

Table of Contents

ACKNOWLEDGMENTS	V
INTRODUCTION	VII

PART I. THE ANALYTICAL TOOLS

CHAPTER 1. THE CRITICAL ROLE OF RISK AND COST	3
1.1000. Chemical Risk	4
1.1100. Introduction to Chemical Toxicity	4
1.1110. The Mechanism of Cancer Toxicity	5
Joseph V. Rodricks, Calculated Risks: The Toxicity and Human Health Risks of Chemicals in Our Environment	5
1.1111. Thresholds	7
1.1112. Setting Regulatory Standards	7
1.1113. Cancer Incidence and Cancer Death Rates	7
1.1120. The Characteristics of Carcinogens	8
1.1130. Regulatory Consequences	9
1.2000. Risk Assessment	9
1.2100. The Risk Assessment Process	10
National Research Council, Risk Assessment in the Federal Government: Managing the Process	10
1.2110. Hazard Identification	12
1.2120. Dose-Response Assessment	15
1.2121. Uncertainty and Default Assumptions	16
1.2122. Choosing the Response to Measure	17
1.2130. Exposure Assessment	17
1.2131. Conservative Assumptions	21
1.2132. Gender and Age	21
1.2140. Risk Characterization	22
1.2141. The Final Step	23
1.2142. Risk Levels	23
1.2143. Why Quantify?	23
1.2144. Multiple Conservatism	24
1.2200. The Risk Assessment Data Gap	24
1.2210. Chemical Risk Assessment in Environmental Statutes	26
1.2220. The Data Gap and the Market	27
1.2230. Roles and Responsibilities	27
1.3000. Risk Management	27
The Presidential/Congressional Commission on Risk Assessment and Risk Management, Risk Assessment and Risk Management in Regulatory Decision-Making	28
1.3100. Risk Perception and Risk Management	30
Paul Slovic & Elke U. Weber, Perception of Risk Posed by Extreme Events	30

	1.3110. A Richer Conception of Risk	33
	1.3120. Perceptions of Risk from Toxic Substances	33
	1.3130. Risk Ranking	34
	1.3140. The Vicious Circle	34
1.3200.	The Risk Management Toolbox.....	34
1.3300.	The Precautionary Principle	35
	Christopher H. Schroeder, Perspective: The Precautionary Principle.....	36
	Jonathan Adler, The Problems with Precaution: A Principle without Principle.....	38
	1.3310. Precaution and Cost-Benefit.....	39
	1.3320. The Costs of Precautionary Risk Management.....	40
	1.3330. The Burden of Proof	40
1.4000.	Cost-Benefit Analysis	40
1.4100.	The Case for Cost-Benefit Analysis	41
	Cass R. Sunstein, Cost-Benefit Analysis and Arbitrariness Review.....	41
1.4200.	The Rise of Cost-Benefit Analysis for Managing Risk	42
	1.4210. The Cost-Benefit Executive Orders.....	43
	1.4220. A Judicial Requirement	44
1.4300.	The Practice of Cost-Benefit Analysis	44
	Office of Management and Budget Circular A-4.....	44
1.4400.	Critiques of Cost-Benefit Analysis.....	46
	Frank Ackerman and Lisa Heinzerling, Priceless: On Knowing the Price of Everything and the Value of Nothing.....	47
	1.4410. The Affirmative Case for Cost-Benefit Analysis	48
	1.4420. The Value of a Human Life	48
	1.4430. Discount Rates.....	49
CHAPTER 2. APPROACHES TO SETTING REGULATORY STANDARDS.....		51
2.1000.	Prevention and Precaution	52
	2.1100. The <i>Lead Industries</i> Case.....	52
	2.1200. Prevention in the Context of Threshold Effects.....	52
	2.1300. Prevention, Margin of Safety, and Cost	53
	2.1400. Prevention and the Precautionary Principle.....	54
2.2000	Hazard.....	54
	2.2100. Zero-Risk Legislation.....	54
	2.2110. The Delaney Clause	55
	2.2120. The <i>De Minimis</i> Interpretation	56
	2.2121. Judicial Rejection of <i>De Minimis</i>	57
	2.2122. Is a Zero-Risk Standard Counterproductive?	58
	2.2123. FDA's "Constituents" Policy.....	59
	2.2130. Rethinking the Zero-Risk Standard.....	59
	2.2131. The SWEETEST Act	59
	2.2132. The Food Quality Protection Act of 1996	60
2.2200.	Precautionary Legislation	62
	2.2210. The "Endangerment" Standard.....	62
	2.2220. The <i>Reserve Mining</i> Case.....	63
	2.2230. Precaution in Other Statutes	66

2.3000.	Feasibility	67
2.3100.	The Occupational Safety and Health Act	68
2.3200.	The <i>Benzene</i> Case.....	69
2.3210.	The <i>Benzene</i> Plurality	69
2.3211.	The Generic Cancer Policy	69
2.3212.	The Two-Step Analysis for Carcinogens	70
2.3213.	Burden of Proof.....	71
2.3214.	Precision in Regulation of Carcinogens.....	72
2.3215.	The Role of Cost	74
2.3220.	The Other <i>Benzene</i> Opinions	75
2.3221.	The Nondelegation Concurrence	75
2.3222.	The Dissent	76
2.3230.	The Aftermath of <i>Benzene</i>	76
2.3300.	The <i>Cotton Dust</i> Case	77
2.3310.	“Feasibility Analysis”	78
2.3320.	The Meaning of “Feasible”	80
2.3330.	The Case for Technology-Based Regulation	82
2.4000.	Best Available Technology	83
2.4100.	The Pre-1990 Clean Air Act	84
2.4110.	The Original Hazardous Air Pollutants Text	84
2.4120.	The <i>Vinyl Chloride</i> Case	86
2.4121.	Comparing the <i>Benzene</i> Case.....	87
2.4122.	Establishing an “Acceptable” Risk Level	87
2.4123.	The Response to <i>Vinyl Chloride’s</i> Analysis.....	88
2.4200.	The 1990 Clean Air Act Amendments	89
2.4210.	Overview of the New Section 112.....	89
2.4220.	Listing	90
2.4230.	Source Categories.....	91
2.4240.	Maximum Achievable Control Technology (MACT)	92
2.4241.	The Two-Step MACT Process	92
2.4242.	“Achieved” and “Achievable”	93
2.4243.	Pollutant-by-Pollutant Regulation	93
2.4244.	Adjusting the MACT’s Stringency	94
2.4250.	Residual Risk.....	95
2.4251.	A Range for Residual Risks.....	96
2.4252.	More Flexibility	97
2.4260.	Schedule.....	97
2.4270.	Voluntary Reduction Program.....	98
2.4300.	Lessons Learned	99
2.5000.	Information Disclosure.....	99
2.5100.	EPCRA and the Toxics Release Inventory	100
2.5110.	The Right-to-Know Provisions.....	100
2.5120.	The Toxics Release Inventory.....	101
2.5130.	Environmental Justice.....	102
2.5140.	Standing and the Right to Know.....	103
2.5200.	California Proposition 65.....	104
2.5210.	Regulatory Innovations in Proposition 65	104
2.5220.	The Impact of Proposition 65.....	105
2.5230.	The Quality of the Standards	106

	2.5240. Consumer Information.....	107
	2.5250. Federal Preemption.....	107
	2.5260. Green Chemistry	108
2.5300.	The Food Quality Protection Act of 1996	109
2.6000.	The Cost of Regulating	110
2.6100.	The Safe Drinking Water Act.....	110
	2.6110. MCLGs and MCLs.....	111
	2.6120. The 1996 Amendments to the SDWA	111
	2.6130. Moving from an MCLG to an MCL	112
	2.6131. Setting a Zero MCLG	114
	2.6132. Review and Notice	114
	2.6140. The SDWA and the FQPA	115
2.6200.	The Supreme Court and Cost.....	115
	2.6210. <i>American Trucking</i> : Forbidding Consideration of Cost.....	116
	2.6211. The Nondelegation Doctrine Revisited.....	116
	2.6212. A Cost-Benefit Presumption?.....	117
	2.6220. <i>Entergy</i> : Permitting Consideration of Cost.....	119
	2.6221. Cost and BAT.....	119
	2.6222. “The Cost-Benefit State”	121
	2.6230. <i>Michigan v. EPA</i> : Requiring Consideration of Cost.....	122
	2.6231. “Appropriate and Necessary”	123
	2.6232. The Cost-Benefit Executive Orders	124
	2.6240. Evolving Views on the Role of Cost.....	125
2.7000.	Toward “Unreasonable Risk”	125

**PART II. LIMITING ACCESS TO TOXIC SUBSTANCES IN MARKETS:
PESTICIDE AND CHEMICAL REGULATIONS**

	CHAPTER 3. REGULATION OF PESTICIDES UNDER THE FEDERAL INSECTICIDE, FUNGICIDE AND RODENTICIDE ACT (FIFRA) AND THE FEDERAL FOOD, DRUG AND COSMETIC ACT (FFDCA)	131
3.1000.	The Pesticides Problem	131
	3.1100. Pesticide Benefits.....	131
	3.1200. Pesticide Risks	131
3.2000.	The Federal Insecticide, Fungicide and Rodenticide Act.....	132
	3.2100. History	132
	3.2200. Overview.....	132
	3.2300. Pesticide Registration.....	133
	3.2310. Standards for Registration	133
	3.2320. The Unreasonable Adverse Effects Standard	134
	3.2330. Data Requirements	135
	3.2340. Labeling	136
	3.2350. Conditional Registration.....	137
	3.2360. Restricted Use Pesticides.....	137
3.2400.	Other Forms of Approval.....	138
	3.2410. Experimental Use Permits	138
	3.2420. Special Local Needs.....	138
	3.2430. Emergency Permits	138

3.2500.	Continuing Duties of Registrants	139
3.2510.	Data Call-In	139
3.2520.	Unreasonable Adverse Effects Reporting	139
3.2530.	Reregistration and Registration Review.....	139
3.2600.	Enforcement	140
3.2700.	Cancellation and Suspension	140
	Environmental Defense Fund Inc. v. E.P.A. (The <i>Heptachlor/Chlordane</i> Case)	142
3.2800.	Preemption	146
3.2900.	Exports and Imports	147
3.3000.	Federal Food, Drug and Cosmetic Act	147
3.4000.	Ongoing Challenges.....	149
3.4100.	Farmworker Safety	149
3.4200.	Threatened and Endangered Species	150
	Washington Toxics Coalition v. EPA	151
3.4300.	Inert Ingredients.....	156
3.4400.	Genetically Modified Organisms (GMO)	156
 CHAPTER 4. REGULATION OF TOXIC SUBSTANCES UNDER THE TOXIC SUBSTANCE CONTROL ACT (TSCA)..... 161		
4.1000.	Overview	161
4.2000.	History of the “Old TSCA”	161
4.3000.	The Frank R. Lautenberg Chemical Safety for the 21st Century Act of 2016	163
4.4000.	EPA Authorities Under TSCA	164
4.4100.	Substances Covered	164
4.4200.	Existing Versus New Chemicals	164
4.4300.	Test Rules	165
4.4400.	Premanufacture Notices	166
4.4500.	Prioritization, Risk Valuation, and Regulation	167
	Corrosion Proof Fittings v. EPA.....	169
	Food & Water Watch, Inc. v. EPA	174
4.4600.	Imminent Hazard	179
4.4700.	Enforcement	179
4.4800.	Preemption	180
4.4900.	Citizens’ Civil Actions.....	180
4.5000.	Citizen’s Petitions.....	181
4.5100.	Judicial Review	182
4.6000.	Chemical Specific Provisions	183
4.6100.	Polychlorinated Biphenyls (PCBs).....	183
4.6200.	Asbestos in Schools	183
4.6300.	Lead-Based Paint.....	184
4.6400.	Radon Gas in Homes.....	184
4.7000.	Recent Developments and Challenges	184

PART III. REGULATING THE DISPOSAL OF HAZARDOUS WASTE
CHAPTER 5. RESOURCE CONSERVATION AND RECOVERY ACT

(RCRA)	189
5.1000. Introduction	189
5.1100. The Background of RCRA	189
5.1200. The Structure of RCRA.....	191
5.1210. Subtitle C	191
5.1220. Subtitle D	191
5.1230. Imminent and Substantial Endangerment Provisions	192
5.1240. Recycled Used Oil.....	192
5.1250. Underground Storage Tanks	192
5.1300. RCRA and State Hazardous Waste Programs	192
5.1400. Researching RCRA.....	193
5.2000. Definition of Hazardous Waste	194
5.2100. The Relationship Between the Statutory and Regulatory Definitions of Solid Waste	194
Notes	195
5.2200. The Subtitle C Regulatory Definition of Solid Waste	196
5.2210. “Discarded” Materials	196
5.2220. Recycled Materials	198
5.2221. The Matrix	198
5.2222. EPA’s Authority to Regulate Recycled Materials Under Subtitle C	201
Notes.....	202
5.2223. Legitimate vs. Sham Recycling.....	203
5.3000. The Subtitle C Regulatory Definition of Hazardous Waste.....	204
5.3100. Listed Wastes	204
5.3200. Characteristic Wastes.....	205
Notes	205
5.3300. Mixture and Derived-From Rules and the Contained-In Interpretation.....	207
Notes	208
5.3400. Exclusions from Classification as a Solid and Hazardous Waste	209
5.3410. Household Hazardous Waste.....	209
5.3420. Domestic Sewage Exclusion	210
5.3430. NPDES Point Source.....	210
5.3440. Special Wastes: Oil and Gas, Mining and Cement Kiln Wastes.....	211
5.3450. Contingent Management	212
5.4000. Regulation of Hazardous Wastes Under Subtitle C.....	212
5.4100. Generators.....	212
5.4110. Large and Small Quantity Generators	213
5.4111. Identification.....	213
5.4112. Reporting and Recordkeeping.....	213
5.4113. On-Site Accumulation and Treatment	213
5.4114. Off-Site Shipment.....	214

	5.4115. Waste Minimization and Pollution Prevention	214
	5.4120. Very Small Quantity Generators	215
	Notes	215
5.4200.	Transporters	216
5.4300.	TSDFs	216
	5.4310. Permit Requirements	217
	5.4311. Technology Standards	217
	5.4312. Closure and Post-Closure Requirements	217
	5.4313. Financial Assurance	218
	5.4314. Groundwater Monitoring and Corrective Action for Releases	218
	5.4315. Corrective Action for SWMUs	218
	5.4320. Permit Process	218
	Notes	219
5.4400.	Land Disposal Restrictions	221
	Notes	222
5.4500.	Regulatory Requirements for Recycled Hazardous Materials	224
	5.4510. General Provisions Regulating Recycling Activity	224
	5.4520. Conditional Exclusion of Reclamation	225
	5.4530. Tailored Regulation of Recycling Activities: Part 266	226
	5.4531. BIF Rules	226
	5.4532. Use Constituting Disposal	227
	Notes	227
5.5000.	Government Enforcement	227
	5.5100. Administrative Orders	228
	5.5200. Civil Actions	229
	5.5300. Criminal Enforcement	230
	Notes	231
	5.5400. Federal/State Enforcement Issues	233
	Notes	234
5.6000.	Citizen Suits	234
	5.6100. § 7002(a)(1)(A): Violation of RCRA Requirements	234
	5.6110. Violation of Subtitle C of RCRA	234
	Notes	236
	5.6120. Open Dumping	236
	Notes	237
	5.6200. Imminent and Substantial Endangerment	238
	Notes	239
5.7000.	International Trade in Hazardous Waste	242
	5.7100. Sources of Authority to Regulate the Export and Import of Hazardous Wastes	244
	5.7110. RCRA	245
	5.7120. Bilateral International Agreements	245
	5.7130. Organization for Economic Cooperation and Development (“OECD”) Waste Decision	245
	5.7200. RCRA Regulatory Requirements for the Export and Import of Hazardous Waste	245
	5.7210. Regulation of the Export of Hazardous Waste	246

	5.7220. Regulation of the Import of Hazardous Waste	246
5.7300.	Regulation of the Import and Export of Hazardous Waste Under the Basel Convention	247
	Notes	247
5.8000.	Environmental Justice	249
5.8100.	The Issue of Environmental Justice	249
	Notes	250
5.8200.	Judicial Response.....	252
5.8300.	Administrative Response.....	253
	5.8310. Environmental Justice Through RCRA.....	253
	5.8320. EPA Title VI Regulations	254
	Notes	256

PART IV. REGULATING THE CLEAN UP OF HAZARDOUS WASTE

CHAPTER 6. CLEAN-UP OF WASTE: THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA)

		261
6.1000.	Overview	261
6.1100.	What Is CERCLA?	262
6.1200.	What Is the Superfund?.....	266
	6.1210. The Problem of Abandoned Mines	267
	Bruce Finley, Troubled Waters	269
	6.1220. The Even Bigger Problem of Natural Resources Industries and the Cleanup of Historic Mining Sites	271
6.1300.	The Under-Funded Superfund.....	273
6.1400.	How to Clean up a Contaminated Site	275
6.2000.	CERCLA in Context	276
6.2100.	Love Canal and the Statute's History	277
	Aldo Svaldi, Northeast Denver Neighborhood Is Nation's Most Polluted.....	280
	Electa Draper, Former Rocky Flats Site Stirs Concerns for Some Neighbors.....	281
6.2200.	CERCLA and RCRA	282
6.2300.	CERCLA and State Law.....	283
6.2400.	CERCLA's Extraterritorial Application	284
6.3000.	The Clean-Up Cornerstones.....	285
6.3100.	The National Contingency Plan (NCP)	285
	6.3110. Evolution of the NCP	285
	6.3120. NCP Procedures	287
	6.3130. NCP Substantive Standards.....	288
6.3200.	The National Priorities List	288
	CTS Corp. v. EPA.....	289
	6.3210. Consequences of an NPL Listing.....	292
	6.3220. Post-Designation Concerns.....	293
	6.3230. Delistings and Deletions	294
6.3300.	Removal Actions.....	294
6.3400.	Remedial Actions	296
	6.3410. Protectiveness.....	298

	6.3420. ARARs.....	299
	Bruce Finley, Drinking Water in Three Colorado Cities Contaminated with Toxic Chemicals above EPA Limits	300
	6.3430. Case Study: ARARs and PCBs	303
	6.3440. Permanence	305
	6.3450. Cost.....	305
	The Quandary of Cost	306
	6.3500. Judicial Review	306
	Notes on Section 113(h) Challenges	309
6.4000.	Liability	310
	6.4100. The Standard of Liability	310
	6.4110. Strict Liability	310
	6.4120. Joint and Several Liability	311
	Burlington Northern and Santa Fe Railway Co. v. United States	314
	6.4130. Retroactive Liability	318
	6.4200. Potentially Responsible Parties	319
	6.4210. Current Owner/Operator	320
	6.4211. Owners	321
	6.4212. Operators.....	323
	6.4220. Past Owners/Operators “At the Time of Disposal”	326
	6.4230. Generators of Waste—Persons Who “Arranged for Disposal or Treatment”	328
	Burlington Northern and Santa Fe Railway Co. v. United States	331
	Issues from Burlington Northern.....	333
	6.4240. Transporters Involved in Site Selection	336
	6.4250. Corporations	337
	6.4251. Officers, Directors, and Employees	337
	6.4252. Parent-Subsidiary.....	339
	United States v. Bestfoods	339
	Follow-Up Issues from Bestfoods	342
	6.4253. Successor Corporations	343
	6.4254. Dissolved Corporations	345
	6.4260. Lenders	346
	6.4270. Fiduciaries, Estates, and Beneficiaries	347
	6.4280. Federal, State, and Local Governments	348
	6.4300. Triggers for Liability.....	349
	6.4310. Hazardous Substances.....	349
	6.4320. Release or Threatened Release	351
	6.4330. Facility	353
	6.4340. A Release Causes the Incurrence of Response Costs	355
	6.4400. Recoverable Costs	357
	6.4410. “All Costs”	358
	6.4420. “Not Inconsistent with the National Contingency Plan”	359
	6.4430. Natural Resource Damages	360
	6.4431. “Natural Resources”	360

	6.4432. Injuries Caused by a “Release”	361
	6.4433. Who May Bring Suit	362
	6.4434. “Damages”	362
6.4500.	Defenses.....	364
	6.4510. CERCLA Statutory Defenses	364
	6.4511. Original CERCLA Defense—Acts of God and Acts of War	365
	6.4512. Original CERCLA Defense—Innocent Landowner	366
	6.4513. The SARA Amendments—Innocent Purchaser Defense	367
	A Note on the BFPP Windfall Lien	371
	Final Thoughts on the Brownfields Act	373
	6.4520. Other Defenses	374
	6.4521. Statute of Limitations	374
	6.4522. Equitable Defenses	374
	6.4523. Indemnity and Hold Harmless Agreements	375
	Other Possibilities for PRPs.....	376
6.5000.	Cost-Recovery Actions and Apportionment of Liability	376
	6.5100. Government Cost-Recovery and Enforcement Actions.....	377
	6.5110. Judicial Relief.....	377
	6.5120. Administrative Orders	379
	6.5200. Settlements and Consent Decrees	380
	Kirk Mitchell, Feds Seek to Recoup Clean-up Costs	381
	6.5210. Major Party Settlements and Consent Decrees	383
	6.5220. <i>De Minimis</i> Settlements	384
	Arizona v. City of Tucson.....	385
	Note on Brownfields.....	390
	6.5300. Private Cost-Recovery Actions	390
	6.5310. “Any Other Person”	391
	6.5320. Causation.....	391
	6.5330. “Necessary Costs of Response”	391
	6.5340. “Consistent with the National Contingency Plan”	392
	6.5400. Cost-Recovery vs. Contribution Actions	393
	United States v. Atlantic Research Corp.	395
	Issues Clarified by <i>Atlantic Research</i>	399
	Jeffrey M. Gaba, <i>United States v. Atlantic Research: The Supreme Court Almost Gets It Right</i>	400
	6.5500. Apportionment of Liability.....	401

PART V. LIABILITY FOR PERSONAL HEALTH INJURIES, AND PROPERTY DAMAGE, THROUGH THE COMMON LAW

CHAPTER 7. TOXIC TORTS.....	407
7.1000. Special Characteristics of a Toxic Tort Case	408
7.1100. Proof of Causation.....	408
7.1200. Evidence and Expert Testimony	414
Notes	419
7.1300. Nature of the Harm and Remedies.....	424

7.1400.	Latent Illness	434
7.1410.	Indeterminate Defendants.....	435
7.1420.	Special Defendants.....	437
7.1500.	“Mass” Tort Litigation: Who Is a Proper Plaintiff?.....	437
	Ebert v. General Mills, Inc.	440
7.1510.	The “Broad” and “Narrow” View of Class Certification	444
7.1520.	Consolidation	444
7.1600.	Insurance.....	445
	Douglas v. Renola Equity Fund	445
	A Note on Comprehensive General Liability Insurance Policies and Their Inevitable “Exclusions”.....	447
7.2000.	The Plaintiff’s Case: The Most Common Legal Theories of Recovery	448
7.2100.	Trespass.....	448
7.2200.	Nuisance	449
	Notes	453
7.2300.	Negligence	454
7.2400.	Strict Liability	455
7.2500.	Products Liability	456
7.2600.	Warranty	457
7.2700.	Fraud and Misrepresentation	458
7.2800.	Statutory Causes of Action.....	458
7.2900.	Employer Liability	460
7.2910.	Other Tort Claims	461
7.2920.	Tort Reform.....	461
7.3000.	The Defendant’s Response	462
7.3100.	Failure to State a Cause of Action in Tort Law	462
	Fischer Estate v. Allied Chemical Co.	463
	Notes	465
7.3200.	Common Law Affirmative Defenses	466
7.3300.	Statutory Defenses.....	467
7.3310.	Statute of Limitations	467
7.3320.	Statutes of Repose	468
7.3330.	Contributory and Comparative Negligence	469
7.3340.	Government Immunity	470
7.4000.	Products Liability Defenses	471
	TABLE OF CASES	475
	INDEX.....	487