

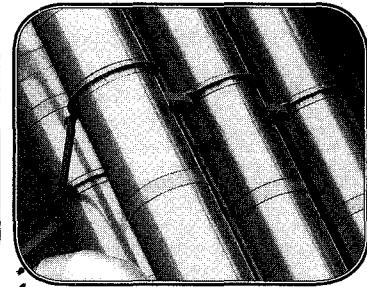
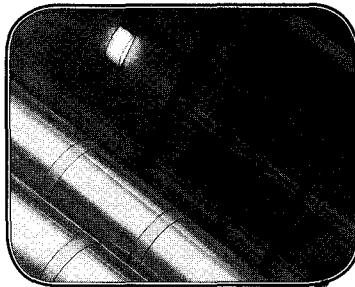
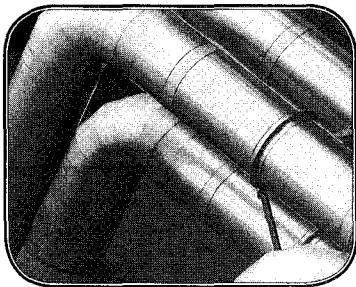
2nd EDITION

SAFETY, HEALTH², and ENVIRONMENTAL CONCEPTS

for the Process Industry

Michael Speegle





Contents

Preface vii

1 The Process Employee's Role in Safety, Health, and Environment	1
Risk in Processing Industries.	2
The Process Employee's Role	4
The Management of Safety	6
The Process Employee and Change.	6
2 History of the Safety and Health Movement.	15
Overview of the Safety Movement in the United States	16
History of Occupational Health.	17
Development of Accident Prevention Programs	20
The Safety and Health Movement Today	23
3 Accidents and Human Error	27
Benefits of Accident Investigations	28
The Cost of Accidents at Work	30
Work Injuries	31
Estimating the Cost of Accidents	33
Partial List of Major Industrial Accidents (1917 To 1985)	34
The Human Factor	35
Human Error	35
Safety Promotion to Prevent Errors.	38
4 Hazard Recognition	45
Physical Hazards	46
Health Hazards	51
5 Toxic Hazards and Blood-Borne Pathogens.	55
Toxic Substances	56
Mechanisms of Toxic Agents.	57
Routes of Exposure	61
Measurement of Toxicity.	63
Blood-Borne Pathogens.	65

Contents

6 Fire and Fire Hazards	69
Fire Hazards.....	71
Firefighters.....	73
Fire Detection, Suppression, and Fighting Systems	73
Types of Fire Fighting Equipment.....	76
7 Hazards of Pressure, Steam, and Electricity.....	81
Hazards of Pressure.....	82
Other Pressure Hazards.....	84
Hazards of Steam.....	86
Hazards of Electricity	88
8 Noise and Vibration Hazards.....	97
Sound.....	98
Hearing Loss	99
Noise Hazard Standards and Regulations	100
Noise Assessment	101
Hearing Protection Devices.....	103
Other Vibration Effects Besides Noise	104
9 Hazards of Temperature	107
The Body's Response to Heat	108
Thermal Burns.....	111
Chemical Burns	113
Hazards of Cold.....	114
10 Hazards of Process Sampling	119
Hazards of Collecting Samples	120
Gas Detectors	122
11 Engineering Control of Hazards.....	129
Hazard Control	130
Types of Engineering Controls	132
Monitoring Devices.....	139
Isolation, Lockouts, Lockins, and Interlocks	141
12 Administrative Control of Hazards	145
Administrative Programs.....	146
Administrative Activities	151
13 Personal Protective Equipment (PPE)	161
The Personal Protective Equipment Program	162
Levels of PPE Protection	163
Chemically Resistant Suits	167
Gloves and Hand Protection	169
Head Protection	170

Foot Protection (1910.136)	171
Fire Retardent Clothing	172
Eye Protection	172
Height and Fall Protection	173
Height Protection	174
Fall Protection	175
14 Hazard Communication (HAZCOM)	181
OSHA Hazard Communication Standard	182
Employee Training	183
Responsibility for Hazard Determination	184
Hazard Communication Program (29CFR 1910.1200 e)	184
NFPA and HMIS Warning Labels	185
Material Safety Data Sheets	188
Trade Secrets	191
15 Respiratory Protection	195
Respiratory Protection	196
Types of Respirators	198
16 Process Safety Management (PSM)	205
The Elements of PSM	207
17 The Permit System	215
Hot Work Permits (29 CFR 1910.119)	216
Control of Hazardous Energy (Lockout/ Tagout) 29 CFR 1910.147	217
Confined Space Standard (29 CFR 1910.146)	220
Confined Space Team	225
18 Hazardous Waste Operations (HAZWOPER)	229
Hazardous Waste Operations	230
Emergency Response	233
Components of an Emergency Response Plan	235
Emergency Incident Zones	238
19 The Occupational Safety and Health Administration (OSHA) and U.S.	
Department of Transportation (DOT)	245
OSHA is Born	247
Workplace Inspections	250
Citations and Penalties	252
The Appeals Process	253
Responsibilities Under OSHA	253
More about OSHA	255
U.S. Department of Transportation (DOT)	257
Other Agencies that Affect the Process Industry	259

Contents

20 Environmental Protection Agency (EPA)	263
Environmental Protection Agency.....	264
Water Pollution Control.....	265
Air Pollution Control.....	267
Solid Waste Control.....	270
Toxic Substances Control Act	273
ISO-14000 (A Brief Discussion).....	273
 21 Stress, Drugs, and Violence	 277
Violence in the Workplace.....	278
Drugs in the Workplace	280
Stress in the Workplace	282
 22 Hurricanes, Plant Security	 289
The Site Security Program.....	291
Hurricane Protection	294
 Glossary 301	
 References 313	
 Index 315	