

Contents

About the authors	vii
Preface	ix
1 The petroleum industry	1
1.1 Introduction	1
1.2 Oil- and gas-field operations	2
1.3 Gas plant processing operations	13
1.4 Refining and refinery operations	19
1.5 Refining technologies	39
1.6 Further reading	95
References	96
2 The Santa Maria oil sumps	99
2.1 Introduction	99
2.2 Environmental health concerns	99
2.3 Removing total petroleum hydrocarbon from soil	100
2.4 Current procedure to remove decommissioned petroleum sumps	100
2.5 Sump identification and remediation in Santa Maria	101
2.6 Lawsuits	103
2.7 The current and future Santa Maria	103
2.8 Conclusion	104
References	104
3 The Santa Barbara oil spill of 1969	107
3.1 Introduction	107
3.2 The incident	107
3.3 Who was responsible for the accident?	107
3.4 Federal response	108
3.5 Lawsuits	108
3.6 Crude oil and the ocean environment	109
3.7 Specific ecological impact of the Santa Barbara oil spill	109
3.8 Cleanup efforts	110
3.9 Impact on legislation and regulations	110
3.10 Conclusion	111
References	111

4	Exxon Valdez oil spill	113
4.1	Introduction	113
4.2	The event	113
4.3	The environment	114
4.4	Cleanup processes	115
4.5	Environmental justice	116
4.6	Government response	117
	References	118
5	Best practices for developing fugitive emissions inventories	121
5.1	Introduction	121
5.2	Methodology by which emissions inventories are prepared	124
5.3	Inherent flaws that contribute to biased reporting	136
5.4	Toxic Release Inventory	150
5.5	IPCC assessment and best international practices	153
5.6	Closing remarks	174
	References	175
6	Guidelines for cleaner production	179
6.1	Introduction	179
6.2	Best practices	179
6.3	Other best management practices	197
6.4	Strategies for reducing flaring	208
6.5	Sulfur recovery strategies	216
6.6	Strategies for emissions testing programs	218
	References	224
	Appendix	227
	Index	249

Contents

Acknowledgements	vii
About the authors	ix
Preface	xi
1 Wood-preserving chemicals	1
1.1 Introduction	1
1.2 Wood types and products	2
1.3 Chemicals used in preservation	6
References	25
2 Wood-preserving technology	27
2.1 Introduction	27
2.2 General facility overview	27
2.3 Timber preparation	29
2.4 Wood treating	33
3 Pollution and pollution controls	43
3.1 Introduction	43
3.2 Sources of waste and pollution	43
3.3 Drip pads	56
3.4 Fate and transport	65
3.5 Case studies	69
References	80
4 Air pollution from wood treatment	83
4.1 Introduction	83
4.2 Emission sources	84
4.3 Emission factors	85
4.4 Wood-waste burning	115
4.5 Emission factors for other wood manufacturing practices	132
References	133
5 Pollution prevention and best practices for the wood-preserving industry	135
5.1 Introduction	135
5.2 Recommended best management practices and technologies	137
5.3 Cleaner production through gasification	145

5.4	Commitment to pollution prevention and environmental management systems	154
	References	178
6	Sources of air emissions from pulp and paper mills	179
6.1	Introduction	179
6.2	Manufacturing technologies	180
6.3	Chemicals of concern and pollution sources	199
6.4	Regulations	227
6.5	Emission factors	228
6.6	Case studies	229
	References	253
7	Pollution prevention and best practices for the pulp and paper industry	261
7.1	Introduction	261
7.2	General P2 practices	261
7.3	Cleaner production	265
7.4	Audit forms for initial environmental reviews	271
	References	291
	Appendix	293
	Index	343

Contents

1	Industry and Products	1
1.1	Introduction	1
1.2	Fertilizers	2
1.3	Pesticides and Other Agricultural Chemicals	4
1.4	Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)	10
1.5	Manufacturing Technologies	10
2	Pollution and Pollution Prevention	25
2.1	Sources of Pollution	25
2.2	Case Study	25
2.3	Environmental Aspects	53
2.4	Recommended Pollution Prevention and Control Options	56
2.5	Source Reduction Opportunities	59
2.6	Water Management and Technical Challenges	60
2.7	Steam Losses and Sensible Heat Recovery	62
2.8	Pollution Prevention Opportunities	68
3	Toxic and Dangerous Properties	81
4	Atrazine	215
4.1	Introduction	215
4.2	Regulations	215
4.3	How Atrazine Works	216
4.4	Breakdown Products	218
4.5	Water Contamination Issues	219
4.6	Syngenta Atrazine Monitoring Program (AMP)	220
4.7	Health Effects	225
4.8	Atrazine Exposure Case Studies	226
4.9	Atrazine Removal Technologies	228
4.10	Alternatives to Atrazine	229
5	1,2,3-Trichloropropane (TCP)	233
5.1	Introduction	233
5.2	Toxicology and Health Risks	234
5.3	Regulations and Standards	236
5.4	The TCP–DCP Fumigant Link	237
5.5	Groundwater Contamination Case Studies	239
5.6	Another Toxic Soil Fumigant: Dibromochloropropane	239
5.7	Treatment and Remediation Technologies	242

6	DDT and Related Compounds	247
6.1	Introduction	247
6.2	History of DDT: Production and Uses	247
6.3	Distribution, Transport, and Environmental Fate	250
6.4	Impact on Wildlife	252
6.5	Health Effects	253
6.6	Current Use, Malaria Controversy, and Alternatives	255
7	Agent Orange	261
7.1	Introduction	261
7.2	Chemical Composition	261
7.3	Uses in the Vietnam War	262
7.4	Health Effects	264
7.5	Government Response	265
7.6	Litigation	266
7.7	Other Uses	267
8	Pesticide Residue in Foods	269
8.1	Federal Monitoring and Surveillance of Residue Contamination	269
8.2	Modification of Pesticides During Post-Harvest	272
8.3	The Food Quality Protection Act (US EPA, 2008)	272
8.4	Organic Foods	273
8.5	The 'Dirty Dozen'	274
8.6	Measuring Residual Levels (Nasreddine et al., 2002)	275
8.7	Acute Exposures and Contamination Variability	276
9	EPA Screening Levels and Pesticide Status	281
	Index	307