

Introduction

For the first time in a quarter of a century working with the problems of the arms race and arms control, I am beginning to get scared. These are not my words, but those of William Epstein, a disarmament expert, which he penned forty-five years ago.¹ Epstein's concern arose from an array of adverse circumstances. India had detonated a nuclear explosive device in 1974, becoming what he (wrongly) believed was only the world's sixth nuclear-armed State (in fact, Israel had already produced nuclear weapons). Also in 1974, Britain had resumed explosive nuclear testing for the first time in a decade; the United States was increasing the sophistication of its manoeuvrable re-entry vehicles on its missiles in order to deliver multiple warheads while also engaging in the development of new nuclear-armed cruise missiles; and the Soviet Union was producing multiple independently targetable re-entry vehicles (MIRVs) of its own to equip its intercontinental ballistic missiles (ICBMs).

What is more, in May 1975, the first review conference of the Treaty on the Non-proliferation of Nuclear Weapons (NPT)² had just taken place, an event which Epstein cast firmly as a failure. There was, he argued, a 'clear and present danger' of the 'crumbling' of the entire structure of the non-proliferation regime. The reason, he affirmed, was the inaction and obduracy of the five Nuclear-weapon States, since they had – 'at least in substantial part' – failed to live up to their disarmament obligations under the NPT.³

Five decades later, a similar set of challenges are confronting the international community. After massive cuts in the level of nuclear arsenals began in the latter years of the Cold War and gathered pace after the fall of the Berlin Wall, a new form of nuclear arms race is underway. Conservatively calculated, since 1940 the world expended the equivalent of more than \$15 trillion (in 2020 United States dollars) on nuclear weapons systems and infrastructure.⁴ The next thirty years are expected to see the dedication of many trillions

¹ W. Epstein, *The Last Chance: Nuclear Proliferation and Arms Control*, The Free Press, New York, 1976, p. xiii.

² Treaty on the Non-proliferation of Nuclear Weapons; opened for signature at London, Moscow, and Washington, DC, 1 July 1968; entered into force 5 March 1970.

³ Epstein, *The Last Chance: Nuclear Proliferation and Arms Control*, pp. xiv–xv.

⁴ The United States alone had dedicated \$5.5 trillion to nuclear weapons development, production, and maintenance by 1996 (in 1996 dollar equivalents). 'Introduction', S. I. Schwartz (ed.), *Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons Since 1940*, The Brookings Institution, Washington, DC, 1998, p. 3.

more to the upgrading of nuclear weapons and their delivery systems. The United States has initiated the development of a US\$100 billion land-based ICBM force that is intended to serve until 2075.⁵

In 2010, the United States formally withdrew from the 1987 Intermediate Nuclear Forces (INF) Treaty,⁶ citing cheating by Russia, an act that was followed swiftly by Russia's withdrawal. The INF Treaty, now defunct, was the first Cold War disarmament treaty to both reduce arsenals and even to eliminate a category of nuclear weapons. It had successfully removed short- and intermediate-range nuclear missiles from Europe and prevented their insertion elsewhere.

The United States also pulled out of the multilateral Joint Comprehensive Plan of Action (JCPOA), which limited Iran's enrichment of uranium from 2015 for an initial period of ten years. Although there were clear signs that it would return to compliance, should the United States decide to rejoin the political agreement,⁷ Iran announced in January 2021 that it had produced 17 kilograms of 20 per cent-enriched uranium within a single month, sharply reducing its nuclear break-out time.⁸ In February 2021, Iran's Minister of Intelligence Mahmoud Alavi even declared in an interview with Iranian TV that Iran could produce nuclear weapons 'in self-defence'. This provocative statement was made despite a religious edict in the 1990s by Supreme Leader Ali Khamenei, which had forbidden them.⁹ In 2021, Iran's Supreme Leader said that Iran could increase its level of uranium enrichment to 'whatever' the nation needed, including up to 60 per cent purity of uranium-235.¹⁰

Earlier in February 2021, the incoming Biden administration in the United States formally agreed with Russia to extend the New START Treaty¹¹ between the two nuclear superpowers for a further five years, restricting the size of each nation's deployed strategic nuclear arsenal. New START would otherwise have expired on 5 February 2021, meaning that, for the first time since 1972, no upper limits whatsoever would have been imposed by treaty on the number of American and Russian nuclear weapons. Precious breathing space had been secured to negotiate a new treaty.¹² In announcing the extension, US Secretary of

⁵ E. Eaves, 'Why Is America Getting a New \$100 Billion Nuclear Weapon?', *Bulletin of the Atomic Scientists*, 8 February 2021, at <http://bit.ly/3bfyUPX>.

⁶ Treaty between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter-Range Missiles; signed at Washington, DC, 8 December 1987; entered into force 1 June 1988; expired (de facto), 2 August 2019. The Russian Federation was bound as a successor State to the Soviet Union along with, for the purpose of the INF Treaty, Belarus, Kazakhstan, Turkmenistan, Ukraine, and Uzbekistan.

⁷ E. Yeranian, 'Rouhani: Iran Will Comply with Nuclear Deal If Other Countries Do', *Voice of America*, 10 February 2021, at <http://bit.ly/3jF0YTF>.

⁸ Radio Farda, 'Iran Enriched "17 Kilograms" of 20 Percent Enriched Uranium, Exceeding Goals', Radio Free Europe/Radio Liberty, 28 January 2021, available at <http://bit.ly/2MDDdfs>.

⁹ Yeranian, 'Rouhani: Iran Will Comply with Nuclear Deal If Other Countries Do'.

¹⁰ 'Khamenei Says Iran Could Enrich Uranium to 60%', *Voice of America*, 22 February 2021, at <http://bit.ly/3qOxAK>.

¹¹ The Treaty between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms; signed at Prague, 8 April 2010; entered into force 5 February 2011.

¹² Later in February 2021, however, Russian Deputy Foreign Minister Sergei Ryabkov said that any possible replacement of New START with a new treaty would be impossible without action by the United States on missile defence. 'If the US is not ready to move on [this] then there are little chances of having a new deal to

State Antony Blinken declared, ‘Extending the New START Treaty makes the United States, U.S. allies and partners, and the world safer. An unconstrained nuclear competition would endanger us all.’¹³

But at the global level, the NPT – the ‘cornerstone’ of the nuclear non-proliferation regime – is under severe pressure, with ‘dismal progress’ achieved towards nuclear disarmament.¹⁴ Expectations for the next NPT review conference, its tenth, were correspondingly low. The conference had been postponed from 2020 until August 2021 and then until 2022 as a result of the global COVID-19 pandemic.

The fracture in the international community, with most non-nuclear-weapon States deeply frustrated at the refusal of the five nuclear-weapon States to countenance disarmament, was further emphasised by the entry into force of the Treaty on the Prohibition of Nuclear Weapons on 22 January 2021.¹⁵

The Comprehensive Nuclear-Test-Ban Treaty, concluded in 1996,¹⁶ has still not entered into force, and there is little prospect it will ever do so. In 2020, the United States, a treaty signatory (but not a contracting State), is reported to have even mulled resuming explosive nuclear testing, at the same time as it accused China and Russia of having violated the Treaty’s norms.¹⁷

In February 2021, US Admiral Charles Richard, the head of US Strategic Command, warned that nuclear war between the United States and either China or Russia had become a ‘very real possibility’.¹⁸ Was this apparent admission of the failure of strategic deterrence an indirect form of fundraising by the military, or does it represent a sober assessment of the prevailing landscape?

THE LAYOUT OF THE BOOK

This book describes how we arrived at this bleak legal and military environment through the lens of State practice and policy as well as under international law. In particular, it articulates the content, implementation, and impact of key bilateral and multilateral

replace the New START, we should focus on the missile defence problem. Otherwise, arms control will be in question’, Minister Ryabkov said at a press conference. E. Mikhaylov, ‘Russian Deputy FM: Any Agreement to Replace New START Treaty Requires Discussing US Missile Defence’, *Sputnik News*, 11 February 2021, at <http://bit.ly/379s4KH>.

¹³ ‘On the Extension of the New START Treaty with the Russian Federation’, press Statement by Antony J. Blinken, Secretary of State, 3 February 2021, at <http://bit.ly/3cEegLV>.

¹⁴ ‘Who Will Go Nuclear Next?’, *The Economist*, 30 January 2021, at <http://econ.st/3r8HcPX>.

¹⁵ Treaty on the Prohibition of Nuclear Weapons; adopted at New York, 7 July 2017; entered into force 22 January 2021.

¹⁶ Comprehensive Nuclear-Test-Ban Treaty; adopted at New York, 10 September 1996; not yet in force.

¹⁷ J. Hudson and P. Sonne, ‘Trump Administration Discussed Conducting First U.S. Nuclear Test in Decades’, *Washington Post*, 23 May 2020, at <http://wapo.st/2yv76ba>. In June 2020, it was reported that the Senate Armed Services Committee had set aside \$10 million in its version of the National Defense Authorization Act for fiscal year 2021 to speed up preparations in case the United States decided to resume nuclear testing. Arms Control Association, ‘Reaction to White House Nuclear Testing Proposal Strongly Negative’, *Issue Briefs*, Vol. 12, No. 4 (16 June 2020), at <http://bit.ly/3hMiYHp>.

¹⁸ B. Hoyle and M. Evans, ‘Nuclear War with Russia or China Now a Very Real Possibility, Warns US Admiral’, *The Times*, 4 February 2021, at <http://bit.ly/2YKJnNy>.

treaties. Written as a work of normative reference, the legality of nuclear weapons is portrayed in accordance with the sources of contemporary international law.

Chapter 1 depicts the development of nuclear weapons from the early work of atomic scientists through to the Manhattan Project and its fission bombs. Also sketched are Nazi Germany's and Imperial Japan's abortive atomic research during the Second World War, followed by the Soviet nuclear weapons programme that followed it. The United States' creation of the first hydrogen (thermonuclear) bomb in the 1950s is part of a broader outline of the nuclear arms race in the Cold War. The nuclear weapons programmes of the other nuclear-armed powers throughout history that built their own weapons – in chronological order, the United Kingdom, France, China, Israel, India, Pakistan, South Africa, and latterly the Democratic People's Republic of Korea (North Korea) – are then summarised in turn. A final section describes the current focus of research and development, to the extent they are known publicly, including the influence of artificial intelligence and cyber operations on nuclear weapons development and launch procedures, as well as the technologies being created and deployed to overcome missile defences.

Chapter 2 details the use of nuclear weapons on two occasions in 1945 as a direct result of which several hundred thousand civilians died at Hiroshima and Nagasaki. Subsequent instances are then recounted in which the use of nuclear weapons in hostilities was seriously entertained. Also described briefly are the dozens of detonations of nuclear explosive devices for 'peaceful purposes' and, to test the ability of troops to fight during a nuclear war, the more limited employment of nuclear weapons in military training exercises. The test detonation of more than two thousand nuclear weapons in 1945–2017 is summarised in Chapter 4.

Chapter 3 chronicles the elaboration and content of the Treaty on the Non-proliferation of Nuclear Weapons, an instrument devised to stem the horizontal proliferation of nuclear weapons. As the NPT was being negotiated, beginning in the mid-1960s, it was feared that several dozen States were either already engaged in or seriously contemplating, a nuclear weapons programme. Almost all, though, subsequently renounced their respective efforts. Five nuclear-weapon States – China, France, the Soviet Union, the United Kingdom, and the United States – were effectively recognised as possessor States and given a special status under the Treaty. All other States were designated 'non-nuclear-weapon States', with those joining the Treaty undertaking never to acquire a nuclear explosive device. But implementation of another 'pillar' of the Treaty, according to which the nuclear-weapon States would seek to reach agreement to destroy their nuclear arsenals, has not been achieved. North Korea withdrew from the NPT in controversial circumstances in 2003 and has aggressively pursued a nuclear weapons programme since. The intentions of Iran and Saudi Arabia, both States Parties to the NPT, appear uncertain. India, Israel, and Pakistan never joined and each became a nuclear-armed State.

Chapter 4 describes the explosive testing of nuclear weapons and other nuclear explosive devices between July 1945 and September 2017 (the last time a State – North Korea – conducted a test detonation). The lives of millions around the world have been prematurely curtailed by atmospheric tests, especially those in the 1950s and early 1960s involving nuclear explosive devices whose explosive yield is counted in equivalence to millions of

tons of trinitrotoluene (TNT). Some areas of the world will remain uninhabitable for hundreds of years as a result of radioactive contamination from nuclear tests. In the South Pacific, for instance, parts of the Marshall Islands are still more radioactive than sites like Chernobyl and Fukushima after the respective accidents at the nuclear power plants in 1986 and 2011. Against this backdrop, the chapter traces the legal regulation of nuclear testing, from its first prohibition in the south polar region under the 1959 Antarctic Treaty, through the 1963 Partial Test-Ban Treaty that banned atmospheric testing, and to the Comprehensive Nuclear-Test-Ban Treaty that outlaws also underground explosive testing and all peaceful use of nuclear explosive devices. With the CTBT still to enter to force, the extent to which its core provisions reflect customary international law is considered. Reference is also made to the relevance of subcritical testing to nuclear weapons development, activities which are outlawed by the 2017 Treaty on the Prohibition of Nuclear Weapons.

Chapter 5 narrates the content of the principal nuclear arms control and disarmament treaties between the Soviet Union/Russian Federation and the United States. These include, among others, the 1972 Anti-Ballistic Missile (ABM) Treaty and the Strategic Arms Limitation Treaty (SALT I), the INF Treaty, the 1991 START Treaty, and the 2010 New START Treaty that replaced both START I and the 2002 Strategic Offensive Reductions Treaty (SORT). All these bilateral (occasionally plurilateral) treaties are now defunct, apart from New START, which, pursuant to its recent five-year extension, formally expires on 5 February 2026.

Chapter 6 considers the comprehensive nuclear weapon prohibition treaties which exist at both global and regional level. Regional treaties outlaw nuclear weapons in the Americas and the Caribbean, Africa, South-East Asia, the South Pacific, and Central Asia, as well as in Antarctica, on the sea bed, and in outer space. The failure – thus far – to conclude a nuclear-weapon-free zone for the Middle East is briefly explained. At the global level, the United Nations Treaty on the Prohibition of Nuclear Weapons, which entered into force in January 2021, is the first terrestrial treaty to proscribe all development, production, stockpiling, transfer, and use of nuclear weapons and other nuclear explosive devices.

Chapter 7 delineates the nature and specific measures of the treaty-based verification regimes, including within the INF Treaty, the CTBT, and New START, as well as the more generic Open Skies Treaty. Transparency measures and national technical means of verification are supplemented by extensive provision for on-site inspections. Particular attention is also paid to the safeguards over nuclear material established in accordance with the NPT between States and the International Atomic Energy Agency (IAEA).

Chapter 8 recounts how *jus ad bellum*, international humanitarian law, international human rights law, the law of neutrality, and international environmental law apply to and restrict nuclear weapons. Jurisprudence in national and international courts is reviewed, particularly the 1996 Advisory Opinion on the legality of the threat or use of nuclear weapons issued by the International Court of Justice. The chapter further discusses individual and national responsibility for unlawful use or testing of nuclear weapons, including under the jurisdiction of the International Criminal Court.

The concluding chapter includes a brief consideration of future prospects for nuclear arms control and disarmament. It might have been hoped that the devastating economic impact of the COVID-19 global pandemic might lead to renewed action in support of reductions and restrictions on nuclear armaments. On 27 April 2020, as the NPT Review Conference was due to open, its postponement owing to COVID-19 was remarked upon by the German Minister for Foreign Affairs in a press conference: ‘More than ever we will need our entire strength for economic recovery and investments in the future. We do not need investments in a new nuclear arms race.’ His hopes look set to be dashed. On the front cover of *The Economist’s* 30 January 2021 issue, the headline asked simply: ‘Who will go nuclear next?’¹⁹

¹⁹ At <http://econ.st/39BaWiP>.