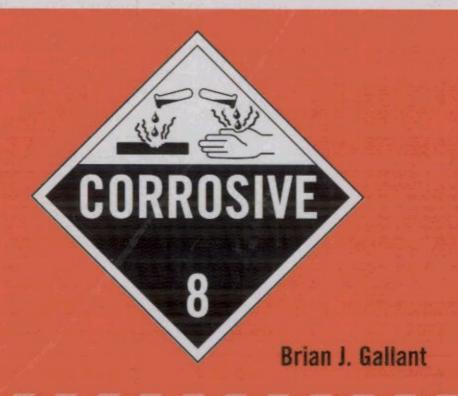


## HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE MANUAL



## CONTENTS

## Introduction—History of Employee Health and Safety Regulations, 1 Regulations, 2 The Environmental Protection Agency, 2 Hazardous Waste Numbers, 3 EPA Identification Numbers, 4 Clean Water Act. 4 Clean Air Act, 5 Resource Conservation and Recovery Act (RCRA), 5 Toxic Substance Control Act, 6 Comprehensive Environmental Response Compensation and Liability Act (CERCLA), 7 Superfund Amendment and Reauthorization Act (SARA), 7 Department of Labor—Occupational Safety and Health Administration, 8 National Institute for Occupational Safety and Health (NIOSH), 9 Department of Transportation (DOT), 9 National Fire Protection Association (NFPA), 10 NFPA 704 Labeling, 10 Hazard Communication Standard, 12 Hazardous Waste Operations and Emergency Response (HAZWOPER), 13 Hazwoper Training, 13 Incident Command System (ICS), 15

1 REGULATIONS, AGENCIES, AND RESOURCES

1

	Site Contractors, 75	
	Consulting Firm / Site Safety Officer (SSO), 75	
	Summary, 76	
4	SITE CHARACTERIZATION	77
	Offsite Characterization, 78	
	Interview/Records Research, 79	
	Perimeter Investigation, 81	
	Protection of Site Entry Workforce, 83	
	Onsite Survey, 84	
	Continuing the Survey, 86	
	Information Documentation, 90	
	Hazard Assessment, 93	
	Threshold Limit Values, 93	
	Permissible Exposure Limit, 95	
	Recommended Exposure Limit, 95	
	IDLH Concentrations, 95	
	Potential Skin Absorption and Irritation, 96	
	Potential Eye Irritation, 96	
	Flammable and Explosive Range, 96	
	Monitoring, 97	
	Summary, 100	
5	SITE CONTROL	101
	Site Map, 102	
	Site Preparation, 103	
	Site Preparation Tasks, 104	
	Site Work Zones, 105	
	Exclusion or Hot Zone, 108	
	Contamination Reduction or Warm Zone, 109	
	Support Zone or Cold Zone, 111	
	Buddy System, 112	

Enforce Decontamination Procedures, 115

121

Security Measures, 116 Communication Networks, 118 Internal Communications, 118 Safety Meetings, 119 External Communications, 119 Summary, 120 6 TOXICOLOGY AND MEDICAL MONITORING Toxicity vs. Hazard, 122 Toxicity Tests, 122 Dose-Response Relationship, 123 Measurement of Response, 123 Dose-Response Terms, 123 Use of Dose-Response Relationship, 124 Limitations of Dose-Response Data, 126 Routes of Exposure, 127 Gender Differences, 127 Age, 127 Synergism, Antagonism, and Potentiation, 128 Genetics, 128 Species Variation, 129 Kinds of Toxicity, 129 Types of Toxic Effects, 129 Toxic Substances and Cancer-Causing Agents, 130 Introduction to Medical Monitoring, 131 Developing a Program, 133 Pre-Employment Screening, 138 Sample Pre-Employment Examination, 140 Additional Medical Testing, 142 Baseline Monitoring, 142 Periodic Medical Examinations, 142 Sample Periodic Medical Examination, 143 Termination Examination, 143

	Emergency Treatment, 144	
	Non-Emergency Treatment, 147	
	Medical Records, 147	
	Program Review and Summary, 147	
7	AIR MONITORING	149
	Monitoring Instruments, 149	
	Direct-Reading Instruments, 150	
	Laboratory Analysis, 155	
	Site Monitoring, 158	
	Monitoring for Dangerous Conditions, 159	
	General On-Site Monitoring, 159	
	Perimeter Monitoring, 160	
	Periodic Monitoring, 160	
	Personal Monitoring, 160	
	Variables of Hazardous-Waste Site Exposure, 161	
	Limitations and Advantages of Monitoring Equipment, 161	
	Summary, 162	
8	PERSONAL PROTECTIVE EQUIPMENT	163
	Introduction, 163	
	Developing a Personal Protective Equipment Program, 165	
	Equipment Use, 165	
	Program Review and Evaluation, 166	
	Selection of Protective Clothing, 167	
	Examples of Protective Clothing, 167	
	Selection of Chemical Protective Clothing (CPC), 169	
	Selection of Ensembles, 179	
	Personal Protective Equipment Use, 185	
	Training, 186	
	Work Duration, 189	
	Inspection, 195	
	Storage, 196	

Heat Stress and Other Physiological Factors, 196 Monitoring, 197 Prevention, 199 Cold Weather Operations, 200 Other Factors, 205 Physical Condition, 206 Level of Acclimatization, 206 Age, 207 Sex, 207 Weight, 207 Maintenance, 208 Summary, 208 9 DECONTAMINATION PROCEDURES 209 Introduction, 209 General Procedures, 210 Preplanning for Decontamination, 210 Personal Protective Equipment, 211 Types of Decontamination, 213 Physical Removal, 213 Chemical Removal, 213 Equipment Needs, 215 Proper Disposal, 215 Personal Protection, 218 Preliminary Concerns, 218 Level of Protection, 220 Work Function, 220 Location of Contamination, 221 Reasons for Leaving Site, 221 Establishment of Procedures, 221 Decontamination during Medical Emergencies, 222 Physical Injury, 222

Partial and Full Decontamination, 222

Persistent Contamination, 225

	Summary, 230	
10	RESPIRATORY PROTECTION	231
	Selection of Respiratory Equipment, 231	
	Air-Purifying Respirators, 235	
	Air-Line Respirators (ALRs), 239	
	Self-Contained Breathing Apparatus (SCBA), 241	
	In-Use Monitoring, 246	
	Storage, 247	
	Inspection, 247	
	Cleaning of Respirators, 248	
	Summary, 248	
11	ENGINEERING CONTROLS	249
	Buddy System, 249	
	Site Security, 251	
	Communications Systems, 255	
	Handling Hazardous-Waste Containers, 258	
	Planning, 259	
	Packaged Laboratory Wastes, 263	
	Bulging, Leaking, Open, Deteriorated, or Buried Drums, 263	
	Sampling, 266	
	Characterization, 267	
	Staging, 268	
	Bulking, 269	
	Shipment, 269	
	Vacuum Trucks, 270	
	Elevated Tanks, 271	
	Compressed Gas Cylinders, 271	
	Ponds and Lagoons, 272	
	Tanks and Vaults, 273	
	Confined Spaces, 274	

	Summary, 285	
12	SITE EMERGENCIES	287
	Planning, 288	
	Personnel, 289	
	Federal Response Organizations, 294	
	Training, 295	
	Emergency Recognition and Prevention, 296	
	Communications, 297	
	Internal Communications, 297	
	External Communications, 299	
	Site Mapping, 299	
	Safe Distances and Refuges, 300	
	Site Security and Control, 301	
	Personal Locator Systems, 301	
	Evacuation Routes and Procedures, 302	
	Decontamination, 303	
	Equipment, 304	
	Medical Treatment and First Aid, 305	
	Emergency Response Procedures, 307	
	Size-Up, 308	
	Rescue/Response Action, 308	
	Follow-Up Procedures, 310	
	Documentation, 310	
	Emergency Response Plan, 311	
	Summary, 313	
	GLOSSARY	315
	INDEX	321

Trenching and Excavation Safety, 279