

Contents

<i>Cases and Materials</i>	<i>page x</i>
<i>Table of Cases</i>	xiv
Introduction	1
The Layout of the Book	3
1 The Development of Nuclear Weapons	7
The Theory and Early Development of Nuclear Weapons	7
The Energetic Effects of Nuclear Fission and Nuclear Fusion	7
The Manhattan Project	11
Nazi Germany and the Bomb	16
Japanese Research into an Atomic Bomb	22
The Development of Nuclear Weapons after the Second World War	23
The Soviet Nuclear Weapons Programme	23
Thermonuclear (Hydrogen) Bombs	26
The Soviet–US Arms Race	27
From Bombers to Land-Based Missiles to SLBMs	29
The United Kingdom’s Nuclear Weapons Programme	35
France’s Nuclear Weapons Programme	38
China’s Nuclear Weapons Programme	39
The Development of Nuclear Weapons by Other States	40
Israel’s Nuclear Weapons Programme	40
India’s Nuclear Weapons Programme	42
Pakistan’s Nuclear Weapons Programme	43
South Africa’s Nuclear Weapons Programme	45
North Korea’s Nuclear Weapons Programme	45
New Technologies	47
2 Use of Nuclear Weapons	52
The Use of Nuclear Weapons in 1945	52
Hiroshima	55
Nagasaki	56

	Use of Nuclear Explosive Devices for Peaceful Purposes	57
	The US Plowshare Program	57
	The Soviet ‘Nuclear Explosions for the National Economy’ Programme	58
	The 1976 Peaceful Nuclear Explosions Treaty	59
	Envisaged Use of Nuclear Weapons against a Nuclear Power	60
	The Cuban Missile Crisis	60
	Envisaged Use by the United States in the Yom Kippur War	61
	The ‘Petrov’ Incident	62
	Envisaged Use against Non-nuclear Forces	62
	The Korean War	62
	Wars in Indochina	63
	Dien Bien Phu	63
	The Vietnam War	63
	‘Broken Arrow’ Incidents	64
3	The Treaty on the Non-proliferation of Nuclear Weapons	67
	The Rationale for the NPT	67
	The Negotiation of the Treaty	69
	Entry into Force and Universalisation of the NPT	72
	The (Non-)Definition of Nuclear Weapons in the NPT	73
	The Obligations of the Nuclear-Weapon States Parties	74
	The Prohibition on the Transfer of Nuclear Weapons	74
	The Prohibition on the Transfer of Control over Nuclear Weapons	77
	The Prohibition on Assisting the Acquisition of Nuclear Weapons	78
	Peaceful Nuclear Explosions	79
	The Obligations of the Non-Nuclear-Weapon States Parties	80
	The Prohibition on Acquisition	80
	A Prohibition on Development?	80
	A Limited Prohibition on Assisting Another Non-nuclear-Weapon State to Acquire Nuclear Explosive Devices	81
	Domestic Implementation and Reporting	82
	Verification: The IAEA Safeguards Agreements	82
	The Comprehensive Safeguards Agreement	83
	The IAEA Additional Protocol	84
	Small Quantities Protocol	84
	The Peaceful Use of Nuclear Energy	85
	The Duty to Pursue Nuclear Disarmament	86
	NPT Review Conferences	94
	Concluding Remarks	96
4	The Testing of Nuclear Weapons	98
	Nuclear Testing by the NPT Nuclear-Weapon States	99
	Nuclear Testing by the United States	99
	Nuclear Testing by the Soviet Union	101

<i>Contents</i>		vii
	Nuclear Testing by the United Kingdom	103
	Nuclear Testing by France	103
	Nuclear Testing by China	104
	The International Legal Regimes for Nuclear Testing	104
	The 1959 Antarctic Treaty	105
	The 1963 Partial Test-Ban Treaty	107
	The 1966 Outer Space Treaty	110
	The 1974 Threshold Test-Ban Treaty	111
	The 1996 Comprehensive Nuclear-Test-Ban Treaty	112
	The Negotiation of the Treaty	112
	The Content of the Treaty	113
	The 2017 Treaty on the Prohibition of Nuclear Weapons	114
	Explosive Nuclear Testing under Customary International Law	115
5	Agreements between Russia and the United States	118
	The 2010 New Strategic Arms Reduction Treaty (New START)	119
	The Negotiation of New START	119
	The Content of New START	122
	The 1987 Intermediate-Range Nuclear Forces (INF) Treaty	126
	The Strategic Arms Limitation Talks (SALT)	129
	The 1972 Anti-Ballistic Missile Treaty	130
	The 1972 Strategic Arms Limitation Treaty (SALT I)	132
	The 1979 Strategic Arms Limitation Treaty (SALT II)	133
	The Strategic Arms Reduction Treaties (START)	135
	START I	135
	START II	136
	START III	137
	The SORT Treaty	138
	Concluding Remarks	139
6	Treaties Prohibiting Nuclear Weapons	141
	The Regional Nuclear Prohibition Treaties	142
	The 1959 Antarctic Treaty	142
	The 1966 Outer Space Treaty	142
	The 1967 Tlatelolco Treaty	144
	The 1970 Sea-Bed Treaty	147
	The 1985 Treaty of Rarotonga	148
	The 1995 Bangkok Treaty	150
	The 1996 Pelindaba Treaty	151
	The 2006 Treaty of Semipalatinsk	153
	The Nuclear-Weapon-Free 'Status' of Mongolia	154
	The Conferences of Nuclear-Weapon-Free Zones and Mongolia	155
	The Proposal for a Nuclear-Weapon-Free Zone in the Middle East	155
	The Treaty on the Prohibition of Nuclear Weapons	156
	The Negotiation of the TPNW	157

	The Prohibitions in the TPNW	159
	Positive Obligations of States Parties	162
	The Declaration of Nuclear Status	163
	National Implementation Measures	164
	The Duty to Promote the Universalisation of the TPNW	165
	Victim Assistance	166
	Environmental Remediation of Irradiated Land	167
	Disarmament Obligations	169
	The Obligations of International Cooperation and Assistance	170
	Verification of Compliance	171
	Safeguards Agreements	171
	The First Meeting of States Parties	172
	The Impact of the TPNW	172
7	Verification	174
	Verification of Testing	175
	Verification of the Treaty Prohibitions of Explosive Nuclear Testing	175
	Project Vela	175
	Verification of the CTBT	177
	The International Monitoring System	177
	On-Site Inspections under the CTBT	179
	Verification of the Prohibition of Testing under the TPNW	179
	Preventing the Proliferation of Nuclear Weapons	180
	The Development of IAEA Safeguards	180
	The IAEA Safeguards	181
	The Comprehensive Safeguards Agreement	181
	IAEA Safeguards and Iran's Nuclear Weapons Programme	182
	IAEA Safeguards and Iraq's Nuclear Weapons Programme	184
	IAEA Safeguards and Libya's Nuclear Weapons Programme	185
	IAEA Safeguards and the Risk of Proliferation in Saudi Arabia	186
	The IAEA Additional Protocol	186
	Iran and the Additional Protocol	187
	Verification of Destruction of Nuclear Weapons	188
	The INF Treaty's Verification Regime	189
	Verification of Compliance with the TPNW	191
	Verification of Deployed and Non-deployed Weapons	192
	Verification under New START	193
	Reporting and Missile Identification	194
	Telemetric Data	194
	Inspections	195
	The Open Skies Treaty	195
	Concluding Remarks	196
8	Use and Testing of Nuclear Weapons under International Law	198
	International Law Governing the Use of Nuclear Weapons	199

<i>Contents</i>	ix
Jus ad bellum	199
Necessity <i>ad bellum</i>	201
Proportionality <i>ad bellum</i>	201
International Humanitarian Law	202
The Principle of Distinction	203
Belligerent Reprisals	206
The Principle of Proportionality	208
The Superfluous Injury Principle	208
International Human Rights Law	210
The Law of Neutrality	211
International Environmental Law	211
Responsibility under International Law for Unlawful Use or Testing of Nuclear Weapons	212
State Responsibility	212
Individual Criminal Responsibility	216
Use of Nuclear Weapons as a Crime of Aggression	217
Use of Nuclear Weapons as a War Crime	220
Use of Nuclear Weapons as a Crime against Humanity	223
Use of Nuclear Weapons as an Act of Genocide	224
Concluding Remarks on the Future of Nuclear Arms Control and Disarmament	226
<i>Select Bibliography</i>	229
<i>Index</i>	235