Institute for Strategic Studies, 1981).

PATRICIA LEWIS

## Verification, Compliance, and Enforcement

The Adelphi Paper *Abolishing Nuclear Weapons* will play an important part in the whole nuclear disarmament initiative that was kicked off in 2007 by a combination of the Hoover Institution and Nuclear Threat Initiative's "Reykjavik Revisited" project; the Kissinger–Nunn–Perry–Shultz op-ed articles in the *Wall Street Journal*; Margaret Beckett's keynote address at the Carnegie International Nuclear Non-Proliferation Conference; and the Seven-Nations Initiative led by the United Kingdom and Norway. Drawing on efforts from previous decades—particularly work carried out in the mid-1980s to mid-1990s by the Verification Research, Training, and Information Centre (VERTIC); the Stockholm International Peace Research Institute; the Natural Resources Defense Council; and the Union of Concerned Scientists, among others—George Perkovich and James Acton have woven a strong fabric of possibility for the eventual elimination of nuclear weapons without glossing over the difficult problems that have yet to be solved.

The key aspect of this paper is that it doesn't try to solve all of the problems. The paper instead addresses some of the most controversial issues pertaining to global nuclear disarmament and lays the foundation for building a stable structure for future global security.

Not least of these issues are verification, compliance, and enforcement—the Golden or Bermuda Triangle of issues, depending on your perspective. This commentary will focus on them.

The three issues are intertwined in a perpetual embrace. Without information provided by verification, the determination of compliance or noncompliance of nuclear disarmament treaties will rest solely in the hands of a few (one? two? three?) national intelligence agencies—and the consequences of that approach are still fresh. The lessons from the hunt for weapons of mass destruction (WMD) in Iraq in 2003 should at the very least teach us that treaty obligations and intrusive verification, supplemented by information obtained through open sources and intelligence gathering, form the best, albeit not perfect, basis for holding states accountable. Without law, without impartial evidence, there can be no chance of enforcement. And without enforcement, the whole web of verification deterrence against the spectrum of possible infringement would have little meaning and the rule of law would be undermined.

Having said that, verification measures—however stringent, effective, or confidence-building—are no panacea. The evidence obtained from verification regimes rarely gets weighed in a court of law; instead, it is dealt with either in the various communications media and the political environment of a treaty body or in the United Nations Security Council. Coming to agreement in such environments when the evidence is overwhelming is hard enough; when the evidence has differing interpretations, decision making is fraught and enforcement is patchy—as every potential violator knows. Indeed as the authors astutely observe, enforcing a prohibition on nuclear weapons cannot escape the shadows cast by history.

In chapter 2, in which the authors deal with verifying the transition to zero nuclear weapons, the paper observes that verification is the means to an end, not an end in itself. The end is compliance and enforcement. However, to say that verification imperfections—of which there will be a few—could be offset by more robust enforcement mechanisms seems to miss the lesson of history: that, with the notable exception of 1991 in Iraq, the process of verification, from detection to identification of noncompliance, has so far been more robust than the enforcement mechanisms set in place. The issues of verification standards and practices and what might be called fine-scalpel verification standards—not an overall approach to verification adequacy but an approach in which key high-risk, high-consequence activities are monitored more closely and with a higher verification demand than low-consequence activities—need extensive investigation, experimentation, and analysis. Such an approach would be mindful of cost-effectiveness and would be aware of diminishing returns in verification practice and the dangers of high rates of false positives. The authors welcome the UK's proposal to bring together experts from the

nuclear-weapon states' laboratories as a good place to start, and indeed it is. One can only hope that the UK's efforts are being supported by the other four states that acknowledge possessing nuclear weapons and that the outlier states are paying close attention.

### **Verifying Zero**

In approaching the crucial question of what constitutes complete nuclear disarmament, the authors refer to a range of end states. At one end of the range of outcomes is the complete dismantlement of the warheads, the delivery vehicles, and the nuclear weapons infrastructure including experimental capabilities, as well as the disposal of fissile material—all done under stringent safeguards.

Another end state, albeit a more temporary state, would be somewhat less than that: a period in which some capability is retained, perhaps to reconvene a weapons program, perhaps even some small residual hedging cache. In the end, though, that hedging state will either diminish down to true zero over time or it will creep or even spiral back up to a new nuclear-armed world, probably with different players. Therefore, the only worthwhile scenario to consider in designing a verification plan is that of complete elimination in the end—however difficult that might be to achieve and however long it may take.

The “standard model” for verification of elimination is sketched out in the paper, representing, with minor variations, the broad consensus on what is needed. First would be detailed declarations of nuclear possessions: where, what, how many, and so forth. All significant items would be counted, sealed, tagged, and recorded—not unlike the groceries in a supermarket, although, we can only hope, with fewer opportunities for shoplifting. Perhaps a more apt comparison would be manufacturers' identification marks on firearms or import-export codes on cars. Random sampling would be used to establish confidence in this identification and securing stage, and a robust chain of custody would be established to guarantee security. Many established technologies and methodologies exist for this stage in the process. Managed-access techniques are in common use, and procedures ranging from preventing the transmission of sensitive information, to sending in international inspectors are either in everyday use or are under development; witness the UK–Norway collaboration under the Seven-Nations Initiative.

When it comes to dismantlement of warheads and disposal of their sensitive materials, the verification procedures are far less worked through. Warhead dismantling itself is a common procedure that has been

undertaken routinely for maintenance purposes for several decades in each of the states that have possessed nuclear weapons. Verification of this stage by outside inspectors, however, would be a departure. Because of the opportunity for gleaning design information in the dismantling of warheads, the procedure would have to be conducted without the scrutiny of outside observers. Automatic, in situ remote sensing could substitute, if coupled, when practical, with sealed containment, input and output monitoring, and material balancing and witnessing of the nonsensitive procedures. It is certainly possible to verify the dismantling of nuclear warheads in this manner, although there would have to be a great deal of experimentation and practical demonstration to be able to bridge unforeseen monitoring gaps and to iron out inevitable glitches.

The paper discusses in some detail the idea of “information barriers” as a solution to the warhead authentication problem, in particular, the pros and cons of “attribute verification,” in which sets of characteristics define the warhead and are monitored, and “template verification,” in which the scrutinized warhead radioactive spectrum is compared with a template spectrum. Much work remains to be done on this technically tricky aspect of the verification chain. In addition to the UK–Norway practical work, other nuclear-weapon and non-nuclear-weapon states could be paired, such as the United States and Australia or perhaps France and Switzerland. China and Indonesia would make an interesting pairing, and Russia and, say, Kazakhstan could do some very useful work.

Past production and nuclear archaeology is probably one of the thorniest problems that lie ahead in the road to nuclear disarmament. Forensic techniques cannot entirely eliminate uncertainties but can help reduce them, perhaps enough to establish confidence. Measurement error may prove to be both a technical and a political problem. When dealing with large quantities of material, quite normal, reasonable, and accurate measurements can lead to what might appear to be significant uncertainties in the quantities they represent. A fascinating table depicting the results of exercises between the United Kingdom and the United States shows that the material that is unaccounted for could lead the uninformed reader to believe that tons of plutonium and uranium were missing rather than a result of unavoidable uncertainties that account for a small share of production. There’s a high likelihood that such calculations could lead to confusion, at best, or even malevolent interpretation.

Such difficulties in accounting for past production in the nuclear disarmament process present a strong case for the importance of a ban on fissile material for the production of weapons. The issue is so important,

particularly when getting down to low levels of nuclear weapons and eventually to zero, that states need to find a way to include past production and stocks in the deal over a Fissile Material (Cutoff) Treaty, or FM(C)T. This could be done either as part and parcel of an FM(C)T or as a separate deal such as the proposed Fissile Material Control Initiative or as the WMD Commission's proposal for a Fissile Material Confidence-Building Measure (FMCBM).

The authors cover the issue of challenge on-site inspection in some detail. While there is a tendency these days for such inspections to be seen as not particularly useful, their verification deterrence quotient is not to be trivialized. In addition, the willingness to be subjected to such inspections is a serious indication of good faith and therefore a useful confidence-builder.

### **Diversifying Intelligence**

The role of national intelligence gathering and analysis requires a great deal more evaluation. Considering the catastrophic 2003 war over Iraq's "clandestine" WMD supposedly possessed by Saddam Hussein's regime, and all the damage that has been done to so many people, a whole territory, and the institution of the United Nations as a result, forgive me if I appear more than a little skeptical of the trust that is placed in national intelligence gathering. It is not that there is no role; indeed, quite the reverse. My problem is that information gleaned from national intelligence gathering—perhaps because of the secrecy involved—is usually assigned more weight (not to mention glamour and excitement) than information obtained through thorough on-site inspection. This is a dangerous tendency when security is involved. We can all come up with several good examples of when open source information was of higher quality and greater accuracy than official, top-secret intelligence. The experience in Iraq of the United Nations Special Commission and its successor, the United Nations Monitoring, Verification, and Inspection Commission, is that on-site inspections are in fact a very good way of obtaining information. The problem is that we did not understand that well at the time, in part because the verification information stream was often at odds with received wisdom and governments chose the latter because of its sources. The fact is that as many independent streams of information as possible are needed on such matters. Those responsible for analyzing security information must be as wary of false triangulation as they are of complacency in inspection strategies and mindless group-think. Open source, investigative journalism, on-site inspections, reports by nongovernmental organizations, human intelligence, overhead imagery, and so on are all valid forms

of information that can lead to increased understanding of a situation and thus to increased security. I would argue strongly for keeping the information lines as clean and independent as possible, so that for those with open inquiring minds, there are truly independent sources of information from which to make better judgments.

### **Civil Society Monitoring**

On the subject of civil society monitoring, it is quite clear that the nuclear disarmament community is way behind the curve. The debate seems to be stuck in the 1980s discussion of whistle-blowing and the ability of citizens to come forward with information. It is as if nobody has read the Landmine Monitor or the BioWeapons Prevention Project's BioWeapons Monitor or the work done by VERTIC on nuclear testing or the Small Arms Survey or the International Committee of the Red Cross on the Convention on Cluster Munitions or the Institute for Science and International Security on the use of satellite imagery. Rather than go through the whole set of experiences in civil society that demonstrate the strength of that sector and its experience over more than a decade to monitor, verify, report, and act on treaty compliance, I shall instead point the interested reader to a series of books and analyses by the Disarmament as Humanitarian Action project of the United Nations Institute for Disarmament Research. Part of the learning from that project has been the issue of bringing cognitive diversity into arms control problem solving, finding new levers to pull to achieve compliance (such as the Norwegian ethical investment policy), and so on. There is much to learn from other disarmament processes, particularly those that have been steadily making progress over the past decade while nuclear arms control stagnated.

### **How to Pay**

On costs and who should pay, Susan Willett's analysis has clearly shown that the costs of disarmament, including verification, should be part of the birth-to-death life cycle of the nuclear weapons themselves.<sup>1</sup> Just as with any large-scale, dangerous and potentially polluting industry (the nuclear energy industry, for example, or automobiles or refrigerator manufacturing), the costs of decommissioning are seen as part of the whole technology and the responsibility of the manufacturer and operators. In most countries, a car buyer pays a tax that covers the eventual demise of the car and the cost of hauling it away and crushing into a cube. When a nuclear power plant is commissioned, factored into the commissioning

costs are the costs of waste management and of the plant eventually being shut down and mothballed. Why isn't this done with weapons? Actually, it already is. As Willett showed, all nuclear weapons reach the end of their lifetime at some point and are then decommissioned by the government as part and parcel of the costs of routine stockpile management. Disarmament treaties merely increase the speed at which that happens. There is a marginal extra cost for the increased storage of materials and also for verification. As with the "polluter pays" principle, those costs should be shared by the defense departments that commissioned the weapons and the contractors that built the weapons. In addition, Willett studied the opportunity cost of nuclear buildup and the savings of nuclear disarmament.

### **Consistent Enforcement**

Finally, on enforcement, there are no easy answers. Clearly the authors came to the same conclusion as others who have studied some sort of automatic enforcement or a scale of reprisals for noncompliance: that in practice it just would not work. Real-politics and unique circumstances will always prevail in such fraught processes. How to ensure some form of consistency and effectiveness in enforcement is perhaps the greatest challenge in nuclear disarmament. Recent experiences in Iraq, North Korea, Iran, Libya, and Syria demonstrate a woeful lack of consistency. Non-nuclear-weapon states cannot help but be perplexed in knowing how to interpret such widely varying actions, with their limited (or lack of) effectiveness.

Just by asking the questions and attempting to answer them, George Perkovich and James Acton have done the world a great service. We are way overdue in getting this disarmament ball rolling again toward the elimination of nuclear weapons, and this paper has at least given the venture a serious push in the right direction.

## Note

- <sup>1</sup> Susan Willett, *Costs of Disarmament—Rethinking the Price Tag: A Methodological Inquiry into the Costs and Benefits of Arms Control* (Geneva: UNIDIR, May 2002).

IAN HORE-LACY

## Nuclear Power and Proliferation: A Nuclear Industry Perspective

Chapter 3 of *Abolishing Nuclear Weapons* focuses not so much on disarmament as on proliferation and some other concerns arising from increased use of civil nuclear technology, particularly the generation of nuclear power. My comments here are in response to that chapter. While the civil nuclear industry deems it important to point out when these concerns are misleading or overstated, the industry unequivocally supports the role of the International Atomic Energy Agency (IAEA) and of measures to counter the proliferation of nuclear weapons.<sup>1</sup>

In their paper, George Perkovich and James Acton competently canvass most of the proliferation-related issues arising from increased use of nuclear technology, including power generation. The paper does not suggest anything new, and its treatment of two issues in particular—uranium resources and reprocessing—needs supplementing, as discussed below.

### **Proliferation and Safety Concerns in Context**

The chapter makes clear that there are two possible routes for material from the civil nuclear fuel-cycle to end up in nuclear weapons: from uranium enrichment (to levels well beyond those used in power generation today) and from reprocessing of normal used fuel (assuming that plutonium is separated and that it is weapon-usable). In the highly enriched uranium case, construction of a weapon is relatively simple; in the plutonium scenario, it is very complex.

So far, neither route has been followed, though there has been some ambiguity regarding plutonium recovery from low burn-up fuels in the United Kingdom (prior to 1960); in India; and probably in Russia (from RBMK, or Chernobyl-type, reactors). All are nuclear-armed states apart from their civil nuclear activities.

Regarding the global renaissance of nuclear power, the Chernobyl accident in 1986 certainly set it back (but, fortunately, did not put an end to it), and it has taken time for the atypical nature of that reactor and its operation to be widely realized. Certainly it is so profoundly different from the mainstream of world nuclear reactor technology as to be practically irrelevant. The accident was brought about by a unique coincidence of technical, cultural, and political factors.

### **The Drivers of the Nuclear Renaissance**

Any discussion of the political compromises between developing or acquiring elements of the civil nuclear fuel-cycle and nonproliferation priorities needs to have sober regard for the drivers of the nuclear renaissance. Fifty years ago, the first generation of nuclear power plants were justified by the need to alleviate urban smog caused by coal-fired plants. Nuclear was also seen as an economic source of base-load electricity, which reduced dependence on imports of fossil fuels. France epitomizes the latter policy.

Today's drivers for building nuclear plants have evolved and can be summarized as follows:

- **Energy demand.** Global population growth in combination with industrial development will lead to a doubling of electricity consumption by about 2030. The increase will be greater if there is a major move to electric vehicles by then, as envisaged by Nissan and other automakers. Over the same period, a lot of generating stock, particularly in the United States and the European Union, will need to be renewed. The shortage of freshwater in drier regions calls for increased use of energy-intensive desalination plants; in the longer term, hydrogen production for transport purposes will need large amounts of electricity or high temperature heat or both.
- **Climate change.** Increased awareness of the dangers and effects of global warming and climate change has led decision makers, the media, and the public to realize that the use of fossil fuels must be reduced and, in the case of electricity generation at least, replaced by zero- or low-emission sources of energy such as nuclear power. Nuclear power is the only large-scale alternative to fossil fuels

that is readily available to meet base-load demand by producing a continuous, reliable supply of electricity.

- **Economics.** Increasing fossil fuel prices have greatly improved the economics of nuclear power for electricity generation. Several studies and the market show that in many parts of the world, nuclear energy is the most cost-effective of the available base-load technologies. In addition, as various government incentives and trading schemes encourage the reduction of carbon emissions, the relative economic benefits of nuclear power will increase further.
- **Insurance against future fuel price exposure.** A longer-term advantage of uranium over fossil fuels is the low impact that increased fuel prices will have on final electricity production costs, because the expense in nuclear generation lies primarily in the original capital outlay for the plant. This insensitivity to fuel price fluctuations offers a way to stabilize power prices in deregulated markets.
- **Security of supply.** As countries realize their vulnerability to interrupted deliveries of oil and gas (the latter being of most relevance to electricity), the abundance of naturally occurring uranium, its relatively low cost, and the ease of storing a few years' supply make nuclear power attractive from an energy security standpoint.

Looking further ahead, nuclear energy is likely to find increased application for process heat, particularly in the areas of hydrogen production, synthetic oil (Fischer–Tropsch process), recovery of oil from tar sands and, potentially on a very large scale, desalination. However, none of these is likely to make a qualitative difference to the issues being addressed in relation to non-proliferation.

### **The Practicalities of Reactor Fabrication**

As nuclear power moves away from small national programs and becomes an increasingly globalized industry, serial production of new plants is expected to drive construction costs down and further increase the competitiveness of nuclear energy. The economies of scale that nuclear power can be expected to achieve will counter the capital cost increases that have affected all major infrastructure projects in recent years.

From the pouring of the first concrete to the generation of the first power, most reactors today are built in less than five years, with four years

being state of the art and three years being the aim with prefabrication. Prior to construction, it typically takes several years to obtain preliminary approval for a reactor, but this time frame, too, should diminish.

The chapter seems to rely on inadequate sources in suggesting that “for the next decade, the world’s nuclear industry can probably build no more than ten reactors per year.” That figure is absurdly low. For the next few years, fewer than ten reactors exceeding 1,000 megawatts-electric (or perhaps 1,200 megawatts-electric for the Russian VVER pressurized water reactor) built annually might, perhaps, be credible. But already, demand is evident for new large forging presses and other equipment, and more will be commissioned as required.<sup>2</sup>

It is noteworthy that 218 power reactors started up in the 1980s, an average of one every 17 days. Among them were 47 in the United States, 42 in France, and 18 in Japan. Their average power was 923.5 megawatts-electric—fairly large even by today’s standards. So at the very least, it is not hard to imagine a similar number of power reactors being commissioned over a ten-year period starting around 2015. In fact, with China and India getting up to speed with nuclear energy (not to mention heavy engineering) and world energy demand doubling in the next twenty years, a realistic estimate might be the equivalent of seventy 1,000-megawatts-electric units per year, or one every five days.

A relevant historical benchmark is that eighteen U.S. shipyards built more than 2,700 so-called Liberty Ships from 1941 to 1945. These standardized 10,800-metric ton capacity cargo ships were of a very basic British design but they became symbolic of U.S. industrial wartime productivity. Average construction time was forty-two days in the shipyard, often using prefabricated modules. In 1943, three were being completed every day.

### **The Evolving Nuclear Fuel Cycle**

With respect to chapter 3’s evolutionary approach to reducing the potential for diverting fissile materials, uranium is a fairly common element in the Earth’s crust and no country is without ample supplies for a few nuclear weapons (one weapon requires as little as five tons of natural uranium). If cost is no object, uranium could be recovered in such quantities from most granites, or even from seawater—sources that would be quite uneconomic for commercial use. In contrast, world trade for electricity production is about 66,000 tons of uranium per year, all of which can be accounted for.<sup>3</sup>

Multinational ownership of enrichment and reprocessing facilities is already happening in some respects, led by reactor vendors and generating utilities. Urenco and Eurodif are government-owned (not essentially private) multinational enterprises. Global Laser Enrichment (GLE, née

SILEX) was set up by a U.S.-Japanese firm, GE Hitachi Nuclear Energy, and now has shareholding of General Electric 51 percent, Hitachi 25 percent, and Cameco 24 percent, giving it a U.S.-Japan-Canada spread before paying licence and royalty fees to Silex Systems in Australia. The International Uranium Enrichment Centre at Angarsk is already a Russian-Kazakh enterprise with equity interest from Ukraine, Armenia, South Korea, and Mongolia. These partnerships, however, are driven by commercial considerations. The radical approach of pursuing multinational control of all such facilities would be a far different matter.

Along those lines, a major omission from this section is the Global Nuclear Energy Partnership (GNEP), a U.S. initiative that has become an international partnership. While opinions differ as to GNEP's potential, and Congress has been slow to adequately fund it, 24 states representing all of the world's nuclear industry have signed up, and the technologies GNEP is designed to foster are certainly important.

GNEP envisages the development of comprehensive fuel services, including such options as fuel leasing, to address the challenges of assuring reliable fuel supply while minimizing the need for enrichment plants in new countries. The general premise that curtailing such expansion will have nonproliferation benefits is a dubious one. What weakening of the nonproliferation system would result from the creation of such facilities in Australia and Canada? Meanwhile, the few countries that are of proliferation concern are hardly likely to be influenced by kind offers of reliable fuel supply. When conceiving of elaborate systems, it is important to get the premises right.

This is not, however, to disparage the potential value of GNEP. The establishment of comprehensive and reliable fuel services, including options for the disposition of used fuel, is expected to create a more practical approach to nuclear power for nations seeking its benefits without the expense and difficulty of establishing indigenous fuel-cycle facilities. As yet, however, GNEP has raised expectations in many parts of the world regarding a rational approach to nuclear waste, without eliciting any corresponding offer from countries to actually dispose of waste from beyond their borders.

The development of advanced reprocessing technologies and fuels will enable further developments in advanced reactor technology. Developments in fast reactor technology center on the need for their cost to become competitive with that of current light-water reactors. Countries such as France, Russia, and Japan have experience in the design and operation of fast reactors, and the United States is working with them to accelerate the development of advanced fast reactors that are cost-competitive,

incorporate sophisticated safeguards features, and are efficient and reliable. Russia has led the way in this with its BN-600 reactor, and it has voluntarily opened this reactor to IAEA inspectors so they can gain experience of safeguarding such units. A further driver of fast reactor development is their prospective use for burning all actinides, which otherwise form the main long-lived component of high-level nuclear waste.

Any discussion of reprocessing needs to disaggregate some ideas. It seems to be assumed (apart from fleeting reference to Urex+) that reprocessing means separating plutonium. In discussing the broad question of abandoning reprocessing, a distinction must be made between chemical reprocessing (which would inevitably have some potential of separating plutonium even if advanced aqueous processes do not) and electrometallurgical reprocessing in a fused salt bath (which does not have this potential).

The other issue that must be addressed concerns the inputs to reprocessing. If it is all high burn-up fuel, the plutonium is not much use for weapons anyway. The comment about Japan's "bomb in the basement" ignores the fact that Japan has no power reactors that could produce low burn-up material without massively and conspicuously compromising power output. Another way of assuaging concerns about the potential for weapon proliferation would be to institute some means of assuring that all material that is reprocessed had on average 20 percent non-fissile isotopes in its plutonium content.<sup>4</sup>

Regarding research reactors and their use of highly enriched uranium, security concerns have grown since the early 1970s, especially since many research reactors are located at universities and other civilian locations where security is much lower than at military weapon establishments which house much larger quantities of highly enriched uranium. Since 1978 only one reactor, the FRM-II at Garching in Germany, has been built with this fuel, while many, in at least sixteen countries, have been commissioned using low-enriched uranium fuel.

Most research reactors using highly enriched uranium fuel were supplied by the United States and Russia, so ongoing efforts to deal with the problem remain largely in their purview. The Reduced Enrichment for Research and Test Reactors program concentrates on converting reactors that exceed 1 megawatt-thermal and have significant fuel requirements to use low enriched uranium fuel. In 2004 the U.S. National Nuclear Security Administration subsumed this program in setting up the Global Threat Reduction Initiative, which more broadly focuses on tackling the

disposition of highly enriched uranium fuel (fresh and used) as well as other radiological materials. The initiative has accelerated the removal of Russian-origin fuel to Russia and U.S.-origin fuel to the United States. In total, almost a metric ton of fresh and spent HEU fuel has been repatriated.

Regarding naval reactors, there does appear to be a dilemma in reducing enrichment levels because doing so would remove the key advantage of lifetime cores, but details of these plants are hard to obtain and verify. However, the technology is far from widespread—and is nonexistent outside the inner sanctums of weapon-capable states—so as a proliferation concern this can be deemed minor.

\*

A concluding and sweeping comment is that the authors, in their concern to rid the world of nuclear weapons, have downplayed some factors that others, including myself, would find paramount:

- It is highly unlikely that complete nuclear disarmament would even become an issue until all nuclear-armed states have reduced their arsenals to quite low levels. Identifying the diplomatic and strategic practicalities of achieving that precondition might have been a better recommendation for action.
- If climate science, as reflected in the findings of the Intergovernmental Panel on Climate Change, is correct, the greatest peril in the history of humankind lies in the damage to biospheric stability that may occur in the twenty-first century unless greenhouse emissions are drastically curtailed.
- Contrary to the authors' expressed agnosticism about whether the nuclear renaissance will retain momentum, most major governments in the world have embraced nuclear power as integral to their long-term plans for energy independence and environmental responsibility. The few lingering exceptions such as Germany prove the rule, while Italy's recent emphatic about-face on the question underscores the trend.

As the nuclear renaissance gains momentum, propelled by factors directly related to international security, security analysts must be practical, nonideological, and precise as they weigh plans to guide its progress.

## Notes

- <sup>1</sup> World Nuclear Association Charter of Ethics, [http://www.world-nuclear.org/about/ethics.html?ekmense1=185bf1b1\\_12\\_0\\_74\\_2](http://www.world-nuclear.org/about/ethics.html?ekmense1=185bf1b1_12_0_74_2).
- <sup>2</sup> A recent WNA Information Paper *Heavy Manufacturing of Power Plants* addresses the question, [http://www.world-nuclear.org/info/inf122\\_heavy\\_manufacturing\\_of\\_power\\_plants.html](http://www.world-nuclear.org/info/inf122_heavy_manufacturing_of_power_plants.html).
- <sup>3</sup> On page 87 of the current volume, the paper refers to “yellowcake (refined uranium ore).” The relevant category is natural

uranium (i.e., unenriched), whatever its chemical form. As shipped from a mine, it is normally  $U_3O_8$  or uranium oxide concentrate (essentially the same thing).

- <sup>4</sup> The question of whether reactor-grade plutonium with around one-third non-fissile isotopes (mainly Pu-240) is “weapon-usable” is contentious. What is not in serious dispute is that such material has never been made to explode and that any attempt to make a bomb with it would be fraught with serious hazard to those preparing it.

PAN ZHENQIANG

## Abolishing Nuclear Weapons: Why Not Outlaw Them First?

Calls for a nuclear-weapon-free world are not new. Indeed, efforts by the international community to achieve that have not ceased since 1945, when those horrible weapons were used at Hiroshima and Nagasaki. None of the nuclear-weapon states, however, has ever been serious about abolition. The United States, in particular, has continued to maintain a large nuclear arsenal, along with the insistence that nuclear weapons play a legitimate role in its security strategy. The Bush administration lowered the threshold of using nuclear weapons in the post-Cold War era despite its argument in the 2001 Nuclear Posture Review that it intends to reduce the role of nuclear weapons in the U.S. security strategy. Russia, the other major nuclear power with a large arsenal, has evidently upgraded the role of its nuclear weapons, declaring openly that it has to rely more on nuclear weapons to compensate for its declining conventional capability to protect its core security interests. Other nuclear powers have also worked to modernize their nuclear arsenals to catch up with the new round of nuclear competition. This continuing obsession with nuclear weapons on the part of nuclear-weapon states, has, many people believe, virtually paralyzed both the multilateral and bilateral negotiations in the field over the past decade.

Against this backdrop, the effort by George P. Shultz, William J. Perry, Henry A. Kissinger, and Sam Nunn to revive international attention to the nuclear abolition question carries special significance. Their January

2007 op-ed in the *Wall Street Journal* and their follow-up article a year later called on the United States to give up its nuclear deterrence policy and take a leading role in helping the world head toward the abolition of nuclear weapons. The world was surprised less by the views expressed than by the identity of the authors. All four are exceptional and served within the decision-making security circle of the United States—and all four were, to a man, staunch cold warriors who advocated or implemented nuclear deterrence for the United States. The fundamental shift of their perspective thus immediately drew world attention and has generated heated debates on how best to initiate the process of nuclear disarmament toward the goal of a nuclear-weapon-free world.

Many Western governments as well as nongovernmental organizations are taking steps to echo their views. Various suggestions have been made in an attempt to translate the new vision into specific action.

Still, serious differences persist as to the feasibility, or even the value, of the notion of a nuclear-weapon-free world. Many people in Washington wonder whether U.S. security interests would be undermined. Even among those who genuinely believe in nuclear disarmament, there is a wide gap in views on how it should be implemented. In the meantime, a large number of non-nuclear-weapon states elect to remain silent, indicating their strong skepticism about the motivation of the newly rising enthusiasm of the West toward the idea of a world free of nuclear weapons. They wonder if this campaign is merely a passing episode of Western interest in nuclear disarmament that will fade away before long, or if something is actually going to happen this time. They seem particularly interested in watching how the new U.S. president will act next year: Will he overcome resistance and embrace the idea of zero nuclear weapons then work out meaningful, concrete steps to that end?

Under the circumstances, *Abolishing Nuclear Weapons*, by two distinguished specialists in the field, George Perkovich and James Acton, can be taken as a valuable contribution to the reflection on the effort to achieve a nuclear-weapon-free world in a timely manner. The authors acknowledge that in taking disarmament problems seriously, they raise more questions than answers. This open-minded attitude of exploration helps them define five major issues, among others, as particularly pertinent to nuclear disarmament: near-term improvements in political-security relations and U.S.–Russian arms reductions; verification; the impact of the expanding global nuclear industry; enforcement; and hedging. In the view of the authors, none of these issues can be bypassed if a process of securely prohibiting nuclear weapons is to start. The paper contains insightful

analysis on each of these issues, including the primary obstacles to overcome and what alternative options may exist for meaningful disarmament. The solutions offered by the authors will not be seen as ideal by many, and will be controversial to some, but the paper delineates the depth and complexity of the most daunting problems on the way to achieving a nuclear-weapon-free world. In this sense, it should be recognized as almost a textbook for the study of future nuclear disarmament.

That said, the paper seems also to have raised a few important questions that, from the humble perspective of a Chinese scholar, need clarification to provide a more solid basis for exploring proper implementation of nuclear disarmament.

### **The Nuclear-Armed States Must Go First**

The first question has to do with the eternal “who goes first?” issue. Nuclear disarmament is first and foremost the responsibility of the nuclear-armed states. In the field of nuclear disarmament, arms control, and nonproliferation, there has always been heated debate over how to strike a balance between the primary responsibility of the nuclear-weapon states, particularly those with the largest nuclear arsenals, and broad participation by the non-nuclear-weapon states. The difference centers on who should do more and who should do it first, along with which is more important: nuclear disarmament by the nuclear-weapon states, or nonproliferation by the non-nuclear-weapon states? But the debate itself is unfair to the non-nuclear-weapon states. Just as its name implies, nuclear disarmament means that countries that have acquired nuclear weapons take actions to reduce the size of their nuclear arsenals. Nuclear disarmament is thus the business of nuclear-weapon states. How can the non-nuclear-weapon countries be expected to follow more or new restrictions in order to make the nuclear-weapon states feel more secure in the process of nuclear disarmament? This is not to suggest that non-nuclear-weapon states have no responsibility in nuclear disarmament. What is important is that the responsibilities of the nuclear haves and have-nots simply cannot be put on the same plane.

The analysis over this question in the paper attempts to treat both categories equally. The authors stress that “it will be impossible to curtail nuclear-weapons proliferation without serious progress toward nuclear disarmament.” At the same time, they argue that “neither non-proliferation nor the abolition of nuclear weapons can be achieved without the active cooperation of non-nuclear-weapon states.” Thus, the conclusion is the belief that “the only way to resolve the ‘who goes first?’ problem among

nuclear-weapon and non-nuclear-weapon states is to move on both the disarmament and non-proliferation fronts simultaneously.”

This everybody-has-a-share principle is fine in theory. In practice, to argue that disarmament and nonproliferation should proceed simultaneously is virtually to put nuclear disarmament conditional on the progress of nuclear nonproliferation and to risk obscuring or even covering up nuclear-weapon states’ primary responsibility to disarm. Indeed, after going through the *Abolishing Nuclear Weapons* paper, one cannot avoid getting an impression of bias: The authors seem more interested in how additional restrictions can be imposed on non-nuclear-weapon states than how nuclear-weapon states can be compelled to implement their special responsibility effectively.

Some of the admonitions in the paper seem particularly discomfoting. The authors argue, for example,

Clearly, nuclear-armed states would demand a great deal from each other and from many non-nuclear-weapons states in creating the conditions that would reassure them that they would not be worse off without their nuclear arsenals. The nuclear ‘haves’ would feel that they had leverage over the ‘have-nots,’ because they possessed something that the others wanted them to give up. If non-nuclear-weapon states did not accept their demands, they would, in effect, shrug their shoulders and say, ‘fine, we’ll keep our weapons then.’ ... “[F]irm leaders would be needed in the non-nuclear-weapon states to enable these states to resist the temptation to regard disarmament as a problem for the nuclear ‘haves’ alone. Accompanying the political-psychological morality play of the nuclear states’ disarmament would be the reality that when the nuclear powers feel insecure, non-nuclear-weapon states can suffer the consequences.” ... “Therefore—regardless of the fairness or otherwise of this situation—non-nuclear-weapons states would be wise to be responsive to the reasonable expectations of nuclear-armed states trying to create conditions for the secure prohibition of nuclear weapons.

And:

To make abolition feasible and to enable the detection of rearmament, all states that possess nuclear reactors, uranium-enrichment plants, plutonium-reprocessing facilities, uranium reserves or even transshipment ports would have to accept more intrusive control measures and inspection procedures

than they do today. To build confidence that an agreement to prohibit nuclear weapons would be enforced, all states would need to demonstrate a willingness to enforce international rules with greater alacrity and robustness than has been historically normal.

But what “reasonable expectations” of nuclear-weapon states must non-nuclear-weapon states listen to? And what “international rules” are the authors referring to? The language used here is vague, susceptible to different, conflicting interpretations. It arouses suspicion that a one-sided argument is being made with regard to nuclear-weapon states imposing burdens on non-nuclear-weapon states. This reduces the persuasiveness of the paper.

### **First Among Unequals, the United States and Russia Must Lead**

The second question is about the special responsibility of the United States and Russia toward nuclear disarmament. Again, this is common sense. While all nuclear-weapon states bear primary responsibility, the two major nuclear powers should have special responsibility. They should take the lead in carrying out all the substantive measures leading to a nuclear-weapon-free world.

The eight states the authors put in the same category of nuclear-armed states can be better divided into three groups. The first group is the two major nuclear weapon powers: the United States and Russia. They have consistently been the driving force in the nuclear buildup as well as nuclear arms control and disarmament, and their nuclear arsenals constitute more than 95 percent of the world total. Furthermore, they are still equipped with aggressive nuclear doctrines that envisage the use of nuclear weapons in a way that no other nuclear-weapon state can match. In short, they should be the main target of any nuclear disarmament process, and only by seriously honoring their obligations can nuclear disarmament be put on the right track.

The second group consists of the United Kingdom, France, and India. Despite the different backgrounds against which they developed nuclear weapons, they share one major motive for their nuclearization: to be accepted by the international community as a major world power. Their motivation is more for prestige than for security. One can hardly imagine a scenario in the post-Cold War era in which the U.K. or France would be seriously tempted to use nuclear weapons to protect its core interests. India may even have diminished the value of its overwhelming superiority vis-à-vis Pakistan in terms of conventional capability; its becoming

nuclear armed challenged Pakistan to follow suit. From a purely military point of view, India's nuclear decision made no sense for its security. There is certainly a China factor. But even to cope with the so-called threat from China as the major motivation, as New Delhi claimed, is also more political in nature than military. I remember an episode at a 1996 International Institute for Strategic Studies conference on potential future challenges from rising Asia. Despite the broad topic being Asia, the real interest was over China. I attended that conference, and almost all the participants were talking almost exclusively about China, whether as a challenge or an opportunity. Then an eminent Indian delegate rose and asked angrily, "If we were talking about Asia, where is India?" His point vividly reflects resentment on the part of many Indians, the elites in particular, that the world had wrongly neglected India as a significant player in the world. It also explains the true motivation of India, that is, to match China's rising influence and to be acknowledged as a major world power through the shortcut of going nuclear, even at a political and military price. Thus, as long as the United States and Russia maintain their nuclear posture and nuclear weapons continue to play a decisive role in ensuring their prestige as major world powers, it would be very difficult to persuade the UK, France, and India to give up their nuclear assets.

The third group consists of China, Pakistan, and Israel. They could be described as responsive nuclear-armed states, as their motivation for going nuclear is to respond to a specific, serious threat that each faces. For China, it is the nuclear threat from the two major nuclear powers, the United States in particular; for Pakistan, it is the nuclear threat from India; and for Israel, from the hostile environment in its neighborhood. As long as the threats they perceive against them are not eliminated or at least reduced, it is highly unlikely that any of these three countries would be willing to consider abandoning their nuclear arsenals.

In short, when the world today is witnessing such discrepancy with regard to the nuclear architecture, many questions asked in the paper as to what the other nuclear-weapon states can do to help induce the two major nuclear powers to embark on nuclear disarmament are as off the mark as asking what the non-nuclear-weapon states can do to help induce the nuclear-weapon states to implement their obligation for nuclear disarmament. To the contrary, the most pertinent and urgent question to ask is twofold: what the United States and Russia can do to pave the way for lesser nuclear-weapon states to participate in the disarmament process and what they can do to provide a better environment in which the key non-nuclear-weapon states would be willing to cooperate in enhancing the

international nonproliferation regime “with greater alacrity and robustness,” as the authors of the paper hope to see.

Surprisingly, the paper devotes little space to discussing this most vital question, although the authors acknowledge that “if the new leaders of [the United States and Russia] do not take initiatives to further reduce the size, roles and political-strategic prominence of their nuclear arsenals, the overall project of nuclear disarmament cannot proceed.” Their greater interest seems to focus on how other nuclear-armed states should act even before the United States and Russia proceed to further reduce their nuclear arsenals.

Understandably, this misplaced interest comes from the authors’ belief that in the path to zero nuclear weapons, it should not be so difficult for the United States and Russia, as a first step, to each cut its nuclear arsenal to, say, 1,000 nuclear warheads. The tough part is that further nuclear disarmament may well depend on other factors, including the strengthening of the international nonproliferation process; the efficient regulation of the expanding nuclear industry; and the attitude of other nuclear-weapon states, particularly China. The authors of the paper even argue that the United States might be less an obstacle to nuclear disarmament than other countries, or at least the other nuclear-weapon states.

This optimism about the attitude of the United States seems a little far-fetched. The fact is that the United States and Russia (and Russia’s predecessor, the Soviet Union) have been and will continue to be not only the major driving force in the nuclear arms race but also the most reluctant states to pursue truly meaningful nuclear disarmament. For these two major nuclear powers, making deep cuts in their nuclear arsenals has been comparatively easy: Having so many nuclear warheads has actually been a burden. With or without a bilateral agreement in the future, they would almost certainly take measures to reduce the number of their nuclear warheads in a dramatic way. The critical issue is whether they are truly ready to embark on the path to zero after the first round of reductions to 1,000 nuclear warheads.

A recent official document jointly released by the secretaries of defense and energy in September 2008 seems to give further testimony to the U.S. determination to keep its reduced nuclear arsenal as one of major pillars of its security strategy in the twenty-first century. The document stresses, among other things:

Nuclear forces continue to represent the ultimate deterrent capability that supports U.S. national security.... Maintaining a safe,

secure, and reliable nuclear weapons stockpile and supporting infrastructure is of vital importance to U.S. interests. Currently, the U.S. is pursuing an alternative to the strategy of service life extensions for existing warheads. The long-term goal is to rely more on a revived infrastructure and less on the non-deployed stockpile to respond to unforeseen events. We seek replacement of existing warheads with Reliable Replacement Warheads (RRW) of comparable capability that would have advanced safety and security features, be less sensitive to manufacturing tolerances or to aging of materials, and be certifiable without nuclear testing.<sup>1</sup>

The document expects “the logic presented here provides a sound basis on which this and future administrations can consider further adjustments to U.S. nuclear weapons policy, strategy, and force structure.”<sup>2</sup> Evidently, in line with this logic, deep cuts in the redundant nuclear weapons (the non-deployed stockpile) would be not only possible but also imperative as the component part of the future U.S. nuclear strategy. But as a path toward abolishing nuclear weapons? Absolutely not.

### **More Than Numbers, Attitudes Toward Use and Salience of Nuclear Weapons Must Change**

The key to finding the pathway to nuclear abolition does not lie in numbers. It lies in the change of the U.S. vision for security, including the role of nuclear weapons in the security strategy, and the way to deal with nuclear proliferation. In a broader sense, it may also involve a new approach toward international relations. To Washington, a world free of nuclear weapons would also mean giving up the nuclear umbrella that is part of the extended deterrent it provides to allies. As a result, the United States must be prepared to make major readjustments in its political relations with its allies as well as with its potential adversaries.

The same can be said in Russia’s case. Deep cuts in the nuclear arsenal are possible, but for Moscow, giving up all nuclear weapons would seem to take away the most physical and reliable instruments that make Russia a world military power and enable it to deal with the preeminence of the conventional capabilities of the United States and NATO. This is going to be the case particularly now that U.S.–Russia relations have become increasingly soured, and a new round of nuclear arms would be pursued after the United States decided to go ahead with the plan to deploy its missile systems in Eastern Europe and Russia vowed to react. On September 26, President Dmitry Medvedev announced that Russia would upgrade its

nuclear weapons systems by 2020, which would include new “warships, primarily nuclear-powered submarines carrying cruise missiles and multi-functional submarines as well as a system of aerospace defense.” He emphasized that Russia “must guarantee nuclear deterrence under various political and military conditions by 2020.”<sup>3</sup>

Another inhibiting factor in both the United States and Russia is the strong negative voice from conservatives, the powerful military-industrial complex, and the nuclear weapon laboratories in both countries. As a result, it can be envisaged that the greatest challenge for these two major nuclear powers to embrace the path to a world free of nuclear weapons would come from the political-military environment of their own countries rather than the attitudes of other states.

Thus, the real question underlying all the other concerns about nuclear disarmament continues to be the attitude of the two major nuclear powers toward taking concrete steps beyond deep cuts in their nuclear arsenals. The following are some other suggested measures that the United States and Russia should take toward achieving a nuclear-weapon-free world:

- 1) Review their military plans and redefine their security strategies without nuclear weapons.
- 2) Take their nuclear weapons off hair-trigger alert on reciprocal steps.
- 3) Declare a categorical no-first-use policy of nuclear weapons without any conditions.
- 4) Eliminate all types of nonstrategic nuclear weapons before complete nuclear disarmament is achieved. In the meantime, they should agree to place these nonstrategic nuclear weapons in central storage on national territory.
- 5) Refrain from upgrading and manufacturing new nuclear weapons of any type while the reduction of the number of nuclear weapons is carried out. As a minimum, they must refrain from developing nuclear weapons with new military capabilities or for new missions. They must not adopt systems or doctrines that blur the distinction between nuclear and conventional weapons or lower the nuclear threshold.
- 6) Refrain from developing or deploying strategic missile defense systems.

- 7) Provide legally binding negative security assurances to non-nuclear-weapon states.
- 8) Support the establishment of nuclear-free zones in various regions, including the Middle East and northeast Asia, and undertake their obligations to that end.

All these measures, if truly put into practice, would go a long way toward building a solid political and technical basis for further nuclear disarmament by all nuclear-weapon states and toward strengthening the international nonproliferation process. Many specific problems involving implementation of obligations of all the states regarding zero nuclear weapons would also be much facilitated. The paper could doubtless become more comprehensive and complete if the authors gave more thought to the leading role of the nuclear-weapon states, the United States and Russia in particular.

In this connection, even if the steps suggested above were effectively taken and there were substantial progress on the path toward zero, the greatest uncertainties in ensuring effective enforcement and hedging policy would still probably come from the United States and Russia. As the authors rightly point out, these two powers possess the greatest potential (in terms of material basis to manufacture nuclear bombs) to cheat or break out. Just imagine, in a nuclear-weapon-free world, if a non-nuclear-weapon state suddenly breaks out, declaring its determination to develop a nuclear bomb. Such a challenge is serious but not without a solution, as the authors elaborately discuss. But if the culprit is the United States, what could possibly be done? Is it possible to pursue sanctions or use force against Washington? Unfortunately, the authors did not give adequate weight to this problem or offer a solution.

### **Moral and Legal Pressure Needed**

Another major question worthy of further discussion is how much time is needed to solve all the problems as defined in the paper to lead toward a nuclear-weapon-free world. For all the authors' efforts to try to cover every aspect of nuclear disarmament, this sense of moral urgency is missing. The paper's conclusion offers five major reasons to justify global efforts for a nuclear-weapon-free world. Although these are very good reasons, they are not adequate in arguing for nuclear disarmament, because they do not question the legitimacy of these weapons. Using security interests as the primary variable or criterion can lead to reaffirmation of nuclear

deterrence just as easily as it can lead to disarmament. Emphasizing security interests narrowly understood may exacerbate the circular problem to which the authors refer: The two major nuclear powers—the United States and Russia—would easily become prey to their own paranoia that the nuclear disarmament process, once initiated, may not be matched with progress of nonproliferation or the corresponding disarmament measures by other nuclear-weapon states, thus undermining their core security interests. These other countries in turn then seriously question the sincerity of the two major nuclear powers for genuine nuclear disarmament, and they might become reluctant to cooperate.

Thus despite all the meticulous efforts in defining solutions to so many specific issues involved in nuclear disarmament, the strategy offered by the authors lacks legal and moral pressure. Why must the nuclear-weapon states proceed to disarm? And how do we ensure that regional powers would not resort to the nuclear option once some unexpected contingencies occur? Countries without legal and moral pressure would always be able, one way or the other, to find excuses to keep a nuclear option. To that end, perhaps nuclear weapons should be outlawed first in a form of a world convention, just as chemical and biological weapons were banned, so that a powerful legal and moral framework is created in which all the other measures on the path to zero are to be taken.

Some argue that such an approach may be too utopian. That may be true. But it may also be true that nuclear disarmament toward the goal of a world free of nuclear weapons would continue to remain an unachievable dream because, as outlined in *Abolishing Nuclear Weapons*, states are bogged down in debates as to who should do what and first in the name of protecting their security interests. The past ought to teach us a lesson: Nuclear weapons cannot be abolished unless we adopt a new vision, one that regards them not as legitimate weapons, but the equivalent of chemical and biological weapons—inhumane weapons that must be banned by the international community. Outlawing nuclear weapons would not solve all the problems for nuclear disarmament. But it would be a good first step—a big step if the world is ready to agree, in the form of a binding legal document, that possession of nuclear weapons is a crime against humanity that violates the norm of international relations. With such a convention in place, the nuclear-weapon states would find it more difficult to argue that they need to keep their nuclear arsenals for their security or any other reason. Non-nuclear-weapon states would also find it harder to cross over the red line of proliferation. And if states or non-state actors violate that convention, the international community would find it easier to bring

them to justice. In the final analysis, if chemical and biological weapons can be outlawed, why not nuclear weapons? Much depends on the strategic wisdom and political courage of world leaders, particularly in nuclear-weapon states. Indeed, taking specific action to outlaw nuclear weapons now while advocating abolishing them in a far more remote future may constitute a litmus test on whether world leaders are truly serious about nuclear disarmament.

### China's Role

Finally, a few remarks about China. China is not a nuclear-weapon state in the Western sense. Ever since it began acquiring nuclear capability in 1964, it has pledged that the purpose of its nuclear arming was solely for self-defense, that is, only for retaliation against a nuclear attack, which it presumed would come from the United States or the former Soviet Union. Unlike other nuclear-weapon states, Beijing has no intention to use its nuclear weapons to make up for inferiority in conventional weapon capability. Thus, the day it acquired nuclear capability, China pledged never to be the first to use nuclear weapons and never to use nuclear weapons against a non-nuclear-weapon state. China has never changed its no-first-use position, which has become a signature in China's nuclear doctrine.

Against that backdrop, an apparent hint in *Abolishing Nuclear Weapons* that China would resort to its nuclear deterrent arsenal to prevent Taiwan's formal independence, and the intervention of U.S. conventional military power on Taiwan's behalf, is a gross mistake, typical of Western ignorance of China's strategic intention for its small-scale nuclear force. Indeed, if there were ever a military conflict across Taiwan Strait, it is not Beijing but Washington that would seriously consider, as a preemptive strike, the use of nuclear weapons.

Given the situation today, and looking toward the future, the only factor that could fundamentally alter Beijing's position on nuclear disarmament is Washington's huge nuclear arsenal and its strategic intention. It would be difficult to imagine China participating in the disarmament process in a substantive way as long as the United States maintains a formidable nuclear-weapon capability and targets China with it. (Russia may also be a concern, but Beijing considers Russia a remote factor in influencing its nuclear posture.) China views the U.S. nuclear threat as multidimensional. The overwhelming U.S. superiority in the number of warheads is only one aspect. As important, if not more so, is the preeminent quality of the U.S. nuclear lethal capability. Thus, although a reduction in the number of nuclear warheads would certainly be a positive development, China

would still want to make sure that the quantitative reduction is not a way for the United States to disguise a qualitative upgrading of its nuclear weapons. The deployment of U.S. missile defense systems, combined with Washington's strong interests to create new space capabilities, would add further complexity to Beijing's calculation. In a broader context, the uncertain nature of the political relations between the two nations may become an even more fundamental cause of mutual mistrust. In such an atmosphere, the United States would be more reluctant to give up its nuclear weapons that target China for the sake of hedge. In turn, China would insist that Washington do more to provide greater reassurance of its nuclear disarmament.

The Adelphi Paper hints that even if the United States were willing to get rid of all its nuclear weapons, China might need to retain nuclear weapons just to balance U.S. conventional power. Reinforcing this suspicion, certain Chinese specialists are inaccurately quoted in the Western media to the effect that China must change its no-first-strike posture in a future conventional conflict with the United States over the Taiwan Strait. But that, too, is a misperception. It highlights serious doubts on the part of Western countries as to whether China will change its avowed nuclear position of not striking first. Western doubts, however, fail to take into consideration China's overall strategic objective of building an enduring peaceful international environment so it could concentrate on domestic development. Nuclear strategy is only part of China's overall national strategy. If China's pledge not to initiate use of nuclear weapons has helped keep it out of an arms race and has contributed to a more or less stable world nuclear order in the past, there is no reason that China must change its approach in the future. Furthermore, despite the fact that China and the United States are so discrepant in their nuclear capability and so divergent in their perspectives on the role of nuclear weapons, the two countries should agree that cooperation rather confrontation serves the best interests of both of them. Both hope to build up a new nuclear world order that can ensure sustained international security and stability pending nuclear disarmament, and to that end, both seem to be striving to put their nuclear weapons in the background. With that in mind, changing China's posture on not striking first in the hope of offsetting the U.S. conventional weapon superiority not only would work against China's nuclear philosophy, but it also would practically undermine China's efforts to build a more harmonious world, jeopardize its strategic stability with the United States, and invite a new round of nuclear arms race with other nuclear powers.<sup>4</sup>

Under the circumstances, Beijing would not resort to its nuclear card to enhance its security. On the contrary, it is far more likely to continue to seek to play down the role of nuclear weapons. China would like to see the United States and Russia take specific measures to implement their special responsibility on nuclear disarmament first so as to create a more propitious condition for China to participate in the nuclear disarmament process in the future. Implementing the eight measures mentioned above, in addition to deep cuts in their excessive nuclear arsenals, could demonstrate true good political will on the part of the United States and Russia for the task of nuclear disarmament.

This does not suggest that until all of its security concerns are met, China is indifferent to the efforts in Western countries to achieve a nuclear-weapon-free world. After all, complete prohibition and thorough destruction of all nuclear weapons has been China's consistent position. The proposals by Shultz et al. and the dynamic push worldwide for a nuclear-weapon-free world ought to give China adequate incentives to ponder the more detailed arrangements around the question of nuclear disarmament. In particular, China should be prepared to respond to a legitimate question raised in the *Abolishing Nuclear Weapons* paper, that is, at what phase of nuclear disarmament by the two major nuclear powers would China think it is time to join them for further actions. An appropriate answer will require a lot of homework on the part of China. I don't think Beijing would know now at what phase to get involved, other than its long-held, rather abstract principles, given that neither the United States nor Russia demonstrates willingness to embark on the road of true nuclear disarmament.

At the current stage, what is most essential is better communication. To that end, while urging the United States and Russia to take their share of responsibility, China would probably welcome various explorations of an effective approach at different levels and channels. Beijing may also support enhanced communication and contact among nuclear-weapon states, including the suggestions by the authors to set up a panel of specialists for further consultation and to strengthen the bilateral and even trilateral strategic dialogues among China, the United States and Russia on appropriate procedures and a time frame to achieve nuclear disarmament.

## Notes

- <sup>1</sup> *National Security and Nuclear Weapons in the 21st Century*, released by the U.S. Departments of Energy and of Defense, September 2008, <http://www.defenselink.mil/news/nuclearweaponspolicy.pdf>.
- <sup>2</sup> Ibid.
- <sup>3</sup> See Atlantic Council of the United States, *Russia to Upgrade Nuclear Weapons System*, September 26, 2008, [http://www.acus.org/atlantic\\_update/russia-upgrade-nuclear-weapons-systems](http://www.acus.org/atlantic_update/russia-upgrade-nuclear-weapons-systems).
- <sup>4</sup> For further discussion on why China will not change its no-first-use posture, see Pan Zhenqiang, "China Insistence on No-First-Use of Nuclear Weapons," *China Security*, no. 1, Autumn 2005, p. 5.



V. R. RAGHAVAN

## Nuclear Abolition: Need for a Phased Plan

The Adelphi Paper, *Abolishing Nuclear Weapons*, through an objective and detailed analysis, looks at the two principal strands of the nuclear disarmament discourse: the political and technical dimensions of the abolition challenge. The two are clearly interconnected, and the paper makes a compelling case for addressing them simultaneously. The questions and suggestions listed in the paper, however, clearly show the political strand to be determinant in achieving progress toward nuclear disarmament and, eventually, abolition. Obtaining a broad global political consensus on a workable disarmament plan, then, should be the first step in reaching global consensus on disarmament as the goal, perhaps through a series of five-year milestones coinciding with Non-Proliferation Treaty (NPT) Review Conferences, and in outlining the process by which it can be achieved. The technical issues are intrinsically linked with the nuclear-weapon states and are best dealt with by them at the same time that the global disarmament consensus is being hammered out. There being little time available until the 2010 NPT Review Conference, it should limit its focus to the political threshold.

### **Establishing Political Conditions**

The Adelphi Paper recommends that the United States and Russia further reduce the size, roles, and political-strategic prominence of their nuclear arsenals. Washington and Moscow will no doubt have differences over the order in which those three issues should be addressed. Whether this is a

technical or political issue will depend on the two countries' respective threat perceptions. They will view this in the context of the larger great power and global strategic dynamic. Concern over the salience of nuclear weapons in the major powers' strategic and operational beliefs is shared by other nuclear-armed states and non-nuclear-weapon states. This is a subject on which the 2010 NPT Review Conference agenda can be developed.

The paper also recommends that the United States and Russia not routinely deploy nuclear weapons poised for immediate use. In some limited ways, this is already being done. Is it possible for the two principal nuclear powers to at least politically and unequivocally commit themselves to this before 2010? The signs are not encouraging. Missile defense and NATO expansion imperatives are perceived as being strategically constraining. And one need only refer to Dmitry Medvedev's September 2008 directive to the armed forces stating, "By 2020 we must have guaranteed nuclear deterrent for various military and political contingencies, and equip troops with new armaments and reconnaissance means"<sup>1</sup> to get a sense of the mood in favor of nuclear weapons. The commitment to give up the use of nuclear weapons is a global political concern that needs to be placed at the top of the 2010 NPT Review Conference agenda.

The immense political content of the recommendation that the United States, Russia, China, India, Pakistan, Israel, and others informally explore their objections to nuclear transparency is obvious. The political aspects involve NPT status of some states; hard-line NPT demands of signatories; and traditional unwillingness of nuclear-armed states to be transparent. Collectively, these aspects will prove to be a barrier too difficult to cross. Is this a political issue or a technical issue? NPT signatory and non-signatory countries will need to reach consensus on this. Furthermore, India, Israel, and Pakistan cannot be expected to disarm in a linked arrangement as is being suggested. There is no strategic linkage between Israel's nuclear weapons and those of India and Pakistan. Indian nuclear concerns include a larger set of strategic parameters than Pakistan's. Any suggestion that India can give up its arsenal if the Kashmir issue can be resolved is based on an inadequate understanding of India's global, regional, and domestic strategic needs. An attempt to seek linkage among new nuclear states' needs without regard to their fundamental strategic perceptions would be incomplete and would impede the cause of disarmament.

### **Verification and Enforcement**

Verification and enforcement are the most valuable and controversial issues raised in the Adelphi Paper. Verification can become irreparably contentious between nuclear-armed states and non-nuclear-weapon states and

also among nuclear-armed states. It is closely linked with enforcement, which raises doubts, fears, and strong resentment of unilateral action by the major nuclear powers. The situation is made worse by selective use of verification and enforcement and varying rules of engagement, all of which leave little confidence in the credibility of the major nuclear powers that will need to play a lead role, or in their commitment to disarmament. New nuclear states and non-nuclear-weapon states alike share this lack of confidence. What is required is a political commitment by the nuclear-weapon states to a fair and equitable verification arrangement. This will need to be painstakingly negotiated. In this context, the United Kingdom-Norway initiative should be enlarged to include all nuclear-armed states; doing so would be a significant step toward creating an inclusive and confidence-building baseline.

A partnership among India, Pakistan, and Israel in a nuclear-weapon enforcement system would draw wide-ranging objections. It is also unlikely that the three states would be willing to enforce prohibition. Israel has already been an enforcer and is seen by many to be ready to do so again. India would be unlikely to find it in its interests to join such a coalition of enforcers.

Enforcement faces a twin dilemma: intention and means. The intention to enforce adherence to nuclear processes can be global or limited to a few states. Only a few states have both the means and capability to enforce adherence, and the two have not been harmonized in the past. The power to enforce would also need to be subordinated to the intent of all states represented in the United Nations.

### **Nuclear Industry**

The Indian nuclear position is a unique model for the future, as shown by its nuclear agreement with the United States, the approval of its nuclear industry needs by the Nuclear Suppliers Group, and its safeguards designed to the satisfaction of International Atomic Energy Agency. Even though India is allowed to retain enrichment facilities outside safeguard arrangements, its strategic intentions and posture are nonthreatening. It is thus possible to visualize arrangements under which responsible stewardship of doctrines, force structures, and strategic postures can be constructively combined with peaceful uses of nuclear energy. India's commitment to a moratorium on testing, a no-first-use pledge, nonproduction of tactical weapons, and clear and complete political control over nuclear arsenals and delivery means are useful indicators of a basis for future global disarmament.

### **An Indian Perspective**

This fine paper combines political and technical aspects that are immediately feasible with those that are medium-term probable or long-term visualizations. And in all of these categories, the paper goes to the heart of the issues. It is apparent, however, that no single international treaty can cover all these issues and at the same time be relevant or practical. Hence, it is necessary to reach globally acceptable critical political conclusions on the key issues described above. The 2010 NPT Review Conference offers a unique opportunity to take the political discourse of disarmament to new commitments that would be acceptable to the five nuclear powers and act as encouragement to NPT signatories to stay the course. A clear and unambiguous statement by all nuclear-weapon states that they renounce the use of nuclear weapons unless attacked by nuclear weapons would be the first step, and it is one that can be achieved even before 2010. Such an agreement would go beyond the no-first-use pledge of some nuclear-armed states. A no-first-use doctrine does not foreclose the use of nuclear weapons; agreeing not to use nuclear weapons unless attacked by nuclear weapons adds value to the doctrine, while opening the doors to disarmament and eventual abolition. Furthermore, this could set the stage for working to establish additional political commitments and consensus.

Inability to agree by 2010 on renouncing the use of nuclear weapons unless attacked by nuclear weapons could have a long-term adverse impact. The Adelphi Paper leaves no room for doubt on the difficulties and obstacles on the route to disarmament and eventual abolition, even as it attempts to show possible directions for it. Should the 2010 NPT Review Conference fail, it would reaffirm as insurmountable the difficulties in achieving disarmament and abolition. That in turn would lead to redoubled efforts among nuclear-weapon aspirants to obtain weapon capability. One breakout state is all that is necessary to encourage others to act. The conclusion would quickly be reached that the benefits of possessing nuclear weapons outweigh the costs of sanctions and opprobrium that would follow. Meanwhile, of course, the disarmament process would be severely set back. Limitations that were apparent in the Six-Party Talks over North Korea's nuclear-weapon program will be a further incentive for some states to speed up efforts to possess nuclear capability. Iran's nuclear ambitions will also be viewed in some circles with empathy should the 2010 NPT Review Conference fail. The overwhelming U.S. superiority in conventional and space-led military capabilities will provide additional cause for states threatened by its policies to seek a nuclear hedge. The political commitments to give up the use of nuclear weapons will also need to

be linked to ongoing evolution of security structures in Europe and Asia. Reassuring Russia and China that their overarching strategic concerns are recognized is as important as the assurance the paper recommends that the United States give its allies.

A possible model for a phased program exists in the seven-point disarmament agenda enunciated by India at the UN Conference on Disarmament in Geneva in March 2008. India had also conveyed its willingness as a nuclear-armed state to turn its no-first-use policy into a multilateral legal commitment. It formally proposed two multilateral agreements and two global conventions in a detailed framework.<sup>2</sup> Its proposal recommended:

- Reduction of the salience of nuclear weapons in security doctrines
- Negotiation among nuclear-weapon states of a no-first-use agreement on nuclear weapons
- Negotiation of a universal and legally binding agreement on non-use of nuclear weapons against non-nuclear-weapon states
- Negotiation of a prohibition on using or threatening to use nuclear weapons
- Negotiation of a prohibition on development, stockpiling, and production of nuclear weapons, moving toward global, nondiscriminatory, and verifiable elimination of these weapons
- Unequivocal commitment of all nuclear-weapon states toward the goal of eliminating nuclear weapons
- Adoption of additional measures by nuclear-weapon states to reduce risks and dangers arising from the accidental use of these weapons

The 2010 NPT Review Conference can become the milestone from which a series of political and technical initiatives can be developed to move the disarmament discourse from mere statements of intentions to actual measures. To make it happen, political commitments must be agreed upon; only then can an international treaty encompassing technical issues be attempted. Such a phased strategy would stand a better chance of building global consensus for reviving the disarmament movement, so convincingly argued in the Adelphi Paper.

## Notes

- <sup>1</sup> Vladimir Radyuhin, "Russia to Modernise Armed Forces," *Hindu*, September 28, 2008.
- <sup>2</sup> Statement by Hamid Ali Rao, ambassador and permanent representative of India to the UN Conference on Disarmament, Geneva, February 28, 2008, accessed on September 30, 2008, at <http://meaindia.nic.in>.

SAMEH ABOUL-ENEIN

## The Roadmap to Total Nuclear Disarmament

Achieving “nuclear zero” will undoubtedly prove to be a long-term process, involving many components and necessitating the engagement of both nuclear and non-nuclear weapon states. The New Agenda Coalition can play an important role, with special emphasis on the 13 Steps as the vehicle for achieving this aim. A cross-regional multilateral and multicultural dialogue is needed for this purpose—one with a clear objective of a world free of nuclear weapons. George Perkovich and James Acton’s positive contribution through this valuable Adelphi Paper is very much welcomed in this ongoing debate.

### **The First Challenge: Definitions**

The authors say that their Adelphi Paper has two key aims: “first, to identify and explore the challenges to the complete abolition of nuclear weapons, and second, to discuss what states can start doing today to circumvent them. We do not claim to exhaust the range of issues that must be resolved, or have optimally framed the subjects we do address. If there are places where we appear defeated by obstacles that could be dismissed or better navigated, we welcome other people’s responses.”

The first challenge is to define what we are talking about. It could be argued that the “abolition” of nuclear weapons is a term generally associated with more philosophical writers, whereas their “elimination” might be favored by diplomats and “prohibition” by those involved in interna-

*The views expressed in this chapter are exclusively the author’s personal views.*

tional law. Moreover, the technicalities of what might actually be eliminated or prohibited within this context might also be considered, even at this early stage. In order of increasing comprehensiveness and stringency, the following might be included: first, nuclear weapons deployed with means for their own delivery. Second, intact nuclear weapons in all conditions and locations. Third, all nuclear weapons and all military stockpiles of directly weapons-usable nuclear materials (separated plutonium and highly enriched uranium). Fourth, all nuclear weapons and all stockpiles of directly weapons-usable nuclear materials, both civilian and military. Fifth, as above but also including all facilities capable of producing directly weapons-usable nuclear materials.

### **The Non-Proliferation Treaty: The Foundation for a More Secure Future**

Most analysts and practitioners would agree that the 1968 Non-Proliferation Treaty (NPT) must be the starting point for constructive discussions on the subject of nuclear disarmament. The next review of the NPT will take place in 2010, and while some have warned about the possible collapse of the treaty, preparatory meetings suggest that efforts will be made to strengthen the treaty and achieve its universality. Despite detractors of the treaty, the reality is that in many important ways it has been a great success. Although India, Israel, and Pakistan have refused to sign the treaty and North Korea withdrew in 2003, its membership is the widest of any arms control treaty. Key successes included South Africa's historic decision to dismantle its nuclear weapons and join the treaty, and the decisions by Belarus, Kazakhstan, and Ukraine to transfer nuclear weapons back to Russia after they seceded from the Soviet Union. The NPT was indefinitely extended in 1995, leading some to assert that despite some problems associated with a lack of movement toward nuclear disarmament by the nuclear powers, the NPT has been the most successful arms control treaty ever negotiated.

Non-nuclear-weapon states are not averse to strengthening the barriers against proliferation. They see no advantage in a world in which more fingers are on nuclear triggers. This level of commitment to the treaty, however, does not guarantee progress unless it is coupled with positive action by the treaty's nuclear-weapon states toward nuclear disarmament.

Ten years ago, the foreign ministers of seven countries—Brazil, Egypt, Ireland, Mexico, New Zealand, South Africa, and Sweden—joined together to form the New Agenda Coalition to work toward a security order in which nuclear weapons would not have a role. Today I am more convinced than ever that nuclear disarmament is imperative for

international peace and security. Nonproliferation is vital to the elimination of nuclear weapons, but alone it is not sufficient. Nuclear nonproliferation and nuclear disarmament are two sides of the same coin. If nonproliferation is to remain a genuine global norm, the process of disarmament has to be revived. Nonproliferation cannot be sustained through coercive imposition of rules; that would serve only to decrease the chances of building and sustaining international cooperation and consensus on nonproliferation. Over time, states would become less inclined to cooperate in critical areas.

Then British defense secretary, Des Browne, recognized this in a 2008 speech when he related nonproliferation objectives to disarmament and said that “Our chances of eliminating nuclear weapons will be enhanced substantially if the [non-nuclear-weapon states] can see forward planning, commitment and action toward multilateral nuclear disarmament by [nuclear-weapon states]. Without this, we risk generating the perception that the [nuclear-weapon states] are failing to fulfill their disarmament obligations, and this will be used by some states as an excuse for their nuclear intransigence.”<sup>1</sup>

There can be no doubt that the NPT is of vital importance to the achievement of nuclear disarmament and nuclear nonproliferation, but this regime should not be regarded as an “a la carte” menu. As IAEA General Director Mohamed ElBaradei has explained: “We must abandon the unworkable notion that it is morally reprehensible for some countries to pursue weapons of mass destruction, yet morally acceptable for others to rely on them for security—and indeed to continue to refine their capacities and postulate plans for their use.”<sup>2</sup> The NPT remains the only international instrument that not only seeks to prevent the proliferation of nuclear weapons but that also embodies a firm legal commitment to eliminate these weapons. In 2000, the nuclear powers made an unequivocal undertaking to eliminate their nuclear arsenals, and all parties adopted a practical plan for the pursuit of nuclear disarmament. Since then, however, little progress has been made in achieving these goals. This reference to an “unequivocal undertaking” is the strongest reaffirmation so far of the commitment to the global elimination of nuclear weapons. It gives diplomatic weight to the 1996 International Court of Justice advisory opinion, which interpreted Article VI of the NPT in the light of other legal obligations, de-linking nuclear disarmament from general and complete disarmament, and making explicit that the Article VI obligation to negotiate in “good faith” implies bringing negotiations to a conclusion.

It is high time to bring to reality the unequivocal commitment undertaken at the 2000 NPT Review Conference by the nuclear-weapon states to

seriously pursue the elimination of their nuclear arsenals. Because these states have the primary responsibility for undertaking the necessary steps to eliminate nuclear weapons, it is incumbent that they accelerate the implementation of their promises to make progress toward achieving the goal of a world free of nuclear weapons. This is a matter of enforcement, too. As Perkovich and Acton note, “Double standards on matters as materially and psychologically important as nuclear weapons will produce instability and noncompliance, creating enforcement crises that increase the risk of conflict and nuclear anarchy. Lawyers, diplomats, and military commanders may debate the relevance and precise meaning of Article VI of the NPT. But it is clear that states would not have agreed to extend the treaty indefinitely, as they did in 1995, if the nuclear-weapons states had tried to claim that they were not obliged to pursue nuclear disarmament.”

NPT articles other than article VI are relevant here too. NATO’s nuclear sharing arrangement would seem to be a direct contravention of Article I of the NPT because it involves the transfer of nuclear weapons during a conflict to non-nuclear-weapon states (such as Belgium and Italy). Simultaneously, the states receiving control of the weapons, which are non-nuclear-weapon state parties to the NPT, would also be in violation of the treaty because Article II forbids them to receive nuclear weapons from a nuclear-armed state or to control such weapons.

The New Agenda Coalition campaigns for the world envisaged by the treaty—a world in which nuclear weapons have no role. Its philosophy is that the world will be safe only when nuclear weapons are eliminated and we can be sure they will never be produced or used again. This is one reason that the coalition calls on India, Israel, and Pakistan to join the NPT as non-nuclear-weapon states. Challenges to the treaty are being made by states that would defy or undermine its rules. The 2010 NPT Review Conference will need to address those challenges as well as other concerns that have arisen in recent years about proliferation. The possession of weapons by the declared nuclear powers is no excuse for other nations to develop their own nuclear arsenals, taking into consideration their inalienable right to peaceful uses of nuclear energy in accordance with Article IV of the NPT.

Proliferation threatens the entire international community. All states have an interest and a responsibility to work together to remove this threat. Forging a common cause is as much the responsibility of the nuclear-weapon states as it is for non-nuclear-weapon states. The New Agenda Coalition anticipates playing a constructive role in ensuring that the Review Conference results in a strong, effective outcome, especially in removing the threats of existing huge arsenals of nuclear weapons and of proliferation.

### **Restoring Confidence in the NPT: A Task for the Great Powers**

Often it is suggested that the NPT has been largely responsible for the slow growth in the number of proliferators and that it has to be supported and maintained. However, one must accept the stark reality that the regime is merely a reflection of the work of the larger forces in the international system. The underlying successes and failures are a function of relations between the great powers, their strategic objectives, and their power equations. Regimes need a medium in which to operate, and their effectiveness varies with the investment that major states put into them. For the regime to work more effectively, then, it needs the support of great powers, in particular the United States and the other nuclear-weapon states.

For the vision of zero to be credible, the permanent members of the UN Security Council should take the lead at an early stage. The agenda must be flexible, depending on both technical and political realities, but must include verification, the progressive reduction of operationally deployed strategic warheads, and a freeze in upgrading, modernizing, and replacing existing weapons.

Leadership in the United States and Russia is imperative, as they have by far the most nuclear weapons. The United States, with NATO's agreement, should withdraw its estimated 240 tactical nuclear weapons stationed in Europe, while Russia should withdraw its tactical weapons from operational deployment and place them in secure storage until they are abolished. In addition, the two countries should extend START I, the Strategic Arms Reduction Treaty, to ensure that verification measures remain in force.

Regardless of whether states agree in the near term to outlaw use of nuclear weapons, a reduction in these weapons' roles in security policies remains an essential component of the nuclear disarmament process, not only to enhance strategic stability and contribute to a climate of international confidence and security, but also to facilitate the process of their elimination. Any plans to develop new nuclear weapons or new uses, roles, or rationalizations for their use must be shelved immediately. In addition, taking practical steps to decrease the operational readiness of nuclear weapons systems, with a view to ensuring that almost 6,000 long-range nuclear weapons are removed from high-alert status, would contribute to nuclear disarmament.

French President Nicolas Sarkozy recently proposed significant movement by the five nuclear-weapon states in advance of the 2010 NPT Review Conference. His speech outlining this program of action—a milestone in changing the political atmosphere—took the international community by surprise. The five states need to take up Sarkozy's challenge collectively

and consider how to demonstrate the political commitment necessary to convince other states that they believe in achieving nuclear disarmament and reversing the dynamics driving proliferation. Sarkozy's list includes:

- The universal ratification of the Comprehensive Test Ban Treaty (CTBT).
- The transparent dismantling of all test sites.
- An immediate moratorium on the production of fissile materials for military purposes and serious negotiations within the Conference on Disarmament toward a Fissile Material Cut-Off Treaty (FMCT).
- Greater transparency among the nuclear-armed states.
- Implementation of the Hague Code of Conduct against ballistic missile proliferation.
- Negotiations on a treaty to ban short- and intermediate-range surface-to-surface missiles.

### **The Importance of Verification and Transparency**

Achieving the vision of a world free of nuclear weapons requires at least a minimum of the following things, as listed by Jonas Gahr Støre, the Norwegian minister for foreign affairs: political leadership at the highest levels; commitment followed up by action; nondiscrimination; transparency; and cooperation. Støre went on to state that non-nuclear-weapon states should cooperate with nuclear-weapon states to develop the technologies required for verifying nuclear disarmament. Technically speaking, this cooperation in nuclear disarmament research should aim to focus on the following:<sup>3</sup>

1. Developing a generic model of the entire dismantlement process. This model should include all relevant verification objectives and technologies and identify suitable verification procedures for each dismantlement action.
2. Developing a declaration standard. This standard should allow the inspected party to list all sites, documentation, and personnel relevant to the verification process. It should include a

section describing sites, documents, or personnel not eligible for inspection and for what reasons. It should include an attached description of special safety precautions the inspectorate must take when visiting the facilities.

3. Identifying key inspection points and associated measurement technologies and techniques, including information barriers and other restrictions. The International Atomic Energy Agency (IAEA) Trilateral Initiative made significant headway in this work.
4. Developing procedures and methods that will help resolve compliance concerns involving national security-related facilities and information.
5. Calculating the cost of building new, identical, built-for-purpose dismantlement facilities and comparing it to the cost of using existing facilities with their inherent challenges.

A significant question is whether non-nuclear-weapon states will become involved in verifying complete nuclear disarmament and if this will require an extension of the IAEA's role. Verification can be understood as the "process of gathering and analyzing information to make a judgment about parties' compliance or non-compliance with an agreement."<sup>4</sup> However, as a practical matter, it is difficult to say what verification will entail outside the context of a given treaty.<sup>5</sup> One thing is relatively certain: The difficulties of verifying nuclear disarmament will correspond with the complexity of the disarmament commitment.

Beyond developing verification technology, the nuclear-weapon states should open their testing sites and their nuclear-weapon facilities to international inspection. Knowing what to look for and where to look is always challenging. Verifying complete disarmament is likely to be far more difficult and will involve addressing an even larger and more complex set of questions: How can the inspectorate be completely sure a state has declared all its nuclear warheads? How can the inspectorate be completely sure there is not a further undeclared production of nuclear warheads? A significant factor that would facilitate effective and efficient verification is a careful selection of which items, activities, and facilities must be monitored and which need not be. To increase transparency and build confidence in a

comprehensive verification scheme, nuclear-weapon states could provide annual declarations to a register that would perhaps be maintained by the United Nations. The declarations could include their:

- Total current numbers of nuclear warheads and delivery systems.
- Current projected level of arsenals at the next NPT Review Conference.
- Plans for the development and deployment of missile defenses and indications of the nature, location, and scope of such defenses.
- Fissile material inventories and plans to place excess fissile materials under international inspection.
- Plans for the elimination of nuclear weapons and delivery vehicles.

### **Key Practical Steps Toward Zero**

#### *The Middle East*

The region's special status was recognized in the 1995 NPT Review and Extension Conference's Resolution on the Middle East, as well as in the Final Document of the 2000 NPT Review Conference. Insofar as it pertains to the NPT, its universality, and its review cycle, the Resolution on the Middle East focused on achieving the following clear objectives:

- The establishment of a nuclear-weapon-free zone in the Middle East.
- The accession to the NPT by states in the region that have not yet done so.
- The placement of all nuclear facilities in the Middle East under full-scope IAEA safeguards.

The establishment of a nuclear-weapon-free zone in the Middle East is a first step toward creating an effectively verifiable zone in the Middle East that would be free of all weapons of mass destruction—nuclear, chemical, and biological weapons and their delivery systems. Egyptian

President Hosni Mubarak's initiative calls for the establishment of such a zone in the Middle East. It has three main components:

- The prohibition of all weapons of mass destruction—nuclear, biological, and chemical—in all states of the Middle East.
- All states in the region should provide assurances toward the full implementation of this goal, in an equal and reciprocal manner to fulfill this end.
- Establishing proper verification measures and modalities to ensure the compliance of all states of the region without exception.

#### *Comprehensive Test Ban Treaty*

A few words on the CTBT are in order here. It was 12 years ago, on September 24, 1996, that the treaty was opened for signature. In its preamble, the CTBT argues “that cessation of all nuclear weapons test explosions and all other nuclear explosions... constitutes an effective measure of nuclear disarmament and non-proliferation in all its aspects...” It also underlines that “the most effective way to achieve an end to nuclear testing is through the conclusion of a universal and internationally and effectively verifiable comprehensive nuclear test-ban treaty.” As of November 2008, 180 states have signed it; 148, including Russia, have ratified it; and of the 44 that must ratify the treaty for it to enter into force, 41 have signed it and 35 have ratified it.

The central premise behind the CTBT, then, is that a ban on nuclear testing effectively ends the ability of any country to develop and deploy nuclear weapons. The treaty is intended to stop the qualitative nuclear arms race, and, once and for all, prevent further horrendous health and environmental damage caused by nuclear test explosions. Now that an agreement on the test ban has been reached and entry into force is within reach, the effort to establish an international norm against nuclear testing must be actively pursued.

Although the United States has not conducted a nuclear test explosion since 1992, the treaty has not been put to the Senate for consideration since it was last rejected in October 1999.<sup>6</sup> If the United States, with its huge nuclear arsenal, does not commit to the treaty, other states may start to question their own involvement. Indeed, some disquiet has already emerged concerning the financial demands of treaty regime.

*Fissile Material Cut-Off Treaty*

The Conference on Disarmament must negotiate a nondiscriminatory, multilateral, and internationally effectively verifiable treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices in accordance with the 1995 statement of the special coordinator, taking into consideration both nuclear disarmament and nonproliferation objectives. The conference should begin negotiations on such a treaty with a view to completing a final draft within five years.

In addition to this central process, technical and scientific seminars should be held to discuss scope, definitions, transparency, accountability, and verification of an FMCT. Efforts should continue in the conference to break the deadlock over the establishment of an ad hoc committee on an FMCT with a negotiating mandate. A group of experts should be convened to examine possible verification measures in the context of an FMCT.

*Operational Status of Nuclear Weapons*

Because concrete and agreed measures to further reduce the operational status of nuclear weapon systems are necessary,<sup>7</sup> the nuclear-weapon states collectively should be encouraged to:

- Deactivate warheads from all systems they are planning to dismantle or eliminate, unilaterally or through agreement.
- Keep only a minimum number of nuclear weapons on high-alert status.
- Develop transparency measures for changes in operational status.
- Initiate discussions of possible ways to reduce the operational status of their nuclear-weapon systems, and report their conclusions to the 2010 NPT Review Conference or the Conference on Disarmament, or both.

*Missile Technology and Space*

No country has developed long-range missiles simply to deliver conventional warheads. The cost of ballistic missile development and deployment can be justified only if they inflict the unique level of damage associated with a nuclear weapon. The stagnation of the disarmament process has resulted in missile defense systems being regarded in an increasingly favorable light. The strategic environment could become ever more competitive

as missile defense research yields technologies for offensive space-based weapons. Hence, it is hardly surprising that prevention of an arms race in outer space is becoming the subject of intense international debate and scrutiny.

### *Outlaw Use of Nuclear Weapons*

It is obvious that the only absolute guarantee against the use of nuclear weapons is their elimination and the assurance that they will never be produced again. Following this logic, it should be equally clear that as long as even a single country possesses nuclear weapons, others will aspire to acquire them. The continued possession of nuclear weapons, or the retention of the nuclear-weapon option by some states, creates the very real danger that they could be used or that they could fall into the hands of non-state actors.

But while the complicated process of negotiating multilateral nuclear reductions and operational changes occurs, and of verifiably eliminating weapons, a global devaluation of the currency of nuclear weapons could be accomplished by outlawing their use. This would not eliminate the dangers overnight, but it would have a major impact in taking nuclear weapons off the list of objects of political status and desire. They would then be treated as weapons of terror that no sane or civilized state would want or be able to use. Those clinging to nuclear deterrence need to wake up to the 21st century. A more effective deterrent against the use of nuclear weapons is to make using them a crime against humanity.

Of course, major questions arise regarding how to enforce a ban on the use of nuclear weapons. As long as any states possessed nuclear weapons, the danger of their use would remain clear and present. A ban on use could therefore be enforced by reaching a legally binding convention along the lines of the conventions that prohibit biological and chemical weapons.

### **Trust and the Way Forward**

The concept of trust is probably the one least developed in the whole disarmament and nonproliferation literature, yet trust is central to our work on the future of nuclear disarmament and arms control. Mutual trust is a key to any process of cooperation among nations. Trust, to me, is about constructive dialogue, cross-regional exchanges, reaching out, crossing bridges and cross-cultural tolerance; it is about building mutual understanding and finding ground for mutual interests.

A nuclear disarmament future based on trust would consist of one in which Iranian proliferation concerns are addressed; the North Korean

capability is rolled back; continuing reductions are made in the existing nuclear arsenals of the five nuclear-armed states toward eventual elimination; the nuclear-free zone in the Middle East makes progress; Israel joins the NPT as a non-nuclear-weapon state; and non-state actors do not acquire nuclear weapons. A combination of trust-building measures would encourage this path.

In contrast, a nuclear disarmament future based on mistrust would consist of a mix of serious challenges and a failure of the NPT regime, one in which proliferation occurs. Israel would continue to develop its arsenal; Iran would gain nuclear-weapon capabilities; and North Korea would not roll back its capacity. There would be a cascade of nuclear proliferation in the Middle East and Asia. In the absence of dialogue, the prevalence of mistrust would lead to failure of agreements or dialogue with North Korea, Israel, or Iran. At the same time, nuclear weapons would play an increasing role in the security policies of the states that possess them.

### **Multilateral Cross Regional, Multicultural Dialogue**

Perkovich and Acton point out that aside from the Conference on Disarmament, there is no diplomatic structure pertaining to nuclear affairs that includes the five NPT-recognized nuclear-weapons states plus India, Pakistan, and Israel. Indeed, nuclear disarmament effectively disappeared from the global agenda some time ago; the Conference on Disarmament has been bereft of real work for nearly twelve years. The Conference on Disarmament should establish an appropriate subsidiary body with a mandate to deal with nuclear disarmament. In addition, the following steps, in the conference, would be appropriate:

- Discussion by an ad hoc group of the steps that would lead toward systematic and progressive efforts to eliminate nuclear weapons.
- Dialogue among states that possess nuclear weapons and those that do not on practical steps that would lead to the implementation of this commitment.
- Technical and political seminars to address issues of scope, definitions, verification, and negotiating approaches pending agreement on a program of work by the Conference on Disarmament.
- Development of ad hoc exchanges to establish a precedent that non-nuclear-weapon states have a legitimate interest and right to question nuclear-armed states on nuclear disarmament matters.

The authors state that “What is needed now is for a conversation about disarmament to take place between officials and experts from non–nuclear-weapon states and those from nuclear-weapon states. There has not been such a conversation for a long time.”

Much more could be done in Geneva, where I served for a few years. The Conference on Disarmament has vast potential and expertise that can make a difference with the necessary political will. Experts, diplomats, researchers, nongovernmental organizations and research institutes (including governmental ones) could do more; at least they could and should facilitate workshops and international dialogue. They can begin working on a genuine international collaboration and then report back to governments, whether through the NPT process, the Conference on Disarmament, or the UN General Assembly.

I very much welcome this call for serious, transparent, and time-framed conversation among the states that possess nuclear weapons and those that do not with the clear objectives of eliminating nuclear weapons and ending any potential proliferation.

The NPT should have a permanent secretariat. Perhaps the upcoming NPT Review Conference in 2010 should be on the ministerial level. We need to think along the lines of summits on the topics of energy, population, food, the financial crisis, and climate change. Why can't there be a summit for a nuclear zero? Isn't the fate of humanity worth it?

## **Conclusion**

The short-term and medium-term effectiveness of the global nonproliferation regime requires the full support and cooperation of both the nuclear-weapon states and the non–nuclear-weapon states in the maintenance of a vigorous IAEA with the inspection powers and resources needed to do its job.

The potential benefits of comprehensive nuclear disarmament are so attractive relative to the attendant risks—and the opportunities presented by the end of the Cold War are so compelling—that increased attention is warranted to studying and fostering the conditions that would have to be met to make prohibition desirable and feasible.

Success in preventing the proliferation of nuclear weapons depends at some fundamental level on the ability to make a credible and compelling argument that they are neither necessary nor desirable, that whatever advantages they confer are outweighed by the costs. It is difficult to sustain this argument when the large and powerful states that possess nuclear weapons routinely proclaim that such weapons provide unique and crucial security benefits.

The ideal normative environment for promoting nonproliferation is one in which nuclear weapons are widely or even universally regarded to be illegal, illegitimate, and immoral. That is, to inhibit nuclear proliferation it is desirable not only to devalue nuclear weapons but also to delegitimize them. Doing so would put in place an additional (normative) barrier to nuclear proliferation.

Former UN Undersecretary for Disarmament Jayantha Dhanapala argues that “the nuclear powers have a particularly heavy burden to reinforce this regime by demonstrating through unilateral and multilateral actions how the interests of international peace and security are best pursued without nuclear weapons.”<sup>8</sup> It is hard to believe that the arguments for acquiring nuclear weapons would play out the same way in a world in which they had been genuinely devalued and delegitimized, in which nuclear disarmament had been substantially achieved, and in which international opposition would confront any state that attempted to breach the universal disarmament norm.

In general, the nuclear-weapon states are keen to establish strict standards for compliance with the NPT and they support stern enforcement against states that violate their obligations. However, it is difficult to effectively advocate that others be held completely accountable under the NPT when the nuclear-weapon states themselves are viewed as delinquent. Why should others be taken to task when, as they see it, the nuclear five are themselves failing to comply with treaty obligations under Article VI? Thus the stern reminder offered by the Carnegie Endowment’s prominent report on universal compliance. “The burden of compliance ... applies equally to nuclear weapon states that are failing to honor their own non-proliferation pledges.”<sup>9</sup>

## Notes

- <sup>1</sup> Des Browne, "Laying the Foundations for Multilateral Disarmament," Speech to the Conference on Nuclear Disarmament, Geneva, February 5, 2008.
- <sup>2</sup> Mohamed ElBaradei, "Saving Ourselves From Self-Destruction," *New York Times*, February 12, 2004. Most recently reiterated by ElBaradei at a conference on "Achieving the Vision of a World Free of Nuclear Weapons," Oslo, February 26, 2008.
- <sup>3</sup> Andreas Persbo and Marius Bjorningstad, "Verifying Nuclear Disarmament: The Inspector's Agenda," *Arms Control Today*, vol. 38, May 2008, [http://www.armscontrol.org/act/2008\\_05/PersboShea](http://www.armscontrol.org/act/2008_05/PersboShea).
- <sup>4</sup> United Nations Institute for Disarmament Research (UNIDIR) and the Verification Research, Training and Information Centre (VERTIC), *Coming to Terms with Security: A Handbook on Verification and Compliance*, 2003, <http://www.vertic.org/assets/Handbook.pdf>.
- <sup>5</sup> Allan S. Krass, *Verification: How Much Is Enough?* (Stockholm: SIPRI/Lexington Books, 1985).
- <sup>6</sup> It should be noted that other states, including India, Israel, and Pakistan, also have a responsibility to ratify the agreement.
- <sup>7</sup> NPT (1968), Article VI, paragraph 15, subparagraph 9, fourth item.
- <sup>8</sup> Jayantha Dhanapala, "Multilateralism and the Future of Global Nuclear Non-Proliferation Regime," *Nonproliferation Review*, vol. 8, no. 3, Fall/Winter 2001, p. 5.
- <sup>9</sup> George Perkovich, *Universal Compliance: A Strategy for Nuclear Security* (Washington, D.C.: Carnegie Endowment for International Peace, November 2006) p. 33.



ERNESTO ZEDILLO

## The Role of International Institutions in the Disarmament Process

### **The Value of Working Backward From the Solution**

With this paper, George Perkovich and James Acton provide immensely valuable intellectual input into the analysis of what is, in my opinion, the most daunting problem of humanity: the continuing existence of nuclear weapons. They have done it by raising the very hard questions inherent to this challenge but without claiming to have the answers. This may be too modest a position for, in fact, the authors' explorations more than hint at possible solutions to some of the complex dilemmas involved in the problem.

I find their general approach—identifying and exploring the challenges to be overcome to achieve complete abolition of nuclear weapons—particularly attractive. In fact, it coincides with the way in which my own institution has tried to stimulate discussion of the subject among experts in this field, most recently at a conference on abolition in February 2008.<sup>1</sup>

In motivating participants, we explained that the approach at our conference would be to think not about how to go about the process of getting rid of nuclear weapons beginning from today's conditions, though indeed we have great respect for that method. Instead, we asked them to think about what would be the security and geopolitical conditions that would have to be met in the end for this process to actually occur—when countries decide it is no longer necessary to possess nuclear weapons—and then work backward to the present. We asked them to imagine, first,

that disarmament had already taken place and then to envision the final construction of an international regime that would guarantee a world without nuclear weapons and what it would look like. Our aim was to provoke inquiries not only about the international covenants and enforcing institutions that would be required in such a world, but also about the specific conditions that would have to be fulfilled from the perspective of every one of the present and potential nuclear powers.

In fact, given our objective, had this Adelphi Paper been available at the time of the conference, I would have encouraged our participants to address the arguments expressed in it. The paper offers both a comprehensive, pertinent agenda for discussion and concrete ideas to be subjected to deeper analysis. In this respect, the authors' suggestion to form an international consortium of research institutes to explore solutions for the multiple problems that the elimination of nuclear weapons entails goes well beyond an exhortation; they are facilitating adoption of this idea by providing an ambitious prospectus and solid terms of reference for such a consortium's undertakings.

It is gratifying that the authors have not swept thorny issues under the rug, as frequently happens with high-level panel reports that, for the sake of political balance and correctness, sink into ambiguities or simply refrain from addressing tough questions. Perkovich and Acton tell it like it is when they dissect the current strategic interests and attitudes of the nuclear-armed states; point to the necessity of solving long-standing regional conflicts; deconstruct the complexities of developing robust systems of verification and safeguards; discuss the tension that exists between the objectives of nuclear disarmament and the expansion of nuclear energy; and depict the enormous challenges of enforcement.

Their analysis makes clear that the abolition of nuclear weapons would be the most ambitious global public good ever undertaken and achieved by the international community. Think of every difficult issue that could possibly be confronted in the provision of any global public good, and all of them will be encountered along the road toward abolition. Indeed, every one of the following problems are acute barriers to getting to zero nuclear weapons: preserving sovereignty (countries' reluctance to accept international binding rules and monitoring of their own compliance with agreements); differing preferences (the fact that countries have different strategic, economic, and political stakes in specific solutions to global problems); free riding (the incentive for every party to wait until the others provide a solution and then enjoy it); the problem of the weakest link (that a solution can only be effective if every country fully complies with

a common approach); and summation (where the successful solution of a global problem is the sum of the individual efforts of all the separate participants).<sup>2</sup>

### **Fulfilling the IAEA's Potential**

Perkovich and Acton clearly delineate the kind of exceptional collective action and surrender of traditional national sovereignty to which countries would have to commit if abolition is to be achieved. Their argument implies that an unprecedented multilateral order would need to be put in place. To do so, historically unique international cooperation and political willingness would be required, as well as substantial reinforcement of some institutions and radical reform of others. An obvious example of the former is the International Atomic Energy Agency (IAEA). As this Adelphi Paper repeatedly shows, much could be done by the IAEA in a world truly determined to eliminate nuclear weapons. The same conclusion was reached in a recent report on the IAEA to 2020 and beyond.<sup>3</sup>

That report envisions a new global nuclear order with increased collective action and partnership, expanded transparency, increasingly effective standards for safety and security worldwide, new nonproliferation measures, and progressive steps to reduce and ultimately eliminate nuclear weapons. The report describes a reinvigorated order that allows for nuclear technologies that make rapidly growing contributions to human well-being while not contributing to the proliferation of nuclear weapons. It calls for safe and secure expansion of nuclear energy in countries that seek it, helping to power a growing global economy while mitigating the threat of climate change; expansion of the role of nuclear technologies in saving lives, growing crops, and providing jobs in the developing world; reduction in the dangers of nuclear accidents and nuclear terrorism; and provision of a path toward dramatically reduced dangers to humanity from nuclear weapons and nuclear proliferation.

The report appreciates that the IAEA has a strong role to play in nuclear safeguards, safety, and security and in maximizing the contributions of nuclear technologies to human well-being while minimizing the risks. And yet what the commission found is that despite its admirable record, the IAEA is underfunded and understaffed. The agency has been an extraordinary bargain considering the low cost at which it carries out responsibilities of immense value to humanity. The IAEA's responsibilities have already increased dramatically, and the likely growth and spread of nuclear energy will further increase demands on the agency. Without additional and reliable funding to replace current unpredictable and voluntary

arrangements, the IAEA will not be able to carry out numerous essential functions, including independently analyzing safeguards samples; combating nuclear terrorism and ensuring the safety of nuclear power plants and other nuclear facilities; providing adequate and prompt international coordination and assistance in the event of a nuclear accident or terrorist act involving nuclear material; ensuring that the many new countries considering introducing nuclear power programs do so in a carefully planned, safe, and secure manner; responding to pressing global crises in food security, health, and the availability of drinking water through the use of nuclear technology; and meeting, in a timely manner, urgent requests relating to verification of non-proliferation.

No robust systems of nuclear safety, security, and safeguards and effective multilateral verification consistent with zero nuclear weapons could be possible without a strengthened IAEA that has adequate authority, resources, personnel, and technology. Such an organization is absolutely essential to reinforce the global nuclear order for peace and prosperity. The cost of providing these would be insignificant compared with the benefits to be gained—or with the costs and risks of failure to act.

### **The Challenge of Security Council Reform**

As much as substantial reform of some multilateral institutions like the IAEA is needed to build a new nuclear order, radical reform is warranted in other institutions to enforce such an order. The authors rightly point out that there would be hardly any alternative to the UN Security Council to enforce a regime of abolished nuclear weapons. Their analysis also shows, however, that the Security Council, if it were to continue as it has functioned until now, would be far from adequate. A Security Council that becomes deadlocked more frequently than not can hardly serve as an effective enforcement body or be a guarantor of disarmament. To perform this job adequately would require radical reform of the Security Council—and let us keep in mind that not even limited reform has been possible in more than forty years.

More precisely, Perkovich and Acton claim, and rightly so, that the issue of the veto would need to be addressed. Unlike the case of other thorny issues for which they suggest possible avenues toward a solution, on this challenge they do not. Probably they shy away from going deeper into the topic because they know that veto reform was not even attempted during recent reform efforts, leaving only Security Council enlargement as the focal point of the (failed) 2005 reform negotiations and all previous negotiations.

In some sense it is fortunate that past Security Council reform attempts that focused solely on enlargement have not gone forward. There is no obvious reason why an enlarged Security Council would inherently be more functional than the present one. Achieving consensus in a larger Security Council, *ceteris paribus*, would conceivably become harder, and therefore the probability of deadlock would become higher. Some have argued that decisions by a larger, and consequently more representative, Security Council would acquire a higher degree of legitimacy. That is true, but it is also irrelevant if the Security Council consistently failed to agree on crucial issues. Furthermore, the success of partial reform—limited to enlargement—would probably make it even harder to undertake comprehensive reform later on.

Proponents of reform that entails enlargement alone should pay serious attention to the unpleasant verdict of bargaining theory: The veto gives its possessor lofty power; no veto proffers nil or very little power. It is for this reason that I am convinced that failure to accomplish veto reform would leave the abolition process in a dead end. Therefore, on the road toward abolition, the power of the Security Council veto must be moderated and eventually eliminated altogether. Over time, the veto-based mechanism should be replaced by a system of weighted voting in which a supermajority would be required for the most important decisions, including those of enforcing nuclear disarmament, and where each member's weight in the Security Council would be determined as a function of variables such as GDP and military capacity.

The authors are right in stressing the indispensability of a process that, once in motion, is capable of making tangible progress on the two fronts of disarmament and non-proliferation. I question their argument, however, that the only way to solve the problem of "who goes first" is to move on both fronts simultaneously. On the contrary, I believe that the pursuit of simultaneous movement risks paralysis.

It is in the global public good nature of nuclear weapons abolition that the process must be ignited by a rather limited number of relevant players willing to exercise catalytic leadership and action. And although the biggest non-nuclear-weapon states should soon come on board, it is up to a subset of the nuclear powers to trigger the remobilization of the system. The United States and Russia have not only the capacity but also a special responsibility to play this role. The nuclear giants have the responsibility to move first once again toward nuclear disarmament, by putting forward initiatives for enhancing cooperation and committing resources. And when this happens, international leadership will emerge, not as an

imposition but as a result of the assumption of responsibility. With this type of leadership, the United States and Russia could then persuade the other nuclear powers to join them and make practically unavoidable the engagement of the non–nuclear-weapon states in the construction of the new nuclear order that Perkovich and Acton have so ably depicted.

For example, a number of non–nuclear-weapon states are now reluctant to undertake further non-proliferation commitments such as the adoption of the Additional Protocol, and certainly not safeguard obligations going well beyond this, as proposed in the report “Reinforcing the Global Nuclear Order for Peace and Prosperity: The Role of the IAEA to 2020 and Beyond.” This position should be expected to change if the nuclear-weapon states move seriously toward disarmament. This need not be an assumption or a guess; strengthening safeguards could be negotiated through the NPT review process. For that to happen, however, the United States and Russia must first take new steps to bolster confidence that nuclear disarmament is not a false promise.

## Notes

- <sup>1</sup> “Nuclear Weapons—The Greatest Peril to Civilization: A Conference to Imagine Our World Without Them,” Yale Center for the Study of Globalization, Yale University, February 21–22, 2008, <http://www.ycsg.yale.edu/activities/conferences.html>.
- <sup>2</sup> The nature of these barriers to solving global problems are discussed in *Meeting Global Challenges: International Cooperation in the National Interest*, the 2006 Final Report of the International Task Force on

Global Public Goods, Stockholm, which I co-chaired.

- <sup>3</sup> *Reinforcing the Global Nuclear Order for Peace and Prosperity: The Role of the IAEA to 2020 and Beyond*, report prepared by an independent Commission, which I chaired, at the request of the director general of the International Atomic Energy Agency, May 2008, <http://www.iaea.org/NewsCenter/News/2008/2020report.html>.



ZIA MIAN

## Beyond the Security Debate: The Moral and Legal Dimensions of Abolition

The greatest strengths of *Abolishing Nuclear Weapons* are the determined willingness of the authors to map out many of the myriad challenges to abolishing nuclear weapons; their insistence that these challenges can be considered seriously; and their exploration of how to overcome them and achieve the goal.

Among its notable weaknesses are the almost exclusive focus on nuclear weapons abolition as an issue of international security and the need to better secure the current global order; the primacy of state interests; and the reliance on a balance of power ethic in making arguments. These failings are all perfectly understandable, given that the intended audience for the paper is the security policy community, which for the most part shares all of these perspectives. The closed nature of the dialogue is apparent in the report's primary recommendation: that analysts from elite think tanks in both nuclear-armed states and non-nuclear-weapon states, with support of governments and foundations, should meet and talk seriously about abolishing nuclear weapons.

To understand more fully the possibilities and challenges of such abolition, and to achieve the goal, it would be useful to expand the traditional security policy debate over nuclear weapons by considering moral and normative arguments for abolition; the role of international law and institutions as well as civil society and social movements in securing and enforcing nuclear weapons abolition; and the relevance of nuclear secrecy in a disarmed world.

Some reflections on these themes inspired by the Adelphi Paper follow. For reasons of space and time, I do not take up the vexed question of the future of nuclear energy in a disarmed world (the focus of chapter 3 in the paper). Suffice it to say that a strong case can be made that an expansion of nuclear energy is neither feasible nor desirable and that, as the preeminent U.S. nuclear weapons designer Theodore B. Taylor (1925–2004) argued, a nuclear-weapon-free world would be far more sustainable as part of a double abolition: an end to nuclear weapons *and* to nuclear energy.<sup>1</sup>

### **Nuclear Abolition as Policy and as Politics**

The paper lists five general national security-based reasons that nuclear weapons should be abolished (curiously, these are laid out in the conclusion). The paper also outlines in chapter 1 some steps that nuclear-armed states would have to take on the path to zero, concerns that might arise, and ways to resolve some of them. It does not, however, analyze the implications of how policy makers in nuclear-armed states, as part of their internal policy debates, might argue for or justify abolition to domestic public audiences, to rival states and allies, and to the broader international community. Nuclear abolition as a policy problem needs to be situated in the politics of nuclear disarmament.

Nuclear weapons, first and foremost, are weapons. They are instruments of violence and the threat of violence. The strategies and policies for their development, deployment, and use are not contained within them—they are given meaning and purpose by politics.

All of the nuclear-armed states have told themselves, their people, and the world that their weapons are necessary for their national defense. Moreover, these states all have a nuclear-weapon complex that will resist efforts at abolition. The British historian and peace activist E. P. Thompson described this complex as comprising “the [nuclear] weapons system, and the entire economic, scientific, political, and ideological support system to that weapons system—the social system which researches it, ‘chooses’ it, produces it, polices it, justifies it, and maintains it in being.”<sup>2</sup> Together, these will make it politically difficult—impossible, some might say—for leaders in these states to make a case for abolition that does not in some way rest on arguments that getting rid of nuclear weapons would make their respective country more secure.

Some arguments that policy makers may advance for abolition will certainly conflict with long-standing official narratives of national security that have served to justify a role for nuclear weapons. These arguments may trigger debates about what, if anything, could fill the nuclear-weapon-

shaped hole that would result from the abolition of nuclear weapons. The pursuit of disarmament may become tied to the search for reassurance through technological, strategic, and political substitutes for nuclear weapons. Other arguments for abolition may claim that eliminating nuclear weapons would not actually undermine the security calculation of a nuclear-armed state, but would in fact strengthen its position relative to rivals and in the international system. Such an argument could complicate efforts by some other states to make a case for disarming.

A simple example may help illustrate the point. In 1999, Secretary of State Madeleine Albright sought to promote ratification of the Comprehensive Test Ban Treaty (CTBT) by the U.S. Senate by arguing that the CTBT served to create a major U.S. advantage: "Under the CTBT, America would gain the security benefits of outlawing nuclear tests by others, while locking in a technological status quo that is highly favorable to us. We have conducted more than 1,000 nuclear tests—hundreds more than anyone else. We do not need more tests to protect our security. Would-be proliferators or modernizers, however, must test if they are to develop the kind of advanced, compact nuclear weapons that are most threatening."<sup>3</sup> At the same time, to preserve an apparent U.S. advantage and to maintain and placate the nuclear-weapon complex, the Clinton administration established the Stockpile Stewardship Program, which aimed to continue U.S. nuclear-weapon design and development capabilities without the need for testing. Together, the "we win" argument, and the pursuit of a technical back door out of the CTBT have inspired lasting doubt about the value of U.S. accession to the treaty.

It is easy to imagine that domestic debates about nuclear-weapon abolition, especially in the United States, would involve similar arguments and compromises and would raise concerns in other states. Other states would have their own domestic arguments and compromises, but not all of these would be as open to international scrutiny or as important to others as the U.S. debate. It is possible to imagine that the arguments in all these states about how to maintain balances of power and pursue relative advantage (while keeping a nuclear option) might lead to agreement on abolition. But it is just as likely, if not more likely, that these policy debates, all of which would be based on power, mistrust, threat, fear, and violence, could combine to derail the whole process.

It is possible to overcome some of the potential problems over nuclear-weapon abolition that result from arguments based purely on national security and national interest by broadening the frame to include normative, moral, and legal considerations.<sup>4</sup> These considerations, in fact, should

be the center of the debate rather than at the margins, because public justifications offered for nuclear weapons are always rooted in claims about the responsibility of states to protect citizens, territory, sovereignty, and “national interests.”

Apart from their intrinsic merit, arguments for abolition that are normative, moral, and legal have the added benefit of being available equally to all states: They are universal in application and can be used consistently both at home and abroad. They also serve both to expand the elite policy process and to mobilize domestic constituencies for a policy of abolition that can help counter opposition from the nuclear complex. Finally, these arguments serve to strengthen a way of thinking, a set of values, and national self-images that can create a particular kind of community that would help restrain states from building nuclear weapons and taking other kinds of hostile action, including resorting to war.

It is possible, for example, to imagine nuclear-armed states justifying their move toward abolition by recalling that the very first United Nations General Assembly resolution, in January 1946, called for “the elimination from national armaments of atomic weapons and of all other major weapons adaptable to mass destruction” and the 1961 UN General Assembly resolution that “any state using nuclear and thermonuclear weapons is to be considered as violating the Charter of the United Nations, as acting contrary to the laws of humanity and as committing a crime against mankind and civilization.” Making the case for nuclear weapons abolition in terms of a widely shared vision of an international community and the sense that such weapons are intrinsically a crime against humanity—and should be seen and treated as immoral, illegal, and illegitimate—would take nuclear weapons away from questions of national security, the balance of power, and the possible loss of relative military or political advantage, while not creating insecurities in other societies. It would put the onus on any nuclear-armed state wishing to keep its weapons to explain why its security interests or those of its allies require the capability and intention to commit a crime against humanity.

Framing abolition in moral terms would also enable greater public participation in many if not all countries in challenging efforts to acquire and threaten to use nuclear weapons. The power of social movements, civil society, and public opinion in confronting and restraining nuclear weapons policies in their respective states, and globally through their practice of a politics of affirmative internationalism—supported by many non-nuclear-weapon states and international organizations—has been well documented by historian Lawrence Wittner in his history of the anti-nuclear movement

since 1945 and in Nina Tannenwald's study of the origin and power of the nuclear taboo that has helped prevent the use and even limit explicit threats of use of nuclear weapons for over sixty years.<sup>5</sup> The role of such citizen action is not limited to protest or to the creation and maintenance of broad norms of state conduct. It is often built on challenging and overturning specific nuclear weapons policies, programs, and institutions, and appears not be restricted to formally democratic societies.<sup>6</sup>

In sum, the stories that nuclear-armed states tell themselves, tell each other, and tell the world at large about why they are giving up nuclear weapons will matter. In most cases, there will be more than one audience for these stories and, depending on the story, the responses of the various audiences may differ in important ways. The framing and possible conflicts between the domestic and the international arguments for abolition that various countries present may determine how (and even whether) disarmament goes ahead, the nature and viability of the process, and the perceived legitimacy and stability of the end result.

It would be useful as a next step for the authors and others to consider how policy makers in nuclear-armed states could frame arguments for abolition in ways other than managing national and international security. Arguments that are not located in calculations of how to preserve the status quo, and the utility of power and violence may contribute better to mobilize support for abolition, build confidence in the good faith, inevitability, and irreversibility of the disarmament process and the global security benefits that it would bring.

### **Abolition as a Management Strategy**

The Adelphi Paper presents nuclear-weapon abolition fundamentally as a way to reduce various proliferation and terrorism risks now facing the international system and to avoid future risks if there is a worldwide expansion of nuclear energy.

The first reason the paper offers for abolition is the need for nuclear-weapon states to be seen as keeping the promises they have made in the Non-Proliferation Treaty (NPT) and thus to preserve a "rules-based international system," without which there would "be a breakdown of nuclear order," resulting in proliferation, arms racing, and perhaps war. Nuclear weapons, in other words, are to be traded for greater stability of the current international system.

The idea of giving up nuclear weapons in exchange for securing the increasingly threatening current international order is at the core of the argument for abolition put forth by Shultz, Kissinger, Perry, and Nunn. Their 2007

op-ed argued “the world is now on the precipice of a new and dangerous nuclear era ... unless urgent new actions are taken, the United States soon will be compelled to enter a new nuclear era that will be more precarious, psychologically disorienting, and economically even more costly than was Cold War deterrence. It is far from certain that we can successfully replicate the old Soviet-American ‘mutually assured destruction’ with an increasing number of potential nuclear enemies worldwide without dramatically increasing the risk that nuclear weapons will be used.”

The authors of the Adelphi Paper, like Shultz and his cohorts, recognize that for 60 years nuclear weapons have played a role in efforts both to maintain and to overturn the global order. For the United States, as one of the earliest studies argued, the fear was that not only might “regular rivals on the same level” acquire these “absolute weapons” but that “possibly some of the nations lower down in the power scale might get hold of atomic weapons and change the whole relationship of great and small states.”<sup>77</sup> A Bush administration official more crudely made the same point about nuclear weapons, noting that, “It is a real equalizer if you’re a pissant little country with no hope of matching the U.S. militarily.”<sup>78</sup> It is clear that if this moment has not already arrived, it may be imminent. Abolition is offered now as a way to forestall this development as much as possible. In this sense, nuclear disarmament, once seen as a hallmark of progressive politics, has now become a conservative goal.

The Adelphi Paper refers to nuclear abolition as part of a “renovation project” for the “global nuclear order.” The emphasis on preserving the current order also comes through in the various arguments for what nuclear-armed states’ next steps could be. It also shapes the discussion of enforcement. The paper does not ask, however, whether the global nuclear order, or the larger order of which it is part, should be preserved, let alone whether it deserves renovation.

Regardless of the interests of the nuclear-armed states in maintaining some key aspects of the current order, it is worth considering whether and how the abolition of nuclear weapons could benefit from being explicitly integrated into a larger set of ideas and initiatives aimed at creating a more egalitarian, cooperative, and democratic international community. Such integration may encourage support for abolition by limiting the capability of one or a few states to determine events, create confidence in structures of adjudication of disputes, reduce fears of reversal, promote compliance, and support enforcement actions should they ever be needed.

Abolition need not, however, wait on such a broad global reordering, which may take a long time to achieve. Policies and the politics to

achieve abolition, however, could usefully build upon the larger principles and considerable detail of a widely agreed upon possible reordering of the international system toward greater equity and participation that are already available in many United Nations conventions and resolutions that command the support of the vast majority of states and much of global public opinion.

### **Power and Law**

The Adelphi Paper takes up the important, difficult, and largely neglected question of the enforcement of a worldwide ban on nuclear weapons. It notes, rightly, that determinations of compliance and the application of enforcement mechanisms must emerge from and work through “decision-making avenues and procedures that enjoy international legitimacy.” This is particularly important because “[t]he room for ambiguity and disagreement over enforcing compliance is great.” More important is that given the nature of nuclear weapons, enforcement may well take place in the shadow of war.

The paper focuses on the nuclear-armed states and the UN Security Council as the agents of enforcement of a nuclear-weapon-free world. It recognizes that domestic politics as well as collusion and rivalry among nuclear-armed states will render such enforcement difficult, but it sees no viable alternative. A bigger problem than the Security Council’s many weaknesses is its lack of legitimacy, other than the formal status granted it by the UN Charter. The council’s great freedom of action is made possible by a lack of formal principles other than procedure. Historically, it has been little more than a forum where the practice of great power politics stands in for due process. It lacks fairness, a fundamental basis for legitimacy, because not all members—including the permanent members—are equal in being able to use the Security Council. Given that the Security Council’s nuclear-armed permanent members are protected by the veto, many non-nuclear-weapon states see it as an egregious instance of inequity in the international system. It can offer at best rough justice.

Rather than relying on the Security Council, the cause of nuclear-weapon abolition would be well served by considering how international law and international courts might be the means by which issues of compliance and enforcement are determined. In a noteworthy omission, the paper misses out on a possible role for international law in considering the politics of nuclear abolition and enforcement, except for the suggestion of “making the illicit proliferation of nuclear weapons an international crime” as a transitional measure toward abolition. The paper does not cite

the 1996 International Court of Justice unanimous advisory opinion that under the NPT, nuclear-weapon states have “an obligation to pursue in good faith *and bring to a conclusion* negotiations leading to nuclear disarmament in all its aspects”<sup>9</sup> [emphasis added].

Nuclear-armed states have traditionally refused to take international law and international courts seriously. The United States itself, which was responsible in large measure for creating the UN system and hence the International Court of Justice, accepted the authority of the court for many years—until the court ruled against it.<sup>10</sup> The 1996 advisory opinion, in fact, has had little effect on the United States or, for that matter, on any of the other nuclear-weapon states that are parties to the NPT.

The recourse to international law and international courts for determining if, when, and how to enforce a nuclear-weapon-free world would bring significant benefits for all. Law has its own characteristics, its own history, its own logic, and if it is to function effectively, a certain autonomy and form are required. In particular, law by and large orients itself toward standards of universality and equity. When law is used as part of an effort to codify an inequality or an injustice, it is usually subject to challenge. Law also must be seen to be applied systematically to the situations where it is meant to apply, which is to say, it treats like cases alike. It also must fit properly within the broader principles and expectations shared by a community rather than being simply an ad hoc response to a particular situation. These characteristics, the very foundation of law, would help create a legitimate international response to nuclear proliferation in a disarmed world.

It is possible, for instance, to imagine that as part of the transition to a disarmed world the International Court of Justice, rather than the Security Council, could serve as the body that adjudicates disputes over compliance involving nonproliferation, arms control, and abolition agreements. Under Article 36 of the Statute of the International Court of Justice, states can choose to accept as binding the court’s findings regarding the interpretation of treaties and the determination of a breach of an obligation.<sup>11</sup> Alternatively, the International Criminal Court could serve as the appropriate body, given that it already has responsibility for crimes of genocide, crimes against humanity, and war crimes.<sup>12</sup> It will also have jurisdiction over cases involving the crime of aggression, once state parties establish a definition of “aggression” and the conditions under which the court could exercise its jurisdiction. Were this definition of aggression to include the development of a nuclear weapon, then proliferation could fall under the Court’s jurisdiction. Rather than a role as self-serving judge, jury, and

executioner, the Security Council then could act as the legally mandated enforcer of the decisions of an independent international court.

### **What's the Big Secret?**

Secrecy has always been a central feature of the politics of nuclear weapons, despite the recognition as early as June 1945 by some of the scientists working on the Manhattan Project that it would be “foolish to hope that this [secrecy] can protect us for more than a few years” from other states developing nuclear weapons.<sup>13</sup> This understanding was crystallized most famously in the 1947 statement by the atomic scientists, issued by Albert Einstein: “For there is no secret and there is no defense; there is no possibility of control except through the aroused understanding and insistence of the peoples of the world.”<sup>14</sup>

Nuclear-armed states have sought to protect what they regard as critical information about such matters as nuclear-weapon arsenals, weapon designs, and the properties of weapon materials on the grounds that secrecy conceals their military capabilities from adversaries and prevents nuclear-weapon proliferation. Recently, the threat of nuclear terrorism has been added as a justification for wide-ranging secrecy.

The Adelphi Paper recognizes the current importance of secrecy about nuclear weapons. It mentions, among others, “sensitive design information,” “classified design details,” “sensitive information,” and “sensitive details.” The authors recognize that this secrecy would make verification of the dismantlement of nuclear weapons and the disposition of weapon materials both more difficult and more costly.

The authors do not ask, however, how much of this secrecy, if any, would be required in the transition to a nuclear-weapon-free world and in a world that is free of such weapons. A great deal of information that nuclear-armed states currently treat as a national security secret—a result of nuclear-weapon laboratories and military forces tasked with using nuclear weapons—could be released because nuclear weapons would no longer play a role in national military policy. Furthermore, states could no longer claim that this secrecy was critical to prevent enemies from learning nuclear-weapon information. Why, for instance, should the mass, shape, composition, or isotopics of highly enriched uranium or plutonium in a nuclear weapon continue to be secret in a world that prohibits nuclear weapons? The real challenge in building a nuclear weapon is to produce these materials in sufficient quantity, rather than the issue of bomb design.<sup>15</sup>

More generally, it would be useful to clarify what nuclear-weapon-related information should be released to make it easier to detect violations

of an international prohibition on the production of nuclear-weapon materials. From the viewpoint of securing abolition, it would be best to make public as much information as possible about nuclear-weapon design. Doing so would make it much easier for citizens to recognize and blow the whistle on a covert program.

Nuclear weapons complexes may resist efforts at such openness. Secrecy has been a way for the nuclear-weapons complex to protect itself from proper governmental and public oversight.<sup>16</sup> More broadly, secrecy is an obstacle to democracy and accountability. It is noteworthy that all nuclear-armed states launched their weapons programs without the knowledge of their own people.

## Notes

- 1 Theodore B. Taylor, *Nuclear Power and Nuclear Weapons*, Nuclear Age Peace Foundation, July 1996, [http://www.wagingpeace.org/articles/1996/07/00\\_taylor\\_nuclear-power.htm](http://www.wagingpeace.org/articles/1996/07/00_taylor_nuclear-power.htm). For an extended discussion of Taylor's views on the link between nuclear energy and weapons and the dangers this poses, see John McPhee, *The Curve of Binding Energy: A Journey into the Awesome and Alarming World of Theodore B. Taylor* (New York: Farrar, Straus and Giroux, 1974).
- 2 Edward Thompson, "Exterminism and Cold War," in *New Left Review*, *Exterminism and Cold War* (London: Verso Editions, 1982), p. 20.
- 3 Madeleine Albright, "A Call for American Consensus," *Time*, November 22, 1999.
- 4 The interweaving of security calculus arguments for abolition with those based on normative, moral, and legal ones are evident in the contributions to Jonathan Schell, *The Gift of Time: The Case for Abolishing Nuclear Weapons Now* (New York: Henry Holt, 1998). Normative and moral and legal arguments for abolition are made even by leading U.S. security policy makers, see e.g., Paul H. Nitze, "A Threat Mostly to Ourselves," *New York Times*, October 28, 1999; Lee Butler, "The False God of Nuclear Deterrence," *Global Dialogue*, vol. 1, no. 2, Autumn 1999, pp. 74–81; Robert S. McNamara, "Apocalypse Soon," *Foreign Policy*, May/June 2005, pp. 28–35; Max H. Kampelman, "Bombs Away," *New York Times*, April 24, 2006.
- 5 Lawrence Wittner, *The Struggle Against the Bomb: A History of the World Nuclear Disarmament Movement*, 3 volumes, (Stanford: Stanford University Press, 1993, 1997, and 2003); Nina Tannenwald, *The Nuclear Taboo: The United States and the Non-Use of Nuclear Weapons Since 1945* (New York: Cambridge University Press, 2007).
- 6 See for instance David Cortright, *Peace Works: The Citizen's Role in Ending the Cold War* (Boulder, CO: Westview Press, 1993); Matthew Evangelista, *Unarmed Forces: The Transnational Movement to End the Cold War* (Ithaca, NY: Cornell University Press, 1999).
- 7 Frederick S. Dunn, Bernard Brodie, Arnold Wolfers, Percy E. Corbett and William T. R. Fox, *The Absolute Weapon: Atomic Power and World Order* (New York: Harcourt Brace & Company, 1946), p. 5.
- 8 Bill Keller, "The Thinkable," *New York Times*, May 4, 2003.
- 9 John Burroughs, *The (Il)legality of Threat or Use of Nuclear Weapons*, International Association of Lawyers Against Nuclear Arms (Münster: Lit Verlag, 1997).
- 10 Nicaragua v. the United States of America, 1984. In 1986, the United States withdrew from the compulsory jurisdiction of the court.
- 11 Statute of the International Court of Justice, <http://www.icj-cij.org/documents/index.php?p1=4&p2=2&p3=0>.
- 12 International Criminal Court, [www.icc-cpi.int/library/about/officialjournal/Rome\\_Statute\\_English.pdf](http://www.icc-cpi.int/library/about/officialjournal/Rome_Statute_English.pdf). Note that among the nuclear-armed states, only the United Kingdom and France are parties to the International Criminal Court. The United States, China, and Israel all voted against the Rome Statute establishing the court.
- 13 *Report of the Committee on Political and Social Problems* (The Franck Report), Manhattan Project "Metallurgical Laboratory," University of Chicago, June 11, 1945.
- 14 Albert Einstein, letter on behalf of the Emergency Committee of Atomic Scientists, June 22, 1947, <http://www.fas.org/sgp/eprint/einstein.html>.
- 15 It is often overlooked that the demands of nuclear-weapon design are very small in comparison to the production of fissile materials. The special status given to the physicists at Los Alamos during the Manhattan Project may be responsible for this impression. Far greater effort, resources, and expertise were spent on the production of kilogram quantities of highly enriched uranium and plutonium.
- 16 See e.g., Stephen I. Schwartz, ed. *Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons Since 1940* (Washington, D.C.: Brookings Institution Press, 1998).



GEORGE PERKOVICH AND JAMES M. ACTON

## What's Next?

The Adelphi Paper, *Abolishing Nuclear Weapons*, and the critiques collected here speak for themselves. They are an early contribution to an analytical conversation that needs to take place within and between nuclear-armed states and non-nuclear-weapon states. This concluding essay highlights some of the outstanding points of agreement and contention that we found among the critiques. Our aim is to pose an agenda for additional analysis and debate to help illuminate further the possible pathways toward a nuclear-weapon-free world.

By highlighting particular points made by the contributors to this volume we do not underestimate the value of many other passages. Readers may find much else to agree with or dispute in these short essays. Our aim, as in the Adelphi Paper, is to invite further international debate on all points of interest.

### **Nuclear Weapons as Valuable Sources of Deterrence and Stability, Versus the Risks of Nuclear Annihilation**

In the Adelphi Paper we wrote that “some commentators on earlier drafts charged us with minimising the difficulties of nuclear abolition. They suggested that our belief in the desirability of abolition blinded us to its infeasibility. Others have said that we have identified too many obstacles.” Our final draft did not remove the stimuli of split perceptions, as the critiques collected here show.

Those who think that nuclear deterrence will not be fail-safe forever tend to put a premium on pursuing abolition. So do people who find threats of mass destruction to be morally unacceptable. Lawrence Freedman speaks for the former: "The case for abolition, though, is that it is hard to believe that the past 60 years of self-restraint can continue for the next 60 years." Jonathan Schell adds that "a world without nuclear weapons, though hardly without dangers, would be incomparably safer and more decent than a world with them." None of this means that abolition would be secure and feasible without the removal of major security obstacles. The argument is that the goal of abolition can help motivate both nuclear-armed states and those that do not possess nuclear weapons to mobilize power to remove these obstacles.

On the other side are those who think that the risks of major warfare in a world without nuclear deterrence would be greater than the risks that nuclear weapons would actually be used. They worry that focusing on abolition could increase the chance of its being undertaken without reliable alternative means of deterring major aggression. Frank Miller writes: "Nuclear weapons exist because nation states retain the option to use military force in world affairs. Nuclear weapons compensate for conventional military inferiority and moderate against the use of force by one great power against another. The problem lies not in the weapons, but in the nature of humankind." Bruno Tertrais adds: "Nuclear-armed states assume that maintaining nuclear deterrence is a safer means to ensure the absence of major conventional war than taking the risk to disarm." Brad Roberts is more open to the value of abolition but judges that we underestimate the difficulties of securing it: "How would the major powers do their jobs as global sheriffs against a nuclear-armed challenger?" "Could deterrence of such a challenger be effective by conventional means alone?"

Takaya Suto and Hirofumi Tosaki eloquently summarize the contradiction between these views and the dilemma that results:

Although the abolition of nuclear weapons may very well be "justice" ... blind pursuance of this cause could disturb order and stability.... However, in the nuclear age, order and stability are provided under the sword of Damocles. The [argument] that deep reductions and the subsequent abolition of nuclear weapons cannot be initiated without the assurance of security and "strategic stability" is prone to be used as a pretext for maintaining the status quo under the premise that the present order and stability would continue. But there is no guarantee that

this premise would hold indefinitely. Nor is there a guarantee that nuclear deterrence would continue to function in today's increasingly complicated security environment as it did when it rendered the Cold War "the long peace."

Suto and Tosaki's invocation of "justice" is particularly instructive. It underscores the political, moral, and psychological nature of this issue as perceived by many, adding balance to the emphasis on security that states under nuclear deterrent umbrellas stress. The requirement to balance justice with security emerges in multiple critiques calling for greater attention to be paid to the moral and legal dimensions of the abolition issue, as we discuss further below.

Security and justice are, in fact, closely interlinked. Societies fear aggression and occupation in part because of the injustice such acts of domination would bring. Conversely, people feel secure when they are confident that the state in which they live protects them against major injustice. Nuclear weapons cut both ways here: On the one hand, the destruction threatened by nuclear weapons is a form of mega-injustice insofar as it could entail the taking of innocent life on a massive scale, hence the moral opprobrium that many feel toward nuclear weapons. On the other hand, nuclear weapons can be attractive because they deter aggression. Part of the challenge, then, in abolishing nuclear weapons is to build confidence that societies living under nuclear deterrent umbrellas will not suffer the injustice of aggression if they relinquish that protection, while simultaneously reassuring those who do not have nuclear deterrents that they will not suffer intervention or unjust power displays by those who do.

James Doyle points to a partial resolution of this tension by focusing on "transforming the role [that nuclear arms] play in today's world, the nature of the infrastructure that supports them, and the manner in which they are deployed and operated." He points to steps nuclear-armed states could take *starting now* to reassure each other and non-nuclear-weapon states that they will not suffer intervention, terrorist acquisition of nuclear weapons, or nuclear blackmail even if nuclear weapons remain in national arsenals. His recommendations can be read as policies to greatly reduce the fears of the material and political injustices associated with nuclear use and status, while time is taken to build confidence that major aggression can be deterred without nuclear weapons.

Harald Müller complements Doyle's synthesis by focusing on limiting the danger of major power competition, which he recognizes is far from being accomplished today. "It is ... urgent," Müller writes, "to provide

a security environment, one that is strategic as well as institutional, to prevent the repetition of great-power rivalry in the classical sense.” The Concert of Europe after the Napoleonic wars provides a model whose basic principles Müller adumbrates. The core attribute was the major powers’ agreement on basic rules of conduct that were practiced through “a dense process of conferences and ambassadorial consultations” in which the actors “showed moderation and restraint when it counted most—in international crises, including those that were caused by internal upheaval in smaller states.” Frank Miller notes that the Adelphi Paper predicates the feasibility of abolition on the reconciliation of interests among the nuclear-armed states and other key actors surrounding them. Jonathan Schell from a very different angle concurs that “agreement among” the United States, Russia, and China “is a necessary condition both for embarking on abolition and for preserving it.”

The “concert” model deserves much greater attention in part because it clarifies that world government need not be invoked in considerations of abolishing nuclear weapons. Nuclear abolition is not an alternative to international politics and power balancing. Rather, it can be a realistic organizing principle of states seeking to balance and order their relations in ways that remove the singular threats of nuclear mass destruction.

### **The Nature of Nuclear Disarmament Obligations and the Relative Responsibilities of Nuclear-Armed and Non-Nuclear-Weapon States**

Another major divide in the critiques concerns the nature of the nuclear-armed states’ (at least those party to the Non-Proliferation Treaty, or NPT) obligation to eliminate their nuclear arsenals. For example, Achilles Zaluar argues that “[t]he abolition debate has already been won, as a matter of principle, in the NPT and the ICJ decision; but as a matter of implementation, it cannot be won today.” Moreover, he notes that the International Court of Justice (ICJ) also ruled that nuclear disarmament is a “‘stand-alone’ obligation,” not contingent on conventional disarmament. Bruno Tertrais agrees in part, writing that nuclear-weapon states “do not challenge the existence of an obligation to pursue nuclear disarmament,” but that “[t]he disarmament obligation contained in Article VI does not contain any deadline... [and] it also contains a conventional disarmament obligation that is hardly met by non-nuclear-weapon states.”

Lawrence Freedman cuts through these arguments eloquently by writing, “The problem is not that the nuclear powers are in breach of a binding promise to disarm; the legal requirement was never more than best efforts. [The problem] is more the impression of cynical disdain, as the

nuclear powers insist that the non-nuclear-weapon states strictly follow treaty obligations while showing indifference to their own. Solemn undertakings delivered by junior officials and backed by no more than lists of relatively minor activities and discussions will no longer suffice.”

In the Adelphi Paper we emphasized the indisputable point that nuclear-armed states can benefit from and afford to take many steps to reduce the numbers and salience of nuclear weapons irrespective of progress on non-proliferation. However, to bring the world much closer to the horizon from which abolition becomes a visible prospect, we urged joint, simultaneous steps on nuclear disarmament and non-proliferation. Several contributors find this unrealistic. Key non-nuclear-weapon states plus India and perhaps China think that non-nuclear-weapon states already have taken more steps to facilitate a nuclear-weapon-free world than have the nuclear-armed states, particularly the United States and Russia. Therefore they believe it is unfair and unrealistic to expect non-nuclear-weapon states to take new steps until nuclear-armed states catch up in meeting agreed disarmament benchmarks.

At the same time, as discussed above, American commentators and Bruno Tertrais from France wonder, if nuclear-armed states did more, whether non-nuclear-weapon states would undertake measures such as making the Additional Protocol universal and clarifying procedures for states to withdraw from the NPT? Miller writes: “[T]he nuclear-weapon states have been steadily reducing their nuclear forces and stockpiles.” “While all this was occurring,... North Korea repudiated its treaty obligations and developed and detonated a weapon, Iran is on the brink of developing a weapon, and two other emerging nuclear weapons programs (Iraq and Libya) were terminated by superior force and skillful diplomacy.” “It is not immediately evident therefore that proliferation is linked to the existing arsenals of the five nuclear-weapon states.” Tertrais adds that “there is little evidence that leaders of states advocating nuclear disarmament consider it a top political priority. When they have a face-to-face meeting with the head of a state or government that has nuclear weapons, how often do they mention disarmament? The answer probably is almost never.”

Representatives of non-nuclear-weapon states should take the lead in answering these arguments. But we can first clear away some of the conceptual and historical underbrush. Informed advocates do not argue primarily that nuclear disarmament would change the minds of determined proliferators such as North Korea or perhaps Iran. Rather, disarmament strengthens the willingness of *mainstream states*—the overwhelming majority of NPT members that are not seeking nuclear weapons—to cooperate in

enforcing the treaty *against* proliferators. Jonathan Schell writes, “the mere example of disarmament would have little sway on proliferators, who are more influenced by local anxieties.” But, Schell continues, “these objections overlook the raw power that would be generated by a concert of all nuclear-armed states, backed by every non-nuclear-weapon state, resolved to stake their security on abolition just as firmly as many now stake it on nuclear arms.” Rather than the current situation in which nuclear-armed states (with varying degrees of alacrity) try to enforce a regime based on a double standard, the abolition framework could mobilize a “global campaign to exert moral, political, economic, and even military pressure against the few holdouts that dared to argue that they alone among the world’s nations had a right to these awful weapons.”

As a matter of history, arms reductions by the recognized nuclear-weapon states have helped encourage or pressure others to relinquish nuclear weapons and related programs. Would Belarus, Kazakhstan, and Ukraine have agreed to join the NPT as non-nuclear-weapon states if the United States and Russia had not been in the midst of major reductions of their nuclear arsenals? Argentina and Brazil shut down their nascent nuclear weapon programs largely for domestic reasons, but there is no doubt that the post-Cold War environment of nuclear arms reductions created norms that helped pull them in that direction. Had the United States and Russia been insisting at the time that they would never eliminate their nuclear arsenals and had no genuine intention of fulfilling Article VI of the NPT, would Argentina and Brazil have joined the Treaty? South Africa dismantled its secret nuclear arsenal and joined the NPT as a non-nuclear-weapon state also because of internal changes and the disappearance of Cold War-related external threats; but this decision, too, came amidst the most significant U.S. and Soviet arms control treaties. The Intermediate Nuclear Forces Treaty, which eliminated nuclear-armed missiles from Europe, had been concluded in 1987, and by the time of South Africa’s 1991 decision to disarm, START was in its final stages of negotiation.

Moreover, contrary to skeptics, the North Korean and Iranian cases do not indicate that disarmament has no value in affecting determined proliferators. North Korea and Iran both began their clandestine efforts to acquire nuclear weapon capabilities *before* the U.S.–Soviet disarmament process began in earnest. It should also be noted that Iranian and North Korean leaders’ interests in acquiring potential nuclear deterrents seem to be affected by fears of U.S. military intervention in any form. U.S.–Russian reductions that still leave each with thousands of nuclear weapons therefore have not addressed these states’ core concerns.

Achilles Zaluar offers a thought experiment for those who argue that proliferation is not linked to the arsenals of existing nuclear-armed states: "Imagine that nuclear weapons had been acquired by several rival Eurasian powers but that the United States had none. Would the strategic calculus of the United States be affected by the nuclear policies of the nuclear-armed countries in Europe and Asia? The question provides its own answer."

Setting these historical and analytical points aside, we expect that non-nuclear-weapon states would make a more fundamental argument: reductions are welcome but if they are paired with expectations that nuclear weapons will be retained indefinitely, then the goal under the NPT of an equitable nuclear balance of zero is still being ignored. The failure of the nuclear-weapon states to implement more than four of the thirteen benchmarks of progress toward nuclear disarmament agreed politically in 2000 heightens the equity argument that non-nuclear-weapon states make in resisting new nonproliferation rules to strengthen IAEA safeguards and other controls on nuclear technology and circumscribe their options to withdraw from the NPT. From the perspective of justice, zero is the issue. Reductions are welcome, but aiming for anything more than zero nuclear weapons is inequitable and problematic. As a political reality, without a clearer commitment to abolition, non-nuclear-weapon states will not cooperate in strengthening the nonproliferation regime and so the issue must not be pushed off the agenda for international analysis and discussion. The politics of gaining the cooperation of non-nuclear-weapon states is missed by those who seek to deflect genuine exploration of abolition.

Frank Miller seems to dismiss arguments over Article VI as rhetoric. But, like frequent American invocations of "freedom," demands for the equity of a nuclear-weapon-free world reflect genuinely felt values and aspirations. The demanders do not always practice what they preach and sometimes undermine their own interests by failing to help strengthen a nonproliferation regime "that prevents one's neighbors from developing nuclear weapons," as Miller writes. But the "cynical disdain" that some nuclear-weapon states' officials display towards serious efforts to abolish nuclear weapons, as Freedman notes, intensifies rather than abates demands for the fairness of zero.

Finally, when asked privately, leaders of non-nuclear-weapon states say they do not press nuclear disarmament in meetings with leaders of nuclear-armed states because they know they will be dismissed by these more powerful actors and they have other business that they do not want to jeopardize. This should not be surprising. Even officials and experts within the United States, Russia, and France have, over the years, felt that

pressing nuclear disarmament with their leaders and nuclear establishments is not a good career move. (The same is no doubt true at least in Pakistan and Israel, if not in India and the United Kingdom. We can only imagine the caution of nuclear dissidents in North Korea and Iran.)

Two steps would break the current impasse. First, as Freedman suggests high-level officials from nuclear-armed and unarmed states must become involved in negotiating on these issues. Second, as many commentators suggested, the United States and Russia must take the lead by doing more to reduce their nuclear arsenals and lower the salience of these weapons as, of course, we urged.

Achilles Zaluar's view could offer a way through key dilemmas and standoffs if it represents wider international opinion and not merely a small minority:

If combined with a firm political commitment toward the implementation of Article VI of the NPT, moving first from thousands of nuclear weapons with high profile (today) to a few hundred with low profile (an intermediate step toward abolition ...) would present many of the benefits and none of the alleged dangers and risks of the abolition scenario. Committing to this agenda of reducing the total number of nuclear weapons globally to the hundreds and taking them out of the foreground of international politics would represent positive change in the direction of the NPT's ultimate objective. In fact, the change would be so enormous that its consequences would ripple throughout the international system, without the risks that some fear from the tidal wave of going to absolute zero. It would, moreover, provide the international community with a "to-do list" that would take at least a decade—a decade in which the loss of credibility of the nonproliferation regime could be reversed.

This analysis deserves attention and debate.

### **Is Exploring Abolition a Distraction or a Necessity?**

The Adelphi Paper's concentration on the challenges of the steps immediately before and after the abolition of nuclear weapons elicits protests in some quarters and applause in others.

Some believe the focus on such a distant prospect distracts official and unofficial expert communities from the more practical moves that can and should be taken to prevent the acquisition and use of nuclear weapons by terrorists and additional states, and to reduce risks of use by states that

now possess these weapons. Ian Hore-Lacy, Frank Miller, James Doyle, and Scott Sagan say this most clearly, though Doyle and Sagan do find that addressing abolition can help motivate progress on near-term steps.

Others argue that the focus on abolition is imperative. Schell insists that without the clear goal of abolition, the world will not muster sufficient political will, moral drive, and power to push states beyond half-measures of arms control that leave too many nuclear dangers unmitigated. However, along with Zia Mian and Pan Zhenqiang, he takes us to task for focusing on security challenges that sap the power of the abolition vision. Others commentators, such as Roberts and Freedman, even if they do not agree with all of our analysis about those security challenges, believe that it is worthwhile to explore, in detail, the challenges of the final abolition of nuclear weapons.

Roberts offers a synthesis that can take us beyond this stalemate. He is “skeptical that the conditions that would make abolition feasible are in any way proximate” because of the role he ascribes to nuclear deterrence today. But, he goes on to write that “[t]his is not to argue that we should not work to bring them into being. After all, we want to live in a world in which most of the conflicts have been eliminated, or at least stabilized, and where major powers act in concert to maintain the peace.” For Roberts, therefore, disarmament could be a good organizing principle for interstate relations, which is a core point of our work. Freedman, Tertrais, Zedillo, and Patricia Lewis would probably concur, even if they do not stake out their position on this point as explicitly as Roberts.

Müller advances this synthesis. He notes that consideration of abolition is necessarily highly speculative, not least because the processes of working toward disarmament change the conditions in which successive steps are taken. “As conditions change, so do the structures of opportunity,” he writes. “New options, unthinkable at the beginning, become a serious possibility.” Müller reminds that “[w]hen the Soviet Union admitted observers to its military maneuvers in a politically binding way for the first time in the Stockholm Document of 1986... none predicted, at the time, that it would end in German unification. Yet the process that followed created, step by step in the interplay between political and arms control changes, the conditions in which unification became not only a real opportunity, but also the right thing to do and, eventually, a necessity.” He advocates that those who think about the long-term challenges of abolition be flexible and adapt their ideas to changing realities.

To be sure, incremental steps can achieve much good even if they are not informed by the distant destination of nuclear abolition, and they can

be taken without having such a destination in mind. But the balance of the arguments in this collection do not alter our view that keeping abolition in mind as the goal helps more than it hurts.

Ultimately, the value in a conversation about the abolition of nuclear weapons probably depends on the way it is conducted. Explorations of the challenges of abolition must take place in parallel with practical near-term steps (lest they be nothing more than empty rhetoric). They are useful to the extent that all parties—nuclear-armed and non-nuclear-weapon states—explore the challenges in good faith for the purpose of finding solutions. Discussions of abolition would become counterproductive if, as Zaluar warns, nuclear-armed states used them as a way of dismissing non-nuclear-weapon states with a barrage of technical objections they were unwilling to explain because of classification rules. The same liability arises when non-nuclear-weapon states use discussions of abolition as a platform to posture. The test in such deliberations—whether in official forums or in the think tank consortium we urge creating—would be intellectual, political, and technical honesty. To evaluate fulfillment of this criterion would require that the analyses be made publicly available so that experts from around the world could evaluate and contest them. Where nuclear-armed states feel that security interests require withholding data and analyses, they should provide explanations sufficient to give experts without security clearances some basis for accepting the secrecy.

### **The United States and Russia Must Lead From the Front**

Another common theme that emerged from the commentaries is that new initiatives by the United States and Russia would change the global nuclear dynamic. Leaders in Washington and Moscow could in the near term take some key disarmament steps and offer to go further still if leaders of non-nuclear-armed states supported incremental strengthening of the nonproliferation regime. Such near-term steps could include the United States and Russia undertaking force reductions beyond those called for in the Strategic Offensive Reductions Treaty (SORT)—that is, below 1,700 deployed strategic weapons—and declaring, at a minimum, that they would not use nuclear weapons against non-nuclear-weapon states in full compliance with their NPT and safeguards obligations.

Then, rather than guess how non-nuclear-weapon states would respond in NPT-related forums, which tend to be managed by working-level diplomats, American and Russian leaders should consult directly with the leaders of key non-nuclear-weapon states to seek agreement on corresponding measures to strengthen nonproliferation rules. The

White House and the Kremlin could promise that if progress in tightening nonproliferation measures were achieved, the two countries would take further steps to reduce their force levels, modify their doctrines, and change operational practices that now put a premium on immediate use of nuclear weapons under warning of attack. A bilateral initiative by the United States and Russia, followed by negotiation of reciprocal additional disarmament and nonproliferation steps, seemingly offers the only feasible way forward to strengthen security against nuclear dangers.

### **Multilateral Reductions and the “Low Numbers” Problem**

Even if the United States and Russia build down, the disarmament process will hit a concrete floor if China is not brought into it. (China would also insist that the other NPT nuclear-weapon states—the UK and France—join, too.) Many treatments of the nuclear disarmament challenge assume that after the United States and Russia reduce their arsenals to 1,000 each, China would join. Yet, there is no evidence for this assumption, as we hinted in the Adelphi Paper. General Pan Zhenqiang acknowledges this in his wide-ranging contribution, writing that “China should be prepared to respond to a legitimate question raised in the ... paper, that is, at what phase of nuclear disarmament by the two major nuclear powers would China think it is time to join them for further actions. An appropriate answer will require a lot of homework on the part of China.”

Other comments on our paper indicate that Beijing is not the only capital that must do intensive homework on this question. If multilateral nuclear arms reductions are to be feasible, many unexplored security questions must be answered. Brad Roberts writes that should the major powers “reduce their reliance on nuclear weapons and adapt their strategic postures to new circumstances,” they “will confront new problems of instability.” Lawrence Freedman notes that “a more inclusive process” of nuclear reductions “would not... necessarily address the issue of more delicate nuclear balances, when small numbers multiply the impact of any aggressive first strike.” Freedman adds that “[t]here is no reason to suppose [danger] just because the numbers had fallen below some threshold level. Nuclear options would come into play only when international relations were already at a breaking point. Nonetheless, those who rely on extended deterrence are going to be more concerned....”

In other words, a great deal of analysis and debate is needed to assess whether and how reductions could be managed to the point that no nuclear-armed state had more than, say, low-hundreds of nuclear weapons. None of today’s nuclear-armed states (and those depending on them for security

guarantees) would commit to major proportional reductions in their arsenals without well-vetted studies by their national defense establishments. And because the envisioned process would be multilateral, and therefore would involve complex calculations of deterrence equations involving changing sets of multiple actors, international analysis and debate would be necessary.

Governments should commission their relevant defense research institutions to begin such studies now. There is no good reason not to, and commissioning such studies would be evidence that a state is taking its disarmament obligations seriously. Independent experts also should explore and model the “low numbers” problem.

- What conditions would China, France, and the UK put on entering or completing multilateral negotiations? Would they, for example, bring in conventional military considerations? Doctrinal issues? Transparency requirements that France urges but that China finds unpalatable?
- Beyond the five recognized nuclear-weapon states, wouldn't India and Pakistan, at least, have to be involved, given the connections between China and South Asia? How could this be squared with the refusal of some key states to include India, Pakistan, and Israel in official discussions of nuclear arms control and disarmament because they are not recognized as nuclear-weapon states under the NPT?
- Would the anomalous position of North Korea continue to be addressed through the Six-Party process? Would North Korea's ongoing possession of a small number of nuclear weapons be reasonable cause to block the others from making reductions to low numbers?
- If multilateral discussions were focused on “nuclear weapons,” Israel presumably would not participate, given that it does not acknowledge possessing them. Could this problem be finessed if a forum were convened of states that possess unsafeguarded fissile materials, with the purpose of negotiating steps to bring materials and facilities under safeguards incrementally? This is essentially what a fissile material production cutoff would do, and it does not require declaring possession of nuclear weapons.

- Have American and Russian strategists actually thought about going below 1,000 nuclear weapons? How much of a numerical advantage does each state think it needs over the rest? (Many Americans, for example, believe the United States should have as many nuclear weapons as everyone beyond Russia combined.) How do they think about triangular deterrence requirements: United States–Russia–China? Does Russia think it needs nuclear deterrence against not only the United States and China, but also the UK and France? Pakistan? How about China: it thinks it needs deterrence against the United States, Russia, and India, but is that all?
- Some American strategists who have thought or opined about the subject worry that reductions to mid- to low-hundreds could invite China to race up to parity. Is it reasonable to think that any multilateral negotiations would have to provide assurance against this, and should that be recommended? Would China insist on parity at its numbers? And would India accept disparity in a formal agreement?
- If U.S.–Soviet parity after the 1970s was not destabilizing, why would parity at low numbers be destabilizing? If the problem is multiple actors and the possibility of two or more collaborating against one to create disparity, how could this be addressed?
- U.S. and some UK (and Russian?) analysts worry that low numbers (a few hundred) could invite nuclear use that would not be attempted when high numbers exist. Such assumptions have not been modeled and tested through international discussion. Shouldn't this be done?
- Why would deterrence be weakened at low numbers? What sorts of scenarios would be presumed, and how justified would they be? Are deterrence and stability more sensitive to numbers or to the survivability of forces? How would ballistic missile defenses affect such calculations?
- Couldn't confidence-building measures and arms control ameliorate concerns about instability? What would the elements be? (Ballistic missile defense would probably be important here.)

- The United States would be very sensitive to erosion of extended deterrence commitments, especially vis-à-vis Japan and South Korea (as would Tokyo, Seoul, and perhaps others). Presumably these states would be consulted thoroughly along the way, and the robustness of conventional deterrence would have to be assured. How should this be addressed?

### **Outlaw Use of Nuclear Weapons?**

Several commentators criticized the Adelphi Paper's inattention to the prospect of outlawing the use of nuclear weapons as a precursor to the more difficult and time-consuming process of actually eliminating the last weapons. The argument for outlawing use is informed by the view that nuclear weapons are immoral, as articulated by Mian and Schell (although neither explicitly urges a ban on the use of nuclear weapons). Mian writes that "[a]part from their intrinsic merit, arguments for abolition that are normative, moral, and legal have the added benefit of being available equally to all states: They are universal in application and can be used consistently both at home and abroad."

Raghavan presents a recent Indian government proposal to move in stages to outlaw nuclear weapon use, but he does not provide a rationale. Pan goes even further and advocates outlawing nuclear weapons themselves, even before the details of abolition have been worked out. He writes that "[c]ountries without legal and moral pressure would always be able, one way or the other, to find excuses to keep a nuclear option." "[P]erhaps nuclear weapons should be outlawed first in a form of a world convention, just as chemical and biological weapons were banned, so that a powerful legal and moral framework is created in which all the other measures on the path to zero are to be taken." Sameh Aboul-Enein takes a similar view.

These arguments and the potential benefits of outlawing the use of nuclear weapons deserve more analysis and international debate. In the Adelphi Paper we were deflected from this in part by space constraints, but more by the reality that global conventions historically have not succeeded in preventing the use or development of banned weapons. In spite of a global injunction against the use of chemical weapons, for instance, Iraq used them against Iran in the early 1980s. The major powers singly and through the United Nations Security Council did practically nothing to stop it or to punish Iraq. The same sorts of enforcement challenges we address in the Adelphi Paper in regard to abolishing nuclear weapons would also determine the feasibility of any attempt to ban their use. For banning possession or use of nuclear weapons to be a realistic proposition,

then, much greater effort must be dedicated to matters of enforcement, with the related challenges we have identified.

Prohibitions on the use of nuclear weapons could be an alternative way of effecting no-first-use declarations. This logic is implicit in the Indian government proposals described by Raghavan and could find receptivity in China, as indicated by Pan. That is, as long as some states possess nuclear weapons, a prohibition on their use would in fact, if not explicitly in “law,” amount to a no-first-use commitment. This is so because the first use of nuclear weapons presumably would release others to retaliate in kind to punish and limit the gains of the nuclear aggressor. In such a debate it is easy to predict that governments and experts who focus on continued political-security competition among nuclear-armed states would find little value in commitments to ban nuclear weapon use. As indicated in the comments of Miller, Roberts, Tertrais, and Müller, declaring the use of nuclear weapons illegal while some states continued to possess them could invite destabilizing crises. If leaders of one or more states hinted at nuclear options, or took hedging steps to increase the readiness of nuclear forces in a crisis, the potential for escalation would grow. A regulatory regime to prevent or manage such moves would need to be built. The challenges of doing so would, in some respects, be similar to the difficulties of abolishing nuclear weapons entirely.

### **Enforcement**

Many contributors to this volume acknowledge the salience and difficulty of the enforcement challenges we raise in chapter 4. Some who criticize us for underemphasizing the benefits of abolition or focusing too much on obstacles do not actually address how these enforcement problems can be resolved. It seems inescapable that the potential to authorize use of force, and to muster effective instruments of coercion, would be necessary to secure a world without nuclear weapons.

In this vein, Schell and Pan rightly criticize us for paying too little attention to the problem of enforcing a nuclear weapon prohibition if one of the major military and economic powers, for example the United States or Russia, were found in noncompliance. We noted that smaller economic and military powers would feel inhibited from undertaking economic sanctions or military action against a great power, but the issue deserves greater consideration. States that now rely on their own nuclear deterrents or extended nuclear umbrellas against larger powers would need to be convinced that reliable means would exist to deter or defeat a larger adversary that breaks out from a nuclear weapon prohibition.

Some might argue that the major military powers would be the least likely to violate a nuclear weapon prohibition, because they would have adequate conventional military power to deter aggression against themselves or those whose security they guarantee. Yet, if conventional military balances among the major powers—say, the United States, Russia, and China—were not managed to give each confidence in its sufficiency, one or more of these powers could be tempted under duress to take measures that could raise questions about compliance. Obviously this is a circular dynamic: The major powers would not agree to eliminate their nuclear arsenals if their relations and military balances were not stable. Still, in the near to medium terms, the history of moves to abrogate or violate arms control agreements, as occurred when the United States withdrew from the Anti-Ballistic Missile Treaty and Russia was found not to have eliminated all its biological weapons as required under the Biological Weapons Convention, have to be overcome.

Zedillo advances the enforcement discussion thoughtfully in his analysis of the impediments posed by the veto mechanism in today's Security Council. He argues persuasively that "[t]here is no obvious reason why an enlarged Security Council would inherently be more functional than the present one." Functionality—effectiveness—would be determined more by the rules of the council's decision making. "[F]ailure to accomplish veto reform," Zedillo writes, "would leave the abolition process in a dead end."

Raghavan makes an elliptical point that "India would be unlikely to find it in its interests to join ... a coalition of enforcers." This deserves elaboration. It seems to reflect a belief that India's attainment of a permanent seat on the Security Council would meet with objections that India would not want to exacerbate by having council membership related to disarmament enforcement. But if India were a permanent member, and the Security Council had a role in enforcing a prohibition on nuclear weapons, which seems inevitable, wouldn't India have to participate? How else would the nuclear disarmament that India now advocates be enforced? Raghavan writes that "[t]he power to enforce would also need to be subordinated to the intent of all states represented in the United Nations." But among other questions, this raises anew the problem of ensuring that enforcement would be reliable and timely.

Similar questions of timeliness and efficacy would also seem to confound Mian's interesting suggestion that "the International Court of Justice, rather than the Security Council, could serve as the body that adjudicates disputes over compliance involving nonproliferation, arms control, and abolition agreements."

### **The Role of the Public**

Lawrence Freedman notes that the Adelphi Paper does not sufficiently address the role that could, would, or must be played by the public if nuclear weapons are to be abolished. If nuclear abolition “is going to be treated with the seriousness it deserves over an extended period,” Freedman writes, “public opinion will need to be engaged.”

In the Adelphi Paper we posited that governments in nuclear-armed states with competing political parties probably would face charges of being weak and careless with national security if they took the last steps to eliminate nuclear arsenals. Opposing parties could always find ways in which verification and enforcement mechanisms could be stronger than those agreed multilaterally. Freedman similarly suggests that “if popular opinion becomes animated, it is as likely to serve as a brake on disarmament progress as an accelerator.” Moreover, public opinion is unlikely to be the same in all states, creating dilemmas that are intractable or at least extremely difficult to resolve, as Mian trenchantly notes. Arguments that might convince the public of one nuclear-armed state that it will gain security in a world without nuclear weapons might communicate to other states that they would lose relative power in such a world. Mian avers that “some of the potential problems over nuclear-weapon abolition that result from arguments based purely on national security and national interest” could be overcome “by broadening the frame to include normative, moral, and legal considerations” that are universal and therefore do not convey relative advantage or disadvantage. This recommendation deserves to be taken seriously. Yet, it is probably arguments from security that will ultimately overcome the braking impulses of public opinion and opposition parties contemplating decisions by their leaders to relinquish nuclear weapons.

### **Relative Silence on Verification**

Interestingly, only one contributor, Patricia Lewis, focused on the chapter on verification, although Aboul-Enein, Müller, and Zaluar also engage with it. This may reflect the judgment offered in the Adelphi Paper that verification is important but ultimately not as vital as political-security dynamics and enforcement, because verification cannot be perfect, and even if it were, the challenges of deterring and defeating an actor that chose to break a prohibition would remain. Lewis correctly notes that historically the process of verification has been much more effective than enforcement mechanisms, which both affirms our argument that enforcement is the major challenge and corrects the impression we might have left that verification difficulties render abolition infeasible.

Somewhat paradoxically, governments of nuclear-armed states show some willingness to commission studies of verification and to discuss these issues with each other, but they resist tasking officials to explore political-security issues such as those raised in the Adelphi Paper. We can only speculate that modern states are more comfortable dealing with technical issues than political ones, acting as if technical solutions might be found to what are in reality political problems. (This is also true when it comes to managing nuclear industry, as discussed below.) This is not to devalue the work being done by national laboratories in the United States, Russia, the United Kingdom, and Norway to develop verification technology. Confidence could be built and useful practices and technologies could be developed through such cooperation.

Harald Müller suggests that research and development oriented to establishing effective verification of a fissile material cutoff treaty could prepare a basis for subsequent nuclear archaeology of fissile material production that has occurred outside of safeguards, as would be necessary to achieve nuclear abolition. His observation emphasizes that including stocks in a fissile material cutoff treaty would significantly enhance its value as a step toward disarmament.

Achilles Zaluar reminds us that after Brazil closed its nascent nuclear weapon program the country incorporated into its Constitution in 1988 a prohibition on the manufacture or possession of nuclear weapons. Were other states to do the same after all nuclear weapons had been abolished, the societal barriers against cheating could be significantly strengthened.

Lewis's contribution offers many insights, including a cogent argument that the costs of nuclear disarmament should be considered as part of the full life-cycle costs of nuclear weapons. She engages with the more "political" of the verification questions: cost, civil society monitoring, challenge inspections, and the role of national intelligence agencies. Although these are probably not as hard to resolve as some of the political issues discussed above, they are sensitive and therefore also deserve to be engaged by international research institutions and, where possible, government representatives.

### **Nuclear Industry and Strengthened Safeguards**

Although many of the commentators did not discuss the nuclear industry, an interesting dichotomy emerged among those who did. The pivot is over whether progress on nonproliferation can, as a political reality, be separated from the disarmament challenge.

Hore-Lacy writes that the chapter of the Adelphi Paper about nuclear energy "focuses not so much on disarmament as on proliferation..."

Similarly, Zaluar writes that “[t]he pros and cons of nuclear disarmament relate to security issues; the pros and cons of nuclear safeguards relate to issues of expense, confidentiality, and technological secrets.” In contrast, Suto and Tosaki implicitly view preventing further proliferation as an integral part of the disarmament challenge.

On this point we agree with Suto and Tosaki. If disarmament is viewed not as an end in itself but as a means to enhance global security, then nonproliferation is essential for nuclear weapons to be safely prohibited. Developing safeguards that build confidence in the peaceful use of declared facilities and in the absence of clandestine activities is an integral part of the disarmament and nonproliferation challenges. Many would find it ideal to develop such safeguards independent of progress on disarmament and commitment to abolition as a real objective. But there is clear evidence that many non-nuclear-weapon states will not agree to strengthen safeguards and their enforcement without concomitant progress toward abolition. To wish this were not so is understandable, but that does not make it realistic.

Sagan notes that all NPT parties, not only states in possession of nuclear weapons, share Article VI obligations and goes on to make the innovative and formidable suggestion that international control or management of the fuel-cycle could be a prerequisite of nuclear weapon abolition. Otherwise, the risks of proliferation would induce states to hedge by retaining nuclear weapons or quick reconstitution capabilities. Thus, Sagan argues, “non-nuclear-weapon states also need to recognize that entering into negotiations about international control of the nuclear fuel-cycle is actually part of *their* Article VI commitment...” As far as we know, this is a new idea and it deserves further international analysis and discussion.

It is tempting for champions of nuclear industry to act as if this commercial enterprise can be separated from the complexities and potential constraints of the twin nonproliferation and disarmament challenge, as Hore-Lacy suggests. Leaving aside highly debatable claims about the likely rate at which nuclear reactors will be built in coming decades, it is unrealistic to assume that the pace and scale of expansion will not be influenced by confidence in nonproliferation bulwarks and nuclear deterrence stability. Proliferation, military nuclear crises, or use of nuclear weapons cannot help but affect public perceptions of all things nuclear, even if states do not use civilian power reactors to proliferate. Key states would urge additional constraints on the trade of nuclear technology. If such backlash made it more difficult for developing countries to receive nuclear cooperation from supplier states, those facing what they would perceive as constrictions of their Article IV rights would consider withholding cooperation on the nonproliferation side, exacerbating a vicious cycle of nuclear disorder.

To prevent a weakening of nuclear order, the nuclear industry should participate positively in efforts to advance nonproliferation tools and disarmament progress rather than seek to distance itself from these challenges.

Perhaps the most difficult issues will arise over managing the fuel-cycle. As the International Atomic Energy Agency and others have argued, international management may be necessary to avoid the risks and instabilities of a proliferation of national enrichment and reprocessing programs. We noted some of the difficulties of this course. Hore-Lacy objects categorically: "What weakening of the non-proliferation system would result from the creation of such facilities [enrichment plants] in Australia and Canada?" Implicit in his logic is that these are "good" states, whereas the dangers are posed by "bad" states. Yet, a number of states that today are not seeking nuclear weapons could do so in the future. Moreover, it becomes much harder to inhibit the acquisition of fuel-cycle facilities by some states if the green light has already been given to others. If the United States "approves" the construction of enrichment plants in Australia or Canada, for instance, the pressure to do likewise for South Korea, Taiwan, or Egypt (all current friends or allies of the United States) would increase considerably.

The recently agreed exemption of restrictions on nuclear cooperation with India demonstrates the problem. The United States and most other members of the Nuclear Suppliers Group do not judge Pakistan to merit a similar exemption, due to its proliferation record and concerns about its overall stability. Yet the nuclear deal with India may increase the probability that China could decide to provide its friend, Pakistan, with similar assistance.

Ultimately, furthering the discrimination that already exists by deciding whether to support or oppose the acquisition of nuclear technology by another state based on perceptions of its government's intentions undermines the sustainability of a rules-based nonproliferation regime. This is especially true when nuclear technology is externally supplied (as opposed to indigenously developed).

A similar political problem arises with proliferation-resistant technology, which Hore-Lacy and Suto and Tosaki discuss (even laying aside the more complex technical debate about how proliferation-resistant this technology really would be). The introduction by South Korea of commercial pyroprocessing (one of the proliferation-resistant electrometallurgical reprocessing processes Hore-Lacy advocates) would not, for instance, be accompanied by a ban on standard (highly proliferative) aqueous reprocessing. In fact, it would help "normalize" reprocessing as a technology

and give states that wished to hedge a convenient excuse to develop aqueous reprocessing (especially if they first asked for assistance with developing pyroprocessing and were refused). This is not to say that proliferation-resistant technologies are a bad idea per se, but that there is no quick technical fix to what is essentially a political problem.

Of the commentaries that discussed current attempts to curtail the spread of fuel-cycle facilities, there was broad agreement on the importance of states' "inalienable right... to develop research, production, and use of nuclear energy for peaceful purposes...." Although Zaluar states that it would not be a good idea if all 191 states had fuel-cycle facilities, he stresses that such decisions are a purely sovereign affair and that attempting to interfere with them (beyond offering fuel assurances "free of political considerations") could spark a backlash. Suto and Tosaki also emphasize the importance of Article IV and a non-discriminatory approach to fuel supply but do see the need for some conditionality. Although they (along with Hore-Lacy) doubt that "determined proliferators... would participate in such an international approach," they presumably do believe that such assurances might have a role in preventing the spread of fuel-cycle facilities to states that are not seeking nuclear weapons today but might do so in the future.

We suspect that, if pushed, others would have taken a different line and advocated a more active policy to curtail the spread of fuel-cycle facilities (such as the one advocated by former U.S. defense secretary Harold Brown). It is interesting, therefore, that few chose to comment on the nuclear industry. In general the politics of the fuel-cycle are an underappreciated dimension to debates about nonproliferation and disarmament. It is surely no coincidence that the two contributions that did focus on efforts to restrict the spread of the fuel-cycle were written by authors from Brazil and Japan, two non-nuclear-weapon states that possess fuel-cycle facilities but worry about being "'punished' for activities by certain non-complying countries, resulting in the divestiture of the rights relating to the nuclear fuel cycle," as Suto and Tosaki put it. The evolution of the fuel-cycle is a key question that requires much more attention than it has attracted in the past.

In particular, the question of returning spent fuel to its suppliers, and therefore removing the perceived need for reprocessing capabilities in countries that do not now possess them, deserves much greater attention. This is important in reducing the risks of proliferation via the "plutonium route." More importantly, without "take-back" provisions, potential buyers of international fuel services will still be left with the costly and

often politically challenging problem of disposing of nuclear waste. Sparing states from this burden would greatly increase the attractiveness of relying on international supply and forgoing acquisition of indigenous fuel-cycle capabilities. As nuclear-weapon states that care greatly about nonproliferation, the United States, France, and the UK need to confront their own legislative obstacles to taking back spent fuel from foreign states that would buy fuel services and agree not to acquire their own enrichment and reprocessing capabilities.

## CONTRIBUTORS

**Sameh Aboul-Enein** is minister plenipotentiary and deputy head of mission of Egypt to the United Kingdom. He has previously served as head of the Political Section and counselor for Disarmament at the Permanent Mission of Egypt to the UN and to the Conference on Disarmament in Geneva. He is the former director of the United Nations Affairs Department at the Egyptian Ministry of Foreign Affairs and worked earlier in the cabinets of two former Egyptian foreign ministers and traveled extensively with them.

Early in the 1990s, Aboul-Enein worked as a research and teaching assistant at the Political Science Department at the American University in Cairo and is the author of several articles published in Egypt's quarterly periodical, *El-siassa El-dowlyya*, and monthly political periodical, *The Diplomat*, on topics ranging from regional zones free of nuclear weapons and a new generation of nuclear reactors for energy purposes to WMD-free-zone terms and definitions.

Aboul-Enein holds a Master of Science in Politics and Government of the Middle East from the School of Oriental and African Studies, UK. This year, he completed his Ph.D./M.Phil. in International Relations and Foreign Policy Making with a specialization in the Middle East from the American University in London and the University of London.

Aboul-Enein has a certificate in Disarmament and Security Policies from the Geneva Centre for Security Policy. He is also currently a member of an Expert Multilateral Study Group on Missiles.

**James M. Acton** is an associate in the Nonproliferation Program at the Carnegie Endowment for International Peace.

Before joining the Endowment in October 2008, Acton was a lecturer at the Centre for Science and Security Studies in the Department of War Studies at King's College London. There he co-authored the Adelphi Paper, *Abolishing Nuclear Weapons*, with George Perkovich and was a consultant to the Norwegian government on disarmament issues. Prior to that, Acton was the science and technology researcher at the Verification Research, Training and Information Centre (VERTIC), where he was a participant in the UK–Norway dialogue on verifying the dismantlement of warheads.

He has published in *Bulletin of the Atomic Scientists*, *Jane's Intelligence Review*, *Nonproliferation Review*, *Survival*, and the *New York Times*.

**James E. Doyle** has worked in the Nuclear Nonproliferation Division at Los Alamos National Laboratory since 1997. His professional focus is on systems analysis, strategic planning, and policy development. He has managed cooperative projects with Russia's nuclear weapons institutes on the development of technologies and procedures for monitoring the dismantlement and storage of nuclear warheads and fissile materials. Previously, Doyle was a senior policy analyst at Science Applications International Corporation. Doyle holds a Ph.D. in International Security Studies from the University of Virginia and is the editor of *Nuclear Safeguards, Security, and Nonproliferation: Achieving Security with Technology and Policy*.

**Sir Lawrence Freedman** has been professor of War Studies at King's College London since 1982. He was appointed vice principal at King's in 2003. Elected a fellow of the British Academy in 1995 and awarded the CBE in 1996, he was appointed official historian of the Falklands Campaign in 1997.

Freedman has written extensively on nuclear strategy and the Cold War, as well as commentating regularly on contemporary security issues. His books include *The Evolution of Nuclear Strategy, Deterrence*, an Adelphi Paper, *The Revolution in Strategic Affairs*, *The Cold War*, and the *Official History of the Falklands Campaign*, published in the summer of 2005. Freedman's most recent book, *A Choice of Enemies: America Confronts the Middle East*, was published in 2008. He was educated at Whitley Bay Grammar School and the Universities of Manchester, York, and Oxford. Before joining King's he held research appointments at Nuffield College Oxford, IISS, and the Royal Institute of International Affairs.

**Ian Hore-Lacy** is director for public communications with the World Nuclear Association, an international trade association based in London. He is the author of *Nuclear Electricity*, the eighth edition of which has been published by Elsevier and World Nuclear University as *Nuclear Energy in the 21<sup>st</sup> Century*.

His particular interests range from the technical to the ethical and theological aspects of mineral resources and their use, especially nuclear power. He has written several books on mining, environmental, economic, and related issues, the latest being *Responsible Dominion—A Christian Approach to Sustainable Development*.

**Patricia Lewis** is the deputy director and scientist-in-residence of the James Martin Center for Nonproliferation Studies at the Monterey Institute of International Studies. Prior to this appointment, she was the director of the United Nations Institute for Disarmament Research (UNIDIR). From 1989 to 1997, she served as director of the Verification Technology and Information Centre (VERTIC) in London. She holds her B.Sc. (Hons) in physics from the University of Manchester and her Ph.D. in nuclear physics from the University of Birmingham. Before her work at UNIDIR in Geneva, she worked in India, New Zealand, Australia, and the United Kingdom. She is a dual national of the United Kingdom and the Republic of Ireland.

Lewis was a commissioner on the 2004–2006 Weapons of Mass Destruction Commission, chaired by Hans Blix. In 1998–1999, she served as a member of the Tokyo Forum for Nuclear Nonproliferation and Nuclear Disarmament, having previously served as an external reviewer for the Canberra Commission. Currently she is an adviser to the International Commission on Nuclear Non-proliferation and Disarmament (ICNND). She was appointed UK governmental expert to the 1990 UN Study on the Role of the UN in Verification and appointed consultant on conventional forces verification to the UK Foreign and Commonwealth Office 1989–1990. She was the Elizabeth Poppleton Fellow at the Australian National University in 1992 and a visiting lecturer at Imperial College London 1991–1992. She is a member of the International Institute for Strategic Studies, Scientists for Global Responsibility, and Women in International Security, and is a fellow of the British–American Project. Lewis sits on the Advisory Boards of the Bonn International Conversion Center (BICC) and PIR (Center for Policy Studies), Moscow. She is the recipient of the American Physical Society’s 2009 Joseph A. Burton Forum Award recognizing “outstanding contributions to the public understanding or resolution of issues involving the interface of physics and society.”

**Zia Mian**, a physicist by training, directs the Project on Peace and Security in South Asia at Princeton University's Program on Science and Global Security. He teaches at Princeton's Woodrow Wilson School of Public and International Affairs. He has previously taught at Yale University and at Quaid-i-Azam University, Islamabad. Mian is affiliated with the International Panel on Fissile Materials (IPFM), an independent group of scientists and analysts from seventeen countries that works to analyze the technical basis for policy initiatives to secure, consolidate, and reduce stockpiles of highly enriched uranium and plutonium, the key materials for nuclear weapons. He was one of the founders of Abolition 2000, a network that now includes over 2000 organizations in more than 90 countries working for nuclear disarmament, and serves on the board of the International Network of Scientists Against Proliferation, and of Peace Action, the largest national U.S. peace and disarmament group.

**Frank Miller** has been senior counselor at The Cohen Group since March 2005. From 2001–2005 he served in the White House as a special assistant to President George W. Bush and as senior director for defense policy and arms control on the National Security Council staff. At the White House he was responsible for a wide range of presidential policy initiatives in the fields of nuclear deterrence policy, strategic arms reductions, national space policy, defense trade reform, land-mines, and transforming the American and NATO militaries. Miller served 22 of his 31-year government career in the Department of Defense, where he was acting assistant secretary for international security policy from September 1996 to November 1997; principal deputy assistant secretary for strategy and threat reduction from November 1997 to October 2000; and acting assistant secretary from October 2000 until January 20, 2001. He played leading roles in shaping U.S. deterrence and nuclear targeting policy, on the START 1 and START 2 treaties, and was instrumental in forging critically important new relationships with the British Ministry of Defence. He also served as the chair of NATO's nuclear policy committee ("the High Level Group") from September 1996 to January 2001 and of NATO's counterproliferation policy committee ("the Defense Group on Proliferation") from September 1996 to December 1997.

**Harald Müller** is professor of international relations at Goethe-University Frankfurt and director of Peace Research Institute Frankfurt, a member institute of the Leibniz Association. Müller received his Ph.D. at Goethe University and taught at the Technical University Darmstadt and (as

visiting professor) at the Bologna Center of the School of Advanced International Studies, the Johns Hopkins University. He served in the German delegation to the 1995 NPT Review and Extension Conference and the 2000 and 2005 NPT Review Conferences. From 1999 to 2005 he was a member of the UN Secretary General's Advisory Board on Disarmament Matters, which he chaired in 2004. In 2004/2005 he participated in the IAEA's Expert Group on Multinational Nuclear Arrangements.

Müller has broadly written on international relations theory, nonproliferation, arms control, and disarmament. His forthcoming book, *Building a New World Order: Sustainable Policies for the Future* will appear in March 2009.

**Major General Pan Zhenqiang (ret.)** is currently deputy chairman of the China Foundation for International Studies, senior adviser to the Council of China Reform Forum (CRF), and director of the Research Institute for Strategy and Management at the Central University of Finance and Economics in China.

He joined in the PLA in 1963, and served in the Department of the General Staff for over two decades. After 1986, he was a research fellow and then director at the Institute of the Strategic Studies, National Defense University, PLA, until the retirement in August 2001. During the long course of his military career, Pan was member of a military expert group in Africa as well as a member of Chinese delegations to various international arms control and disarmament negotiations.

In addition to his current post, Pan is also now deputy president of the Shanghai Institute for International Strategic Studies; senior adviser to the Center for Strategic Studies, China Academy of Engineering Physics; a member of China's Committee at the Council of Security Cooperation in the Asia-Pacific (CSCAP); council member of the Chinese People's Institute of Foreign Affairs, (CPIFA); council member of the China Arms Control and Disarmament Association; and guest research fellow at a number of Chinese research institutions and civilian universities.

Pan has extensive contacts abroad. He has been research fellow to a number of U.S. universities, including National Defense University (1987), Stanford University (1988–1989), and Harvard University (1999 and 2000, respectively). He is currently a member of the executive committee of the Council of Pugwash Conferences on Science and World Affairs; the Weapons of Mass Destruction Commission (WMDC) in Sweden; the Council of Advisers of the Oxford Research Group in the United Kingdom; and the Pacific Council in the United States.

**George Perkovich** is vice president for studies and director of the Nonproliferation Program at the Carnegie Endowment for International Peace. He is the author of the award-winning book *India's Nuclear Bomb*, which received the Herbert Feis Award from the American Historical Association, for outstanding work by an independent scholar, and the A. K. Coomaraswamy Prize from the Association for Asian Studies, as an outstanding book on South Asia.

Perkovich is co-author of the Adelphi Paper, *Abolishing Nuclear Weapons*, published in September 2008 by the International Institute for Strategic Studies, and also of a major Carnegie report, *Universal Compliance: A Strategy for Nuclear Security*, a blueprint for rethinking the international nuclear nonproliferation regime. He is an adviser to the International Commission on Nuclear Non-proliferation and Disarmament (ICNND), and a member of the Council on Foreign Relations Task Force on U.S. nuclear weapons policy.

Perkovich served as a speechwriter and foreign policy adviser to then-Senator Joe Biden from 1989 to 1990.

**Lieutenant General V. R. Raghavan (ret.)** is one of India's leading military strategic thinkers. He served in the Indian Army for thirty-seven years and retired as the director general of Military Operations in 1994. After retirement from the army he wrote several books and is currently the director of the Delhi Policy Group and president of the Centre for Security Analysis, Chennai.

Raghavan has been appointed adviser of the newly constituted International Commission on Nuclear Non-Proliferation & Disarmament. He is a council member of the International Institute of Strategic Studies (IISS), London. He was a commissioner of the Weapons of Mass Destruction Commission chaired by Hans Blix; visiting fellow at CISAC, Stanford University and the Henry L. Stimson Center. He is an elected member of the council of the United Services Institution of India and was a member of the committee to review the Armed Forces Special Powers Act. Raghavan graduated in 1968 from the Royal Military College of Science and the Army Staff College in the UK.

The general is the author of the monograph, *India's Need for Strategic Balance*; an essay on *Limited War and Nuclear Escalation in South Asia*; and two widely known books, *Infantry in India* and *Siachen—Conflict Without End*. He has edited more than dozen books and his articles have been carried in leading newspapers, journals, and magazines in India and internationally. He is a guest lecturer at Indian War colleges and the National Defence College.

**Brad Roberts** is a member of the research staff at the Institute for Defense Analyses in Alexandria, Virginia and a professorial lecturer in international affairs at the George Washington University. He also serves as a member of the Department of Defense's Threat Reduction Advisory Committee and of the board of the U.S. Committee of the Council for Security Cooperation in the Asia-Pacific. From 1992 to 1995 he served as chairman of the research advisory council of the Chemical and Biological Arms Control Institute. From 1986 to 1995 Roberts served as editor of the *Washington Quarterly* and as a research fellow at the Center for Strategic and International Studies. His recent publications include "Tripolar Stability: The Future of Nuclear Relations among the United States, Russia, and China" and "'All the King's Men?' Refashioning Global Nuclear Order," *International Affairs*.

**Ambassador Takaya Suto** is special assistant to the minister of foreign affairs and director of the Center for the Promotion of Disarmament and Non-Proliferation, Japan Institute of International Affairs. He served as ambassador to Denmark, Iran, and Egypt. He is an expert on disarmament and Middle Eastern politics and economics and has authored numerous books and articles on Middle Eastern affairs and Japan-Middle Eastern relations.

**Scott D. Sagan** is a professor of political science and co-director of Stanford's Center for International Security and Cooperation. Before joining the Stanford faculty, Sagan was a lecturer in the Department of Government at Harvard University and served as a special assistant to the director of the Organization of the Joint Chiefs of Staff in the Pentagon. He has also served as a consultant to the Office of the Secretary of Defense and at the Sandia National Laboratory and the Los Alamos National Laboratory.

Sagan is the author of *Moving Targets: Nuclear Strategy and National Security*, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons*, and with co-author Kenneth N. Waltz, *The Spread of Nuclear Weapons: A Debate Renewed*. He is the co-editor of Peter R. Lavoy, Scott D. Sagan, and James L. Wirtz, *Planning the Unthinkable* and the editor of the forthcoming book, *Inside Nuclear South Asia*.

**Jonathan Schell** is the Harold Willens Peace Fellow at The Nation Institute and teaches a course on the nuclear dilemma at Yale. His acclaimed book, *The Fate of the Earth*, which was serialized in the *New Yorker*, helped inform the global nuclear debate of the 1980s. He subsequently wrote *The Abolition* and *The Gift of Time: The Case for Abolishing Nuclear Weapons Now*, which

remain frequently cited explorations of the nuclear disarmament challenge. His latest contribution to this subject is *The Seventh Decade: The New Shape of Nuclear Danger*.

**Bruno Tertrais** is a senior research fellow at the Fondation pour la recherche stratégique (FRS), as well as an associate researcher at the Centre d'études et de recherches internationales (CERI). In 2007–2008, he was a member of the presidential commission on the White Paper on Defense and National Security. Tertrais is also a member of the International Institute for Strategic Studies (IISS), and a member of the editorial board of the *Washington Quarterly*. His latest book in English is *War Without End*.

Tertrais graduated from the Institut d'études politiques de Paris in 1984. He also holds a Master's degree in Public Law from the University of Paris (1985), and a Doctorate in Political Science of the Institut d'études politiques de Paris (1994). In 1990–1993, he was the Director of the Civilian Affairs Committee, NATO Assembly. In 1993, he joined the Policy Division of the French Ministry of Defense. In 1995–1996, he was a visiting fellow at the RAND Corporation. From October 1996 until August 2001, he served as special assistant to the director of strategic affairs at the French Ministry of Defense.

**Hirofumi Tosaki** is a senior research fellow at the Center for the Promotion of Disarmament and Non-Proliferation, Japan Institute of International Affairs. His areas of expertise include arms control, disarmament, nonproliferation, missile defense, nuclear strategy, and deterrence and his publications include a co-authored volume, *Japan's Missile Defense: Diplomatic and Security Policies in a Changing Strategic Environment* and "Combating Proliferation of Weapons of Mass Destruction: U.S. Policy in the 'Post Post-Cold War' Era and Its Implications," *Kokusai Koukyou Seisaku Kenkyuu* [International Public Policy Studies]. He received his Ph.D. in International Public Policy from the Osaka School of International Public Policy, Osaka University, Japan in 2003.

**Achilles Zaluar** is minister-counselor at the Brazilian Embassy in Washington, D.C., where his portfolio includes nonproliferation, nuclear, defense, and multilateral issues. Prior to this, he served as deputy head, United Nations Division, at the Ministry of Foreign Affairs in Brasilia. In previous assignments, he worked on nonproliferation and export control, including Brazil's relations with the MTCR and NSG control regimes, was

secretary of the interagency group that drafted Brazil's export control law, and was a member of the team that drafted the position papers and presidential message for Brazil's accession to the NPT. His thesis at the Brazilian Rio Branco Institute was on "Nuclear Nonproliferation and the Security Council."

**President Ernesto Zedillo** is director of the Yale Center for the Study of Globalization; professor in the field of International Economics and Politics; professor of International and Area Studies; and adjunct professor of Forestry and Environmental Studies at Yale University. He served as president of Mexico from 1994–2000.

Since leaving office in 2000, President Zedillo has been a leading voice on globalization, especially its impact on relations between developed and developing nations. In 2007–2008 he chaired a commission to recommend the future course of the IAEA and he currently serves on the International Commission on Nuclear Non-proliferation and Disarmament. He is chairman of the Board of the Global Development Network and was recently appointed by the president of the World Bank to chair the High Level Commission on Modernization of World Bank Group Governance charged with offering an independent view on how that organization's governance needs to adapt to the international economic realities of the twenty-first century. He recently edited *The Future of Globalization: Explorations in Light of Recent Turbulence* and *Global Warming: Looking Beyond Kyoto*. He received a Ph.D. in Economics from Yale University, where he currently teaches an undergraduate course on Debating Globalization.



## Carnegie Endowment for International Peace

The Carnegie Endowment for International Peace is a private, nonprofit organization dedicated to advancing cooperation between nations and promoting active international engagement by the United States. Founded in 1910, Carnegie is nonpartisan and dedicated to achieving practical results. Through research, publishing, convening and, on occasion, creating new institutions and international networks, Endowment associates shape fresh policy approaches. Their interests span geographic regions and the relations among governments, business, international organizations, and civil society, focusing on the economic, political, and technological forces driving global change.

Building on the successful establishment of the Carnegie Moscow Center, the Endowment has added operations in Beijing, Beirut, and Brussels to its existing offices in Washington and Moscow, pioneering the idea that a think tank whose mission is to contribute to global security, stability, and prosperity requires a permanent international presence and a multinational outlook at the core of its operations.

The Carnegie Endowment's **Nonproliferation Program** is a leading global clearing house of information on nuclear nonproliferation issues and publisher of *Proliferation News*, a bi-weekly e-newsletter read around the world, an extensive website, and factual publications, including the acclaimed reference book, *Deadly Arsenals*.

The program is also a leading source of analysis and policy prescriptions and a major convener of international officials and experts. In Washington, Moscow, Brussels, New Delhi, and increasingly in Beijing, the program hosts public and private seminars, speeches, and workshops, where leading officials and experts seek to overcome obstacles to reducing the danger of nuclear war. The program works publicly and behind-the-scenes in active Track II diplomacy to promote solutions to challenges such as the Iranian nuclear case, U.S.–Russian threat reduction cooperation, new approaches to managing the nuclear fuel cycle, and the future of nuclear disarmament. The program's *Universal Compliance: A Strategy for Nuclear Security*, provides an overall strategic framework for strengthening a rule-based system for containing, and over time, eliminating nuclear threats.

**Carnegie Endowment for International Peace**

1779 Massachusetts Ave., NW  
Washington, D.C. 20036-2103  
Phone: 202.483.7600  
Fax: 202.483.1840  
[www.CarnegieEndowment.org](http://www.CarnegieEndowment.org)  
[info@CarnegieEndowment.org](mailto:info@CarnegieEndowment.org)

**Carnegie Moscow Center**

125009, Moscow  
Tverskaya, 16/2  
Russia  
Phone: 495.935.8904  
Fax: 495.935.8906  
[www.Carnegie.ru](http://www.Carnegie.ru)  
[info@carnegie.ru](mailto:info@carnegie.ru)

**Carnegie China Center**

Room 513, Chang Xin Building  
39 Anding Road, Chaoyang District  
Beijing, 100029  
China  
Phone: 86.10.6443.6667 ext. 627  
Fax: 86.10.6894.6780

**Carnegie Middle East Center**

Parliament St. 88  
Postal Code 2011 8806  
Downtown, Beirut  
Lebanon  
Phone: 961.1.99.12.91  
Fax: 961.1.99.15.91  
[www.carnegie-mec.org](http://www.carnegie-mec.org)

**Carnegie Europe**

Brussels Office  
Avenue d'Auderghem, 82  
1040 Brussels, Belgium  
Phone: 32.2.735.56.50  
Fax: 32.2.736.62.22  
[www.carnegieeurope.eu](http://www.carnegieeurope.eu)



# ABOLISHING NUCLEAR WEAPONS: A DEBATE

The groundbreaking paper *Abolishing Nuclear Weapons* by George Perkovich and James Acton was first published by the International Institute for Strategic Studies as an Adelphi Paper in September 2008. One of the paper's main aims was to jump-start a broad international debate about how to achieve the immensely important and equally difficult goal of nuclear disarmament. The present volume takes the next step. Perkovich and Acton have invited a distinguished group of experts—current and former officials, respected analysts and authors—from thirteen countries, nuclear and non-nuclear, to critique the Adelphi Paper, which is reprinted here. Their diverse views explore pathways around obstacles to nuclear disarmament and sharpen questions requiring further deliberation. The volume concludes with an essay by Perkovich and Acton that works through some of the key questions and dilemmas raised by the critiques.

---

**As long as talk of abolition remains the diplomatic equivalent of easy-listening elevator music, and as political leaders remember to assert their belief in a world without war and weapons . . . few will pay attention. Only as the talk becomes serious will public debate open up, and properly so.**

**SIR LAWRENCE FREEDMAN**

**Nuclear weapons compensate for conventional military inferiority and moderate against the use of force by one great power against another. The problem lies not in the weapons, but in the nature of humankind.**

**FRANK MILLER**

**[T]here would be hardly any alternative to the UN Security Council to enforce a regime of abolished nuclear weapons. . . . The veto gives its possessor lofty power; no veto proffers nil or very little power. It is for this reason that I am convinced that failure to accomplish veto reform would leave the abolition process in a dead end.**

**ERNESTO ZEDILLO, FORMER PRESIDENT OF MEXICO**

CARNEGIE ENDOWMENT

---

FOR INTERNATIONAL PEACE

WASHINGTON DC • MOSCOW • BEIJING • BEIRUT • BRUSSELS