

Contents

<i>List of illustrations</i>	xvi
<i>List of contributors</i>	xxiii
<i>Foreword</i>	xxv
<i>Preface to eighth edition</i>	xxvi
<i>Preface to first edition</i>	xxvii
 Part 1 Law	 1
1.1 Explaining the law B. Watts	3
1.1.1 Introduction	3
1.1.2 The incident	3
1.1.3 Some possible actions arising from the incident	3
1.1.4 Legal issues of the incident	4
1.1.5 Criminal and civil law	4
1.1.6 Branches of law	5
1.1.7 Law and fact	6
1.1.8 The courts	7
1.1.9 Judicial precedent	14
1.1.10 Court procedure	15
1.1.11 Identity of court personnel	20
1.1.12 Employment Tribunals	22
1.1.13 European Community Courts (ECJs)	23
1.1.14 Human Rights Courts	25
1.1.15 Sources of English law	25
1.1.16 Legislation	26
1.1.17 Safety legislation before the Health and Safety at Work etc. Act	32
1.1.18 Safety legislation today	33
1.1.19 Principles developed by the courts	36
 1.2 Principal health and safety Acts S. Simpson	 44
1.2.1 The Health and Safety at Work etc. Act 1974	44
1.2.2 The Factories Act 1961	53
1.2.3 Fire precautions	53
1.2.4 The Mines and Quarries Acts 1954–1971	53
1.2.5 The Environmental Protection Act 1990	54
1.2.6 The road traffic Acts 1972–1991	54

1.2.7	The Public Health Act 1936	55
1.2.8	The Petroleum (Consolidation) Act 1928	55
1.2.9	Activity Centres (Young Persons Safety) Act 1995	55
1.2.10	Crown premises	56
1.2.11	Subordinate legislation	56
1.3	Influences on health and safety J. R. Ridley	60
1.3.1	Introduction	60
1.3.2	The Robens Report	60
1.3.3	Delegation of lawmaking powers	61
1.3.4	Legislative framework for health and safety	62
1.3.5	Self-regulation	63
1.3.6	Goal-setting legislation	64
1.3.7	European Union	65
1.3.8	European standards	68
1.3.9	Our social partners	69
1.3.10	Social expectations	70
1.3.11	Public expectations	70
1.3.12	Political influences	71
1.3.13	Roles in health and safety	72
1.3.14	Safety culture	72
1.3.15	Quality culture	73
1.3.16	No-fault liability	73
1.3.17	Risk assessments	74
1.3.18	Risk aversion	75
1.3.19	Conclusion	76
1.4	Law of contract R. W. Hodgkin	78
1.4.1	Contracts	78
1.4.2	Contracts of employment	81
1.4.3	Employment legislation	82
1.4.4	Law of sale	84
1.4.5	Specialised legislation affecting occupational safety advisers	86
1.5	Employment law S. Ali (with acknowledgements to R. D. Miskin)	90
1.5.1	Introduction	90
1.5.2	Employment law	90
1.5.3	Statutory rights of workers and employees	91
1.5.4	Equality Act 2010	92
1.5.5	The employment of children and young persons	97
1.5.6	Health and Safety Representative	98
1.5.7	Working time	99
1.5.8	Disciplinary procedures	101
1.5.9	Dismissal	103
1.5.10	Summary	113

1.6 Consumer protection	R. G. Lawson	117
1.6.1	Fair conditions of contract	117
1.6.2	A fair quality of goods and services	125
1.6.3	Product safety	126
1.6.4	Product liability	131
1.6.5	Misleading advertising	134
1.6.6	Exclusion clauses	135
1.6.7	Distance selling	138
1.6.8	Stop now orders	139
1.6.9	Consumer redress	140
1.7 Insurance cover and compensation	A. West	143
1.7.1	Workmen's Compensation and the State insurance scheme	143
1.7.2	Employer's liability insurance	145
1.7.3	Public Liability insurance	151
1.7.4	Investigation, negotiation and the quantum of damage	152
1.7.5	General	156
1.8 Civil liability	E. J. Skellett (updated by D. Greenhalgh)	157
1.8.1	Introduction	157
1.8.2	The common law and its development	157
1.8.3	The law of tort	158
1.8.4	Occupier's Liability Acts 1957 and 1984	162
1.8.5	Supply of goods	163
1.8.6	Employer's liability	164
1.8.7	Employer's Liability (Defective Equipment) Act 1969	166
1.8.8	Health and Safety at Work etc. Act 1974	167
1.8.9	Defences to a civil liability claim	167
1.8.10	Volenti non fit injuria	168
1.8.11	Limitation	168
1.8.12	Assessment of damages	169
1.8.13	Fatal accidents	170
1.8.14	'No fault' liability system	171
Part 2 The management of risk		173
2.1 An introduction to risk management	J. E. Channing	175
2.1.1	Introduction	175
2.1.2	The components of risk	177
2.1.3	Strategies to control risk	180
2.1.4	Risk management in the twenty-first century	183
2.2 Principles of the management of risk	L. Bamber	186
2.2.1	Principles of action necessary to prevent accidents	186
2.2.2	Definitions of hazard, risk and danger	187
2.2.3	Risk management	188
2.2.4	Loss control	192

2.2.5	Degrees of hazard	196
2.2.6	Accident causation models	197
2.2.7	Accident prevention: legal, humanitarian and economic reasons for action	199
2.3	Risk management: organisation and administration for safety	
	J. E. Channing	204
2.3.1	Introduction	204
2.3.2	Organisation structure models	205
2.3.3	Roles and responsibilities	209
2.3.4	Work groups	211
2.3.5	Organisational theory	212
2.3.6	Organisational techniques	215
2.3.7	Culture	218
2.3.8	Potential problems	219
2.3.9	The role of specialists in the organisation	221
2.3.10	Conclusion	223
2.4	Risk management: techniques and practices L. Bamber	224
2.4.1	Risk identification, assessment and control	224
2.4.2	Job safety analysis	230
2.4.3	System safety	235
2.4.4	Systems theory and design	237
2.4.5	System safety engineering	239
2.4.6	Fault tree analysis	240
2.4.7	Probabilistic risk assessments	241
2.4.8	Health and safety in design and planning	243
2.4.9	Quality, Environment, Safety and Health Management Systems (QUENSH)	245
2.4.10	Use of data on accidents	247
2.4.11	Maintenance systems and planned maintenance	248
2.4.12	Damage control	249
2.4.13	Cost effectiveness of risk management	250
2.4.14	Performance evaluation and appraisal	253
2.4.15	Loss control profiling	256
2.5	The collection and use of accident and incident data A. J. Boyle	261
2.5.1	Introduction	261
2.5.2	Types of accident and incident data	261
2.5.3	Collection of accident and incident data	265
2.5.4	Legal requirements to notify accidents and incidents	268
2.5.5	The use of accident and incident data	268
2.5.6	Epidemiological analysis	276
2.5.7	Accident investigation	278
2.5.8	Accident and incident data and risk assessment data	288
2.5.9	The use of computers	289
	Appendix. UK requirements for reporting accidents and incidents	294

2.6	Practical safety management: systems and techniques	J. E. Channing	298
2.6.1	Introduction		298
2.6.2	Legal obligations		299
2.6.3	Generic safety management		300
2.6.4	Implementing a regulation within a safety management system		304
2.6.5	Safety management and housekeeping		310
2.6.6	Assessment techniques		312
2.6.7	Proprietary audit systems		316
2.6.8	Safety systems and incidents		317
2.6.9	Learning organisations		318
2.6.10	Safety management systems in small organisations		320
2.6.11	Risk profiling		321
2.6.12	Limitations of safety systems		340
2.6.13	Conclusion		340
2.7	The individual and safety	A. Hale	343
2.7.1	Introduction: What does this chapter try to do?		343
2.7.2	Individuals as controllers of danger		345
2.7.3	Behavioural science and the human information processor		349
2.7.4	Individual behaviour in the face of danger		364
2.7.5	Change		384
2.7.6	Conclusion		395
2.8	Risk management and behaviour modification	J. E. Channing	400
2.8.1	Introduction		400
2.8.2	Behaviour modification for employees		402
2.8.3	Behaviour modification for managers and supervisors		412
2.8.4	Applying behaviour concepts to incident investigation		416
2.8.5	Behaviour concepts and the safety management system		417
2.8.6	Risk, behaviour, leadership and commitment		419
2.8.7	Behaviour modification processes: the hazards		421
2.8.8	Behaviour and safety culture		421
2.8.9	Conclusion		423
2.9	Using the Risk Management Standard ISO 31000 to support Health and Safety	N. Dennis	427
2.9.1	Choosing a risk management system		427
2.9.2	The advantages of using standards		428
2.9.3	The process of generating standards		428
2.9.4	Why a risk management standard?		429
2.9.5	A definition of risk		429
2.9.6	Principles for managing risk		431
2.9.7	Introducing the risk management framework		432
2.9.8	Key components in framework design		433
2.9.9	Establishing the risk management policy		434
2.9.10	Risk appetite		434
2.9.11	Implementing the framework		435

2.9.12	The risk management process	436
2.9.13	Establishing the context	437
2.9.14	Risk criteria	437
2.9.15	Risk assessment	438
2.9.16	Risk treatment	440
2.9.17	Monitoring and recording	441
Part 3	Occupational health and hygiene	443
3.1	The structure and functions of the human body T. Coates	445
3.1.1	Introduction	445
3.1.2	History	445
3.1.3	The functions of an occupational health department	447
3.1.4	Overseas developments	448
3.1.5	Risks to health at work	449
3.1.6	Occupational hygiene	449
3.1.7	First aid at work	450
3.1.8	Basic human anatomy and physiology	452
3.1.9	Cancer and other problems of cell growth	465
3.1.10	The body's defence mechanisms	466
3.1.11	Factors determining the effect of substances in the body	467
3.1.12	The assessment of risk to health	468
3.2	Occupational diseases A. R. L. Clark	470
3.2.1	Introduction	470
3.2.2	Toxicology	470
3.2.3	Diseases of the skin	474
3.2.4	Diseases of the respiratory system	477
3.2.5	Diseases from metals	481
3.2.6	Pesticides	486
3.2.7	Solvents	486
3.2.8	Gassing	491
3.2.9	Oxygen deficiency	493
3.2.10	Occupational cancer	494
3.2.11	Physical agents	496
3.2.12	Ionising radiations	497
3.2.13	Noise-induced hearing loss	500
3.2.14	Working in heat	502
3.2.15	Work-related upper limb disorders (WRULD)	503
3.2.16	Diseases due to micro-organisms	504
3.2.17	Psychosocial disorders	507
3.2.18	Target organs	508
3.3	Occupational hygiene C. Hartley	512
3.3.1	Recognition	512
3.3.2	Evaluation	513

3.3.3	Control measures	529
3.3.4	Summary	536
3.4	Radiation A. D. Wrixon (updated by P. Shaw and M. Maslanyj)	539
3.4.1	Introduction	539
3.4.2	Structure of matter	539
3.4.3	Radioactivity	540
3.4.4	Ionising radiation	540
3.4.5	Biological effects of ionising radiation	541
3.4.6	Quantities and units	542
3.4.7	Basic principles of radiological protection	543
3.4.8	Legal requirements	547
3.4.9	Health Protection Agency	550
3.4.10	Incidents and emergencies	550
3.4.11	Non-ionising radiation	551
3.5	Noise and vibration R. W. Smith (updated by T. Bramer)	557
3.5.1	What is sound?	557
3.5.2	Other terms commonly found in acoustics	560
3.5.3	Transmission of sound	563
3.5.4	The sound level meter	564
3.5.5	The ear	565
3.5.6	The equivalent noise level	567
3.5.7	Community noise levels	567
3.5.8	Work area noise levels	568
3.5.9	Noise control techniques	570
3.5.10	Vibration	577
3.5.11	Summary	579
3.6	Workplace pollution, heat and ventilation F. S. Gill	581
3.6.1	Methods of assessment of workplace air pollution	582
3.6.2	Measurement of the thermal environment	585
3.6.3	Standards for workplace environments	586
3.6.4	Ventilation control of a workplace environment	587
3.6.5	Assessment of performance of ventilation systems	589
3.7	Lighting E. G. Hooper (updated by J. David)	593
3.7.1	Introduction	593
3.7.2	The eye	593
3.7.3	Eye conditions	594
3.7.4	Definitions	595
3.7.5	Types of lighting	597
3.7.6	Illuminances	598
3.7.7	Factors affecting the quality of lighting	600
3.7.8	Emergency lighting	603
3.7.9	Recycling and dangerous substances	603
3.7.10	Use of light measuring instruments	603

3.8 Applied ergonomics	J. R. Ridley (updated by N. Cook)	606
3.8.1	Introduction	606
3.8.2	Physiology	608
3.8.3	Working environment	620
3.8.4	Manual handling	625
3.8.5	Repetitive actions	626
3.8.6	Plant design	627
3.8.7	Controls and indicators	627
3.8.8	Noise and vibrations	630
3.8.9	Stress	631
3.8.10	Display screen equipment (DSE)	632
3.8.11	Signs and signals	633
3.8.12	The written word	634
3.8.13	The diseases of inactivity	634
3.8.14	Coda	635
Part 4 Workplace safety		639
4.1 Science in engineering safety	J. R. Ridley	641
4.1.1	Introduction	641
4.1.2	Structure of matter	641
4.1.3	Properties of chemicals	643
4.1.4	Physical properties	647
4.1.5	Energy and work	652
4.1.6	Mechanics	653
4.1.7	Strength of materials	654
4.1.8	Modes of failure	656
4.1.9	Testing	657
4.1.10	Hydraulics	657
4.1.11	Summary	658
4.2 Fire precautions	R. Chalklen	660
4.2.1	Introduction	660
4.2.2	Basic fire technology	661
4.2.3	Fire hazards and their control	663
4.2.4	Fire alarms and detectors	666
4.2.5	Classification of fires	673
4.2.6	Portable firefighting equipment	675
4.2.7	Fixed firefighting equipment	681
4.2.8	Fire safety signs	687
4.2.9	Means of escape in case of fire	689
4.2.10	Fire engineering	692
4.2.11	Fire protection measures	693
4.2.12	Legal requirements	696
4.2.13	Fire risk assessment	702
4.2.14	Access and facilities for the fire brigade	704
4.2.15	Fire terminology	705

4.3 Safe use of machinery	J. R. Ridley (updated by A. Spain)	713
4.3.1	Introduction	713
4.3.2	Strategy for selecting safeguards	720
4.3.3	Safeguarding techniques	722
4.3.4	Powered trucks	733
4.3.5	Lifting equipment	736
4.3.6	Pressure systems	743
4.3.7	Coda	747
4.4 Electricity	E. G. Hooper (updated by C. Buck and A. Spain)	752
4.4.1	Alternating and direct currents	752
4.4.2	Electricity supply	753
4.4.3	Statutory requirements	754
4.4.4	Voltage levels	756
4.4.5	Electrical accidents	756
4.4.6	The basic electrical circuit	756
4.4.7	Dangers from electricity	758
4.4.8	Protective means	760
4.4.9	Competence	763
4.4.10	Permits-to-work	764
4.4.11	Static electricity	766
4.4.12	Use of electricity in adverse or hazardous environments	767
4.4.13	Electrical equipment in flammable atmospheres	767
4.4.14	Portable tools	770
4.4.15	Residual current devices	771
4.4.16	Maintenance	772
4.4.17	Conclusion	772
4.5 Statutory examination of plant and equipment	J. McMullen (updated by C. Sinclair)	776
4.5.1	Introduction	776
4.5.2	Legislation	777
4.5.3	Pressure systems	777
4.5.4	Lifting equipment	781
4.5.5	Power presses and press brakes	788
4.5.6	Local exhaust ventilation	789
4.5.7	Electrical equipment and installations	791
4.5.8	Other considerations	793
4.5.9	Conclusion	795
4.6 Safety on construction sites	R. Hudson	801
4.6.1	Construction accidents	801
4.6.2	Safe working in the industry	802
4.6.3	Construction site hazards	805
4.6.4	Access	816
4.6.5	Lifting and Equipment Operations	819
4.6.6	Welfare facilities	822
4.6.7	Other relevant legislation	823

4.7 Managing chemicals safely	J. Adamson	829
4.7.1	Introduction	829
4.7.2	Chemical data	829
4.7.3	Source of information	830
4.7.4	Risk assessments	831
4.7.5	Minimising the risk	835
4.7.6	Legislative requirements	838
4.7.7	Storage of substances	844
4.7.8	Transport	847
4.7.9	Plant and process design	849
4.7.10	Further safety studies	856
4.7.11	Plant modifications	857
4.7.12	Safe systems of work	857
4.7.13	Laboratories	859
4.7.14	Emergency procedures	861
4.7.15	REACH	862
4.7.16	Conclusions	862
Part 5 The environment		867
5.1 The environment: issues, concepts and strategies	J. E. Channing	869
5.1.1	Introduction	869
5.1.2	Environmental predictions	870
5.1.3	Sustainable development	871
5.1.4	Environmental hazards	873
5.1.5	Evaluating environmental risks	876
5.1.6	Environmental control strategies	880
5.1.7	Conclusion	881
5.2 Environmental management systems	J. E. Channing	884
5.2.1	Introduction	884
5.2.2	Establishing an environmental management system	885
5.2.3	Additional EMAS requirements	894
5.2.4	Conclusions	894
5.3 Waste management	S. Moss	896
5.3.1	Introduction	896
5.3.2	Waste authorities	897
5.3.3	National waste strategies	898
5.3.4	Defining waste	899
5.3.5	The waste hierarchy	901
5.3.6	Waste management in practice	902
5.3.7	Waste minimisation	916
5.3.8	Other waste management legislation	925
5.3.9	The cost of failure to manage waste effectively	926
5.3.10	Conclusion	928

5.4 Chemicals and the environment	J. L. Adamson	932
5.4.1	Introduction	932
5.4.2	Chemical data	932
5.4.3	Risk reduction	933
5.4.4	The Environmental Protection Act 1990 (EPA)	933
5.4.5	Minimising environmental harm	937
5.4.6	Air pollution: control measures and abatement techniques	940
5.4.7	Monitoring atmospheric pollution	941
5.4.8	Control of water pollution	944
5.4.9	Groundwater pollution	946
5.4.10	Waste disposal and Duty of Care	947
5.4.11	Reuse or recycling of industrial waste	955
5.4.12	Environmental management systems	955
5.4.13	Conclusion	957
5.5 The environment at large	G. N. Batts	960
5.5.1	Introduction	960
5.5.2	Environmental issues	961
5.5.3	The environment and the media	966
5.5.4	The global impact of environmental issues	967
5.5.5	Ethical investing and green procurement	968
5.5.6	Increasing environmental legislation, controls and public reporting	969
5.5.7	End-of-pipe control	970
5.5.8	Polluter pays	971
5.5.9	Producer or shared responsibility	972
5.5.10	Environmental management system (EMS) and sustainable development	973
5.5.11	Corporate social responsibility	974
Appendix 1	The Institution of Occupational Safety and Health	979
Appendix 2	Reading for the NEBOSH level 6 Diploma examination	980
Appendix 3	List of abbreviations	982
Appendix 4	Organisations providing safety information	988
Appendix 5	List of Statutes, Regulations and Orders	991
Appendix 6	List of cases	1000
<i>Index</i>		1005