

NEW EDITION CROSSOVER GUIDE - DETAILED

Revisions to Firefighters Handbook: Essentials of Firefighting and Emergency Response, 2nd Ed.

Firefighters Handbook: Essentials of Firefighting and Emergency Response, 2nd Ed. (Delmar)	Page	Revisions
CHANGES THROUGHOUT		
		"Standard Operating Guidelines" replaces "Standard Operating Procedures"
		Re-titled "Suggested Reading" sections "Additional Resources"
CHANGES BY CHAPTER AND SECTION		
NFPA 1001 Correlation Guide	xxxiii-xxxiv	New
NFPA 472 Correlation Guide	xxxv-xxxvii	New
Job Performance Requirement Correlation Guide	xxxviii-xli	New
CHAPTER 1: OVERVIEW OF THE HISTORY, TRADITION, AND DEVELOPMENT OF THE AMERICAN FIRE SERVICE		
Objectives	4	Focused the chapter objectives
The Mission of the Fire Service	4	No revisions
Roots in the Past	4-16	See subsections
Ancient Beliefs	5-6	No revisions
Recorded History	6	No revisions
Early History and Symbols of the Fire Service	7	No revisions
The Middle Ages	7	No revisions
Early American History	8-13	Slight revision
The Civil War	13-14	No revisions
The Industrial Revolution	14	No revisions
The Beginning of the Twentieth Century	15-16	Revised title from "The Turn of the Twentieth Century"
Technology, Transition, and Times of Change	16	No revisions
The Effects of World War II	17	No revisions
Modernization of the Fire Service	17-18	No revisions
The Fire Service of Today	18-19	Expanded and updated with additional statistics and reference to September 11
Lessons Learned	19	No revisions
Key Terms	19-20	No revisions
Review Questions	20	Added one question for more complete review
Additional Resources	20	Changed title
CHAPTER 2: FIRE DEPARTMENT ORGANIZATION, COMMAND, AND CONTROL		
Objectives	23	No revisions
Introduction	23	No revisions

Fire Department Organization	23-25	See subsections
The Business of Fire Protection	24-2	Revised to further describe mission
Mission Statement	24	No revisions
Organizational Structure	24-25	No revisions
The Firefighter	26-27	Incorporated "Fire Fighter I and II" subsection Updated line-of-duty-death statistics Updated references to organizations
The Company	28-32	Added reference to NFPA apparatus standards and table listing NFPA 1901 requirements (Also see subsections)
The Engine Company	29	Added information from NFPA apparatus standards
The Truck Company	29	Added information from NFPA apparatus standards
The Rescue Company	29, 31	Slight revision
Specialty/Combination Units	31-32	New section
Emergency Medical Services	32	No revisions
The Chief Officers	32	No revisions
Additional Fire Department Functions	32-34	See subsections
Fire Prevention and Life Safety	32-33	Slight revision
Training	33-34	No revisions
Emergency Medical Services	34	No revisions
Apparatus Maintenance and Purchasing	34	No revisions
Special Operations	34	Slight revision
Regulations, Policies, Bylaws, and Procedures	34-35	See subsections
Regulations	34	No revisions
Policies	34	No revisions
Bylaws	35	No revisions
Procedures	35	Added note on terminology (SOPs/SOGs) Incorporated information from "Rules for Developing Standard Operating Procedures"
Allied Agencies and Organizations	35-36	No revisions
Incident Management	36-37	Slight revision (Also see subsections)
Command and Control	36-37	Revised to reflect variations in radio message formats
Incident Management System (IMS)	37-42	See subsection
Five Major Functions of an Incident Management System	39-42	Clarified incident command designations list Slight revision
Lessons Learned	42	No revisions
Key Terms	42-43	Added definitions for ARFF and quint
Review Questions	44	No revisions
Additional Resources	44	Revised reference list
CHAPTER 3: COMMUNICATIONS AND ALARMS		
Objectives	47	No revisions
Introduction	47-48	Slight revision

Communications Personnel	48-49	Slight revision
The Communications Facility	49-51	No revisions
Computers in the Fire Service	51	Slight revision
Receiving Reports of Emergencies	51-58	Reorganized for greater clarity (Also see subsection)
Methods of Receiving Reports of Emergencies	53-58	Added a paragraph about new emergency reporting technology in motor vehicles
Emergency Services Deployment	58-62	Slight revision
Traffic Control Systems	62-63	No revisions
Radio Systems and Procedures	63-67	Added several precautions Added a paragraph on new emergency alerting features in some radios Added a summary paragraph
Arrival Reports	67-68	Slight revision
Mobile Support Vehicles	68	No revisions
Records	68-70	No revisions
Lessons Learned	70	No revisions
Key Terms	71-72	Slight revision
Review Questions	72	No revisions
Endnote	72	Added endnote
Additional Resources	73	Updated selections
CHAPTER 4: FIRE BEHAVIOR		
Objectives	76	Updated language regarding thermal events
Introduction	76-77	No revisions
Fire Triangle, Tetrahedron, and Pyramid	77	Added paragraph applying the fire tetrahedron to fire extinguishment
Measurements	77-78	Slight revision
Chemistry and Physics of Fire	78-82	Added paragraph on reducing agents in combustion Revised description of atoms Added a Firefighter Fact on oxidizing reactions
Sources of Heat	82-85	See subsections
Chemical	83	Added detail about products of combustion
Mechanical	83	No revisions
Electrical	83-84	No revisions
Nuclear	85	Slight revision
Combustion	85	No revisions
Oxygen and Its Effect on Combustion	86	Added detail on oxygen concentration necessary for combustion to occur
Vapor Pressure and Vapor Density	86-89	No revisions
BLEVE	88-89	No revisions
Boiling Point	89	No revisions
Flammable and Explosive Limits	90-91	No revisions
The Burning Process—Characteristics of Fire Behavior	91-93	See subsections
Ignition Stage	91	Moved section here from earlier in chapter and related it to fire tetrahedron

Growth Stage	91-92	No revisions
Fully Developed Stage	92	Added reference to flashover
Decay Stage	92-93	No revisions
Modes of Heat Transfer	94-97	Added a paragraph on heat release rate (Also see subsections)
Conduction	94-95	No revisions
Convection	95-96	No revisions
Radiation	96-97	Slight revision
Thermal Conductivity of Materials	97	No revisions
Physical State of Fuels and Effect on Combustion	98-99	No revisions
Solid	98	No revisions
Liquid	98	No revisions
Gas	98-99	No revisions
Theory of Fire Extinguishment	99	Incorporated "Thermal Balance and Imbalance" section (Also see subsections)
Unique Fire Events	99-100	New
Thermal Layering	99	New
Rollover and Flashover	99	New
Backdraft	100	New
Classes of Fire	100	Added Class K fires Slight revision to other content
Lessons Learned	103	No revisions
Key Terms	103-104	Added definitions for backdraft, flashover, and rollover Replaced definition of stratification with more current term, thermal layering
Review Questions	105	No revisions
Endnotes	105	No revisions
Additional Resources	105	Added several references
CHAPTER 5: FIREFIGHTER SAFETY		
Objectives	108	No revisions
Introduction	108	No revisions
Safety Issues	108-110	See subsections
Firefighter Injury and Death Causes	108	Revised to indicate that line-of-duty deaths have not decreased
Safety Standards and Regulations	109-110	Added description of 2-in-2-out requirement Added description of NIOSH
Accident Prevention	110	No revisions
The Safety Triad	111-117	See subsections
Procedures	111-112	No revisions
Equipment	112-114	Slight revision
Personnel	114-117	Added detail on the most common injuries at fire stations
Firefighter Safety Responsibilities	117-120	See subsections
The Department	117-118	No revisions

The Team	118-119	Added several precautions, including use of an incident engagement checklist and safety in riding apparatus
The Individual Firefighter	119-120	Added comment on impairment from substance use Added recommendation to use an Incident Engagement Checklist Added safety measures for riding on apparatus
Lessons Learned	120	No revisions
Key Terms	121	Added NIOSH
Review Questions	121	No revisions
Endnote	122	New
Additional Resources	121	Added NIOSH
CHAPTER 6: PERSONAL PROTECTIVE CLOTHING AND ENSEMBLES		
Objectives	125	No revisions
Introduction	125-126	No revisions
Personal Protective Equipment Factors	126	No revisions
Standards and Regulations	126	No revisions
Types of Personal Protective Equipment	127-136	Added alternative names for personal protective equipment (Also see subsections)
Ensembles	127-133	Added variables affecting thermal protective performance of coats and trousers Highlighted importance of using helmet chin straps Added descriptions of ice rescue, technical rescue, and swift-water ensembles
Miscellaneous PPE Components	134-136	Noted automatic activation requirement for PASS devices integrated with SCBA
Care and Maintenance of Personal Protective Equipment	136	No revisions
Personal Protective Equipment Effectiveness: "Street Smarts"	137-138	Added introduction emphasizing effective "automatic behaviors" (Also see subsections)
Good PPE Habits and Attitudes	137-138	Added Street Smart Tip emphasizing importance of hydration
Streetsmart Suggestions	138	No revisions
Lessons Learned	139	No revisions
Key Terms	139	No revisions
Review Questions	139-140	No revisions
Additional Resources	140	Added NFPA 1851
CHAPTER 7: SELF-CONTAINED BREATHING APPARATUS		
Objectives	143	No revisions
Introduction	143-144	Added information on hydrogen cyanide and effects inhaling of toxic gases Slight revision to other content
Conditions Requiring Respiratory Protection	145-146	No revisions
Oxygen-Deficient Environments	145	No revisions
Elevated Temperatures	145	No revisions

Smoke	145-146	No revisions
Effects of Toxic Gases and Toxic Environments	146-148	Slight revision (Also see subsection)
Carbon Monoxide	146-148	Revised for greater clarity
Legal Requirements for Self-Contained Breathing Apparatus Use	148	Eliminated repetition
Title 29 Code of Federal Regulations, Section 1910.134	148	No revisions
NFPA 1500: Standard on Fire Department Occupational Safety and Health Program	148	No revisions
Limitations of Self-Contained Breathing Apparatus	148-151	Slight revision (Also see subsections)
SCBA Design and Size	150	Slight revision
Limitations of the SCBA User	150-151	Updated death statistics
Types of Self-Contained Breathing Apparatus	151-158	Slight revision
Open-Circuit Self-Contained Breathing Apparatus	152-157	Slight revision
Closed-Circuit Self-Contained Breathing Apparatus	158	Slight revision
Open-Circuit Supplied Air Respirators	158	No revisions
Donning and Doffing Self-Contained Breathing Apparatus	158-168	See subsections
General Considerations	159	No revisions
Storage Case	159-162	Added Street-Smart Tip regarding SCBA preparation
Seat-Mounted Apparatus	162, 164, 165	Added Street-Smart Tip regarding remaining seated
Compartment or Side-Mounted Apparatus	164	No revisions
Donning the SCBA Face Piece	164-166	Added more precautions to procedure Added Street-Smart Tips regarding testing of air seal and working in pairs
Removing/Doffing the SCBA Unit	166-168	Added paragraphs on PASS Heads-Up Display and PITC/UAC
Self-Contained Breathing Apparatus Operation and Emergency Procedures	168-171	Expanded on ways firefighters can maintain contact (Also see subsections)
Safe Use of SCBA	168-169	No revisions
Operating in a Hostile Environment	170	No revisions
Restricted Openings	170	Slight revision
Emergency Procedures	171	No revisions
Inspection and Maintenance of Self-Contained Breathing Apparatus	172-180	See subsections
Daily Maintenance	172	Eliminated repetition Added detail to procedure
Monthly Maintenance	172	Slight revision
Annual and Biannual Maintenance	172	No revisions
Changing SCBA Cylinders	172-176	Added procedure for having cylinder changed while wearing it
Servicing SCBA Cylinders	176-180	Slight revision
Lessons Learned	180	No revisions
Key Terms	180-181	No revisions
Review Questions	181-182	No revisions

Endnote	182	No revisions
Additional Resources	182	No revisions
CHAPTER 8: PORTABLE FIRE EXTINGUISHERS		
Objectives	185	Added as an objective the ability to choose the right fire extinguisher and agent for a given fire scenario
Introduction	185	Revised for greater clarity
Fire Classification and Risk	185-187	See subsections
Class A	185	Slight revision
Class B	185-186	Slight revision
Class C	186	No revisions
Class D	186	Revised to cover nature and likely location of combustible metals
Class K	186-187	No revisions
Types of Fire Extinguishers	187-193	Expanded criteria for choosing extinguisher type (Also see subsections)
Types of Extinguishing Agents	187-188	Revised for greater clarity
Kinds of Extinguishers	188-193	Added note about inverting extinguishers
Rating Systems for Portable Extinguishers	193-194	Added information on extinguisher labeling
Class A	193-194	No revisions
Class B	194	No revisions
Class C	194	No revisions
Limitations of Portable Extinguishers	194-195	Slight revision
Portable Extinguisher Operation	195-197	Added warnings about delays from improper extinguisher use Added emphasis to importance of training Added information on use of stored-water extinguishers Added precautions for using CO2 extinguishers around animals
Care and Maintenance of Portable Extinguishers	197	No revisions
Inspection Requirements	197-198	No revisions
Lessons Learned	198	Slight revision
Key Terms	198-199	No revisions
Review Questions	199	Shortened list for relevance
Endnotes	199	No revisions
Additional Resources	199-200	No revisions
CHAPTER 9: WATER SUPPLY		
Objectives	203	No revisions
Introduction	203	No revisions
Sources of Water Supply	203-205	See subsections
Groundwater	203-204	No revisions
Surface Water	204	No revisions
Mobile Water Supply Apparatus	204-205	Added note explaining <i>water tender</i> and <i>tanker</i> terminology

Tanks, Ponds, and Cisterns	205	No revisions
Water Distribution Systems	205-206	See subsections
Fire Hydrants	206-209	Added definition of fire hydrant and usage of the word plug
Wet Barrel	206-207	No revisions
Dry Barrel	207	No revisions
Dry Hydrant	208	No revisions
Specialty Hydrants	209	No revisions
Valves Associated with Water Distribution Systems	209-210	No revisions
Rural Water Supply	210-212	See subsections
Portable Water Tanks	210-211	Added a note on protecting portable tank liner with a tarp
Tender Operation	211-212	No revisions
Pressure Associated with Water Distribution Systems	212-213	No revisions
Testing Operability and Flow of Hydrants	213-214	No revisions
Determining Static, Residual, and Flow Pressures	214-215	Added a note on determining hydrant coefficients
Obstructions and Damage to Fire Hydrants and Mains	215-216	No revisions
Lessons Learned	216	No revisions
Key Terms	217	Revised definitions of tanker and tender to note variations in usage Added definition of water tender
Review Questions	218	No revisions
Endnotes	218	Revised endnote reference list, with endnotes renumbered throughout chapter
Additional Resources	218	Updated and refocused reference list
CHAPTER 10: FIRE HOSE AND APPLIANCES		
Objectives	221	No revisions
Introduction	221	No revisions
Construction of Fire Hose	221-223	Added NFPA requirements for amount of hose pumpers should carry
Care and Maintenance of Fire Hose	223-225	Revised most common sources of damage to hose Added limitation of commercial hose washers
Types of Hose Couplings	225-226	Revised information on couplings, adding reference to Higbee Indicator
Care and Maintenance of Couplings	226-227	Added explanation of a hose strap Added precaution concerning pressure build-up from hose clamps
Hose Tools and Appliances	227-228	Added definition of "Duck's Foot" strainers
Coupling and Uncoupling Hose	228-230	Added precaution on tightening threaded couplings
Hose Rolls	230-233	See subsections
Straight/Storage	230, 232	No revisions
Single Donut	231, 232-233	No revisions
Twin or Double Donut	231, 233	Added instructions for securing a self-locking roll
Hose Carries	234-236	No revisions
Drain and Carry	234	No revisions

Shoulder Loop Carry	234-235	No revisions
Single Section Street Drag	236	No revisions
Hose Loads	236-250	See subsections
Accordion Load	237-239	No revisions
Flat Load	237-241, 246	No revisions
Horseshoe Load	239, 242-244	No revisions
Finish Loads and Preconnected Loads	243-245	Added precaution on clearing preconnected hose from hose bed
Flat Load, Minuteman Load, and Triple-Layer Load	245-250	Added introductory sentences Added section on stored hose loads/packs
Stored Hose Loads/Packs	248	New
Wildland Fire Fighting Hose Loads	248, 250	No revisions
Advancing Hose Lines—Charged/Uncharged	251-261	See subsections
Into Structures	253	Added precaution kinking hose or getting it wedged in handrails
Up and Down Stairs	254-255, 260	No revisions
Using a Standpipe System	255-257	Slight revision
Working Hose Off of Ladders	257-259, 261	No revisions
Establishing a Water Supply Connection	261-266	See subsections
From Hydrants	262-265	Added instruction to flush hydrant before connecting Added instructions on removing kinks from large diameter hose
From Static Water Supplies	264-266	No revisions
Extending Hose Lines	265, 267-269	No revisions
Replacing Sections of Burst Hose	268-269	Expanded instructions
Hose Lay Procedures	269-271	No revisions
Forward Lay	270	No revisions
Reverse Lay	270	No revisions
Split Lay	271	No revisions
Deploying Master Stream Devices	271-274	Revised paragraph about master stream appliance power and precautions, for clarity Added mention of “deck gun” terminology
Service Testing of Fire Hose	274-275	No revisions
Lessons Learned	276	No revisions
Key Terms	276-277	Added definition of hose strap
Review Questions	278	No revisions
Endnotes	278	No revisions
Additional Resources	278	New
CHAPTER 11: NOZZLES, FIRE STREAMS, AND FOAM		
Objectives	281	No revisions

Introduction	281	No revisions
Definition of Fire Stream	281	Added the four elements of a fire stream
Nozzles	281-288	See subsections
Solid Tip or Stream	282-283	Added information that straight streams prevent steam burns in certain situations
Fog	283-285	Added precaution to use straight stream in certain situations
Straight Stream	285	No revisions
Special Purpose	286	No revisions
Playpipes and Shutoffs	286	No revisions
Nozzle Operations	287-288	No revisions
Operating Hoselines	288-289	See subsections
Small-Diameter Handlines	288	No revisions
Medium-Diameter Handlines	289	Added information about continued usefulness of 2½-inch hoselines
Master Stream Devices	289	No revisions
Stream Application, Hydraulics, and Adverse Conditions	289-295	See subsections
Direct, Indirect, and Combination Attack	289-290	Added alternative motion patterns for use in combination fire attack
Basic Hydraulics, Friction Loss, and Pressure Losses in Hoselines	290-295	No revisions
Adverse Conditions that Affect Fire Streams	295	No revisions
Types of Foam and Foam Systems	295	No revisions
Foam Characteristics	295-296	No revisions
Classification of Fuels	296-297	See subsections
Class A	296-297	Revised percentage application range for Class A foams
Class B	297	No revisions
Application of Foam	297-303	No revisions
Fog Nozzle vs. Foam Nozzles	300-302	No revisions
Lessons Learned	304	No revisions
Key Terms	304-306	No revisions
Review Questions	306	No revisions
Endnotes	306	No revisions
Additional Resources	306	Consolidated NFPA references Added hydraulics text
CHAPTER 12: PROTECTIVE SYSTEMS		
Objectives	309	No revisions
Introduction	309	Expanded to introduce protective systems as fire protection as both ensembles and individual systems
Detection Systems	309-314	Revised to emphasize variety of systems and purpose to notify people of danger (See subsections)
People or Manual Systems	309-310	No revisions
Heat Detectors	310-311	No revisions

Smoke Detectors	311-313	Expanded to emphasize need for firefighters to be able to explain smoke detectors to occupants Added extensive information on operation of ionization and photoelectric smoke detectors
Gas Detectors	313	Added extensive information on operation of carbon monoxide detectors
Flame Detectors	313-314	No revisions
Sprinkler Systems	314	No revisions
Sprinklers and Life Safety	314-315	No revisions
Sprinkler Head Design and Operation	315-317	No revisions
Types of Sprinkler Systems	318-321	See subsections
Wet Pipe Systems	318-319	No revisions
Dry Pipe Systems	319-320	No revisions
Deluge Systems	320-321	Added extensive information on operation and water supply demands of deluge systems
Preaction Systems	321	No revisions
Residential Systems	321	No revisions
Sprinkler System Connections and Piping	321-324	No revisions
Control Devices for Sprinkler Systems	324-325	No revisions
Returning Sprinkler Systems to Service	325-326, 329	Expanded information on stopping sprinkler flow at the head Expanded information on establishing a fire watch
Standpipe Classifications	329-330	No revisions
Standpipe System Connections and Piping	330-331	No revisions
Alarms for Standpipes and Sprinklers	331	No revisions
Other Protective Systems	331-333	Moved up in text sequence
Local Application and Hood Systems	332	No revisions
Total Flooding Systems	332-333	No revisions
Fire Department Operations with Protective Systems	333-336	Changed section title from "Fire Department Standpipes and Sprinklers Operations" Added information on annunciator panels and Fire Command Centers (Also see subsections)
Standpipe Operations	334	Added subhead to demarcate existing material
Sprinkler System Operations	327-328	Added subhead to demarcate existing material Expanded information on initial actions
Detector Activation Operations	335	New
Operations for Other Protective Systems	336	New
Lessons Learned	336	Added summary of operational procedures
Key Terms	337	No revisions
Review Questions	338	Added six questions
Endnotes	338	Updated references
Additional Resources	338	Focused and updated references
CHAPTER 13: BUILDING CONSTRUCTION		
Objectives	341	No revisions

Introduction	341-342	Heavily revised to introduce scope of construction concerns. Added descriptions of eleven historically significant collapses
Building Construction Terms and Mechanics	342-346	Moved up in section sequence and changed title from "Mechanics and Materials of Building Construction" Added emphasis to the shelter function of buildings and the role of gravity Added examples to definitions Expanded the list of variables involved in time to failure (Also see subsections)
Types of Loads	342-344	New as separate subsection Added more definitions
Imposition of Loads	344-345	New as separate subsection Revised for clarity
Forces	345-346	New as separate subsection Revised for clarity
Structural Elements	346-347	New as a separate section; consolidated and greatly expanded information previously addressed only in "Types of Building Construction" section (Also see subsections)
Beams	346	New as separate subsection
Columns	346	New as separate subsection
Walls	347	New as separate subsection
Connections	347	New as separate subsection
Fire Effects on Common Building Construction Materials	347-352	Moved section up in sequence Added summary of factors that determine construction material suitability Added introduction to new technology in building materials Added tribute to Frank Brannigan (Also see subsections)
Wood	348-349	Moved subsection up in sequence Added discussion of the effect of fire on wood's mass Added discussion of native vs. engineered wood Slight revision remaining content
Steel	349	Revised for tighter focus on fire effects
Concrete	349-350	Expanded and revised discussion of ways strength is added to concrete Slight revision remaining content
Masonry	350	Revised to clarify forces and hazards involved with masonry walls
Composites	350-352	New
Types of Building Construction	352-360	Incorporated information, previously contained in Introduction, on relevance and limitations of fire-resistance ratings to firefighting (Also see subsections)

Type I: Fire-Resistive	353-354	Revised for clarity and expanded with additional comments on types of occupancies commonly seen and firefighting concerns
Type II: Noncombustible	354	Revised for clarity and expanded with additional comments on types of occupancies commonly seen and firefighting concerns
Type III: Ordinary	354-355	Revised for clarity and expanded with additional comments on types of occupancies commonly seen and firefighting concerns
Type IV: Heavy Timber	355-356	Revised for clarity and expanded with additional comments on types of occupancies commonly seen and firefighting concerns
Type V: Wood Frame	356-357	Changed title from "Frame" Revised for clarity and expanded with additional comments on types of occupancies commonly seen and firefighting concerns
Other Construction Types	357-358	Changed title from "Factory-Built Construction" Heavily revised with new construction types and examples
Relationship of Construction Type to Occupancy Use	359-360	New; incorporated and revised section titled previously "Occupancy versus Type of Construction"
Collapse Hazards at Structure Fires	360-365	Changed title from "Hazards Associated with Structure Fire" Revised to emphasize collapse Incorporated "Engineered Wood Structural Members" subsection into "Composites" subsection of "Fire Effects on Common Building Construction Materials" section Incorporated "Synthetic Materials" subsection into "Composites" subsection of "Fire Effects on Common Building Construction Materials" section and "Other Types of Construction" subsection of "Types of Building Construction" section Incorporated "Fire-Resistive and Noncombustible Construction (Types I and II)" subsection into corresponding subsections of "Types of Building Construction" section (Also see subsections)
Trusses	361	Heavily revised with additional construction information
Void Spaces	362	Added detail on truss voids Added information on voids in Type III ordinary construction
Roof Structures	362-363	Revised and expanded to cover more roof types and purposes
Stairs	363	New
Parapet Walls	363	Revised for conciseness
Collapse Signs	364	New
Buildings Under Construction	364	New
Preparing for Collapse	364-365	New
Lessons Learned	366	Expanded to more fully reflect chapter content
Key Terms	366-367	Revised list scope and definitions to reflect changes in chapter

Review Questions	368	Revised topics covered to reflect changes in chapter Doubled the number of questions
Additional Resources	368	Revised selections to reflect changes in chapter
CHAPTER 14: LADDERS		
Objectives	371	No revisions
Introduction	371	No revisions
Ladder Terminology	371-373	Slight revision
Parts of a Ladder	371-373	No revisions
Ladder Companies	373	No revisions
Types of Truck-Mounted Ladders	373-376	See subsections
Aerial Ladders	373-375	Slight revision
Tower Ladder	375-376	Slight revision
Articulating Boom Ladder	376	No revisions
Types of Ground or Portable Ladders	376-381	See subsections
Straight Ladder	376-377	No revisions
Extension Ladder	377-378	Slight revision
Roof or Hook Ladder	378-379	No revisions
Folding Ladder	379-380	No revisions
A-Frame Combination Ladder	379-381	No revisions
Pompier Ladder	381	Slight revision
Use and Care of Portable or Ground Ladders	381-382	Added reference to NFPA 1932 (Also see subsections)
Maintenance Cleaning and Inspection	382-383	Added detail about inspection schedule.
Cleaning Ladders	383	No revisions
Ladder Safety	383	Added instructions for keeping three limbs in contact with ladder and focusing eyes
Ladder Uses	383-384	Slight revision
Access	384	Slight revision
Rescue	384	No revisions
Stability	384	No revisions
Ventilation	384	No revisions
Bridging	384	Slight revision
Elevated Streams	384	No revisions
Elevated Work Position	384	Slight revision
Ladder Selection	384-387	Added detail about relating ladder height to structure height
Butt Section	385	No revisions
Fly Section	385-387	No revisions
Special Uses	387-390	Deleted section on improper use of aerial ladder for forcible entry See subsections
Removal of Numerous Victims	387	No revisions
Chute with a Tarp	388	No revisions
Over a Fence	388	No revisions

Elevated Hose Streams	388	No revisions
Portable Pool	388	No revisions
Barrier	389	No revisions
Support	389	Changed title from "Support of Falling Sign"
Hoist Point	389	Slight revision
Ventilation Fan Supports	390	No revisions
Safety	390-393	See subsections
Overhead Obstructions	390	Moved up in subsection sequence Revised to incorporate "Electrical Lines" subsection from previous version, and expanded topic to cover other overhead obstructions
Climbing Path	391	Slight revision
Ground Considerations	391	Changed titled from "Uneven Ground"
Ladder Load	391-392	No revisions
Working Off a Ladder	392-393	No revisions
Miscellaneous Ladder Information	393-395	Changed titled from "Miscellaneous Points of Information" (Also see subsections)
Ladder Storage	393	No revisions
Apparatus Ladder Storage	393	No revisions
Ladder Apparatus Parking	393-394	No revisions
Ladder Painting	394-395	Slight revision
Certification and Testing Procedures	395	Incorporated topic previously treated as a separate section Expanded with details of NFPA 1931
Ladder Skills	395-399	Also see subsection
Carrying Ladders	395-399	Revised with further detail on suitcase carry, shoulder carry, and flat carry
Raising Skills	399-414	Moved section down in section sequence Moderately revised for clarity (Also see subsection)
Raising Ladders	399	Added note on importance of standard terminology Added rule of thumb on proper distance from building of ladder foot or butt Incorporated information from subsection on one- and two-person raises into general remarks
Rung and Beam Raises	400-408	Moved section down in section sequence Changed title from "Rung and Beam Raises: Concepts" Incorporated subsections "Two-Person Rung Raise" and "Two-Person Beam Raise" and greatly expanded, with subsections on "Fly Extension Raise," "Lower Ladder into Building," and "One-Person Raise" (Also see subsections)
Leg Lock	408	Moved subsection here from "Raising Skills" section
Carrying Tools	408-409	Moved subsection here from "Raising Skills" section

Mounting and Dismounting	410-412	Moved subsection here from "Raising Skills" section Added extensive information on securing a ladder
Engaging the Hook on a Hook Ladder	412, 413	Moved subsection here from "Raising Skills" section
Roof Ladder Deployment	412	Moved subsection here from "Raising Skills" section
Hoisting Ladders by Rope	412, 414	Moved subsection here from "Raising Skills" section
Lessons Learned	415	Added comment on keeping in mind the purpose for which a ladder was designed
Key Terms	415	No revisions
Review Questions	416	Added three questions
Additional Resources	416	No revisions
CHAPTER 15: ROPES AND KNOTS		
Objectives	419	Added one objective
Introduction	419	Slight revision
Rope Materials and Their Characteristics	419-422	Slight revision
Natural Materials	419-420	Slight revision
Synthetic Materials	420-422	Slight revision
Construction Methods and Their Characteristics	422-423	See subsections
Laid (Twisted)	422	Slight revision
Braided	422-423	Slight revision
Braid-on-Braid	423	No revisions
Kernmantle	423	No revisions
Primary Uses	423-424	Focused paragraph regarding broad range of knowledge more tightly (Also see subsections)
Utility	423-424	Slight revision
Firefighting and Rescue Uses	424	Slight revision
Fire Service Knots	424-439	Revised for clarity (Also see subsections)
Nomenclature of Ropes and Knots	425-426	Revised for easier practice and memorization
Knots	426-439	Slight revision
Inspection	439-441	Slight revision
Maintenance	441-449	See subsections
Cleaning	441-444	Slight revision
Storage	444-449	Slight revision
Rigging for Hoisting	449-452, 455	Slight revision (Also see subsections)
Specific Tools and Equipment	449-452, 455	Added one step to the procedure for hoisting a pike pole Slight revision to remaining content
Securing a Rope between Two Objects	452, 454, 456	Slight revision
Lessons Learned	456	No revisions
Key Terms	456-458	No revisions
Review Questions	458	No revisions
Additional Resources	458	No revisions

CHAPTER 16: RESCUE PROCEDURES		
Objectives	461	No revisions
Introduction	461	No revisions
Hazards Associated with Rescue Operations	461	No revisions
Search of Burning Structures	461-467	Revised and expanded for more comprehensive treatment of size-up Added a thorough description of thermal imaging devices and their use (Also see subsections)
Primary Search	465	Expanded with a variety of strategies
Secondary Search	465	No revisions
Victim Removal, Drags, and Carries	467-481	Revised and expanded precautions about avoiding muscle and spine injury during victim removal (Also see subsections)
Carries	468-471	Added precautions about weight and keeping a "tight core"
Drags	469, 471-477	No revisions
Backboard, Stretcher, and Litter Uses	478-481	Added other terms used for "stretcher"
Extrication from Motor Vehicles	482-490	See subsections
Tools and Equipment	482-485	No revisions
Scene Assessment (Size-Up)	486	Changed title from "Crash Scene Assessment (Size-Up)" Revised scene safety precautions for more general application
Establishment of Work Areas	486-487	New
Vehicle Stabilization	487-488	Added mention of specialized tools and suggestion to consult with tow-vehicle and vehicle-recovery businesses
Patient Access	488	Changed title from "Accessing the Victim" Added precaution about undeployed air bags
Disentanglement	489	Changed title from "Disentangling the Victim" Added mention of complications from new vehicle technology and materials
Patient Removal	489-490	Changed title from "Removing the Victim" Added precaution that removal must be supervised by an EMS responder
Scene Stabilization	490	New
Specialized Rescue Situations and Tools	490-505	(Also see subsections)
Vertical Rescue	491-492	No revisions
Water Rescue	492-494	Added instructions for swift-water rescue
Ice Rescue	494	Added precautions about approaching the victim
Structural Collapse Rescue	494-497	No revisions
Trench and Below-Grade Rescue	497-498	No revisions
Confined Space Rescue	498	No revisions
Rescue from Electrical Situations	498-499	Added precautions about vehicle involvement
Industrial Entrapment Rescue	499-500	No revisions

Elevator and Escalator Rescue	500-505	Revised for conciseness
Farm Equipment Rescue	505	No revisions
Lessons Learned	505	No revisions
Key Terms	505-506	No revisions
Review Questions	506-507	Updated
Additional Resources	507	No revisions
CHAPTER 17: FORCIBLE ENTRY		
Objectives	510	No revisions
Introduction	510-511	No revisions
Knowledge	510-511	No revisions
Skill	511	No revisions
Experience	511	No revisions
Forcible Entry Tools	511-519	No revisions
Striking Tools	512-513	No revisions
Prying and Spreading Tools	513-515	No revisions
Cutting Tools	515-518	No revisions
Pulling Tools	518	No revisions
Special Tools	518-519	No revisions
Safety with Forcible Entry Tools	519-521	Added Safety Tip to be cautious about what hazards might exist in an unfamiliar area (Also see subsections)
Rotary and Chain Saws	520	Added instruction to use eye protection
Carrying Tools	520-521	No revisions
Hand Tools	521	No revisions
Maintenance of Forcible Entry Tools	521	No revisions
Construction and Forcible Entry	522-530	No revisions
Door Construction	522	No revisions
Types of Doors	522-526	No revisions
Locks	526-530	No revisions
Additional Security Devices	530	No revisions
Methods of Forcible Entry	530-540	No revisions
Conventional	531-536	No revisions
Through-the-Lock Forcible Entry	536-538	No revisions
Operating Lock Mechanisms	538-539	No revisions
Lock Variations	539-540	No revisions
Windows	540-544	No revisions
Forcible Entry of Window	540-542	
Glazing	542-543	No revisions
Types of Windows	543-544	No revisions
Breaching Walls and Floors	544-546	No revisions
Techniques for Breaching Walls	544-545	No revisions
Techniques for Breaching Floors	545-546	No revisions
Tool Assignments	546	No revisions
Lessons Learned	546	No revisions

Key Terms	546-547	No revisions
Review Questions	547	No revisions
Additional Resources		Deleted out of date resources
CHAPTER 18: VENTILATION		
Objectives	550	No revisions
Introduction	550	No revisions
Principles, Advantages, and Effects of Ventilation	550	No revisions
Heat, Smoke, and Toxic Gases	551	No revisions
Considerations for Proper Ventilation	551-554	No revisions
Fire and Its By-Products	554-556	No revisions
Flashover	556	No revisions
Backdraft (Smoke Explosion)	556-560	No revisions
Rollover	560	No revisions
What Needs to Be Vented?	560-562	No revisions
Voids and Compartments	561	Changed title from "Not Only Structures"
Cocklofts	561-562	No revisions
Horizontal and Vertical Voids	562	No revisions
Air Movement	562-563	No revisions
Types of Ventilation	563-567	No revisions
Natural	563	No revisions
Mechanical	563-567	No revisions
Mechanics of Ventilation	567-568	No revisions
Vertical Ventilation	567	No revisions
Horizontal Ventilation	567	No revisions
Ventilation Techniques	568-575	No revisions
Break Glass	568-569	No revisions
Open Doors	569	No revisions
Effect of Glass Panes	569	No revisions
Rope and a Tool	570	No revisions
Hook or Pike Pole	570	No revisions
Iron or Halligan	570-571	No revisions
Ax	571	No revisions
Portable Ladder	571-572	No revisions
Aerial Ladder Tip		Deleted
Negative Pressure Ventilation	572-573	No revisions
Positive Pressure Ventilation	573-575	Revised guideline on size of exhaust opening
Roof Ventilation	575-581	Revised opening remarks to shift emphasis to offensive vs. defensive openings (Also see subsections)
Expandable Cut	575-577	No revisions
Center Rafter Cut (Louver)	577-579	Changed title from "Louver Cut" Revised for clarity
Triangular Cut	579	No revisions
Trench Cut or Strip Cut	579-581	No revisions

Inspection Cut	581	Changed title from "Examination Holes" Dropped discussion of kerf cut to emphasize and revise instructions for triangular inspection cut
Smoke Indicator Hole	581	New
Safety Considerations	581	No revisions
Will Ventilation Permit the Fire to Extend?	581	No revisions
Will the Escape Route Be Cut Off?	581	No revisions
Will Ventilation Endanger Others?	581-582	No revisions
Work in Teams	582	No revisions
Proper Supervision	582	No revisions
Obstacles to Ventilation	583-585	No revisions
Access	583	No revisions
Security Devices	583	No revisions
Height	583-584	No revisions
Poor Planning	584	No revisions
Personnel Assignment	584	No revisions
Unfamiliar Building Layout	584	No revisions
Ventilation Timing	584-585	No revisions
Cut a Roof—Open a Roof	585	No revisions
Factors Affecting Ventilation	585-590	See subsections
Partial Openings	585	No revisions
Partially Broken Windows	585	No revisions
Screens	586	Revised upward the percentage by which screens reduce airflow
Roof Material	586-587	No revisions
Dropped or Hanging Ceilings	587	No revisions
Building Size	587-588	No revisions
Weather	588	No revisions
Opening Windows	588-590	No revisions
Lessons Learned	590	No revisions
Key Terms	590	No revisions
Review Questions	590	No revisions
Additional Resources	590	No revisions
CHAPTER 19: FIRE SUPPRESSION		
Objectives	593	"Fire triangle" changed to "fire tetrahedron"
Introduction	593	No revisions
Elements of Fire Control	593-606	"Fire triangle" changed to "fire tetrahedron" (Also see subsections)
Structural Fire Components and Considerations	593-595	"Fire triangle" changed to "fire tetrahedron"
Ground-Cover Fire Components and Considerations	595-599	Transition added to point out that "fire triangle" is used in discussing ground cover fires
Vehicular Fire Components and Considerations	599-601	No revisions
Flammable Liquids Fire Components and Considerations	601	Definitions added of polar and nonpolar solvents
Flammable Gas Fire Components and Considerations	602-603	No revisions

Process of Fire Extinguishment	603-604	Precaution added for self-protection when "steaming" a fire out
Proper Stream Selection	604-606	No revisions
Tactical Considerations	606-628	No revisions
Residential Occupancies	611-614	No revisions
Business and Mercantile Occupancies	615-616	No revisions
Multistory Occupancies	616-618	No revisions
Below-Ground Structures or Basements	618-619	No revisions
Structures Equipped with Sprinklers or Standpipes	619-620	No revisions
Exposure Fires	620	No revisions
Nonstructural Fires	620-628	Added caution that backdraft and flashover can occur in vehicular fires Added information about forcible entry into vehicle hood and trunk Added information about alternative fuels used in vehicles Added subsection on outside stacked or piled materials fires
Lessons Learned	628	No revisions
Key Terms	628-629	Added polar solvent
Review Questions	629	Changed "fire triangle" to "fire tetrahedron"
Additional Resources	630	No revisions
CHAPTER 20: SALVAGE, OVERHAUL, AND FIRE CAUSE DETERMINATION		
Objectives	633	No revisions
Introduction	633	Slight revision
Salvage Tools and Equipment	633-636	Revised to make a more general statement
Salvage Covers	634	Slight revision
Floor Runner	634-635	Slight revision
Water Vacuum	635	Slight revision
Miscellaneous Salvage Tools	636	Slight revision
Maintenance of Tools and Equipment Used in Salvage	636-639, 640-641	Simplified the procedure for checking a salvage cover for holes Slight revision to other content
Salvage Cover Folds and Rolls	637, 640-641	Revised for clarity
Salvage Operations	639-646	See subsections
Safety Considerations	639-642	Revised to improve flow
Stopping Water Flowing from Sprinkler Heads	642	Slight revision
Methods of Protecting Material Goods	642	Slight revision
Arranging of Furnishings and Salvage Cover Deployment	642-644	Revised for clarity
Water Removal	644-646	Revised for clarity
Salvage Operations in Sprinklered Buildings	647-648	See subsections
Post Indicator Valve and Outside Screw and Yoke Valve	647-648	Slight revision
Sprinkler Stops	648	Slight revision

Salvage Operations Lessons Learned	648	Slight revision
Overhaul Tools and Equipment	648-649	Revised to improve flow
Common Tools	649	Slight revision
Carry-All	649	Slight revision
Overhaul Operations	649-652	Slight revision (Also see subsections)
Overhauling Roofs	650	Slight revision
Electronic Heat Sensors	650	Slight revision
Revisits of the Involved Structure	650-651	Slight revision
Debris Removal	651	No revisions
Overhaul Operations Lessons Learned	651-652	Revised for conciseness
Fire Cause Determination Concerns	652-654	Slight revision
Preservation of Evidence	653	Revised for clarity
Basics of Point of Origin Determination	653-654	Slight revision
Fire Cause Determination Lessons Learned	654	Slight revision
Securing the Building	654-655	Slight revision
Lessons Learned	655	Revised to emphasis customer service
Key Terms	655	No revisions
Review Questions	656	No revisions
Additional Resources	656	Deleted outdated references
CHAPTER 21: PREVENTION, PUBLIC EDUCATION, AND PRE- INCIDENT PLANNING		
Objectives	659	No revisions
Introduction	659	No revisions
Administration of the Fire Prevention Division	659-660	Slight revision
Fire Company Inspection Program	660-679	See subsections
Equipment	660-661	No revisions
Preparation for Inspections	661	No revisions
Conducting the Inspection	661-662	Slight revision
Typical Violations	662-674	Added a paragraph on halon restrictions Added a paragraph on labeling of hazardous materials Added further instructions on checking fuse and breaker panels Slight revision to other content
Concluding the Inspection	674-677	Slight revision
Reinspections	677-679	No revisions
Home Inspections	677-679	Slight revision
Fire and Life Safety Education	679-684	Explained benefits of fire safety houses
Fire and Life Safety Program Presentations	680-681	No revisions
Forms of Fire and Life Safety Programs	681-684	No revisions
Pre-Incident Management Process	684-687	No revisions
Deciding to Preplan	685-685	No revisions
Site Visit	685	No revisions

Diagrams	685	No revisions
Seek Input from Others	685-687	No revisions
The Finished Document	687	No revisions
Lessons Learned	687	No revisions
Key Terms	687	Updated
Review Questions	688	No revisions
Additional Resources	688	New
CHAPTER 22: EMERGENCY MEDICAL SERVICES		
Objectives	691	Slight revision
Introduction	691	No revisions
Roles and Responsibilities of an Emergency Care Provider	691-695	Slight revision
Key Responsibilities	692	Slight revision
Legal Considerations for Emergency Care Providers	694	No revisions
Interacting with Emergency Medical Services Personnel	694-695	No revisions
Safety Considerations	695-701	Changed title from "Understanding Safety and Infection Control" (Also see subsections)
Analyzing the Safety of the Emergency Scene	695-696	Added staging consideration
Firefighter Physical and Mental Health	696	No revisions
Infection Control for Emergency Care Providers	696-701	Changed title from "Infection Control" Incorporated "Infectious Diseases" and "Prevention of Exposures to Infectious Diseases" subsections Revised for clarity, flow, and context Added material on washing hands and clothing
Assessing a Patient	700, 702-707	See subsections
Performing an Initial Assessment	700, 702-707	Incorporated "Perform a Quick Visual Assessment" subsection
Vital Signs and the Focused History and Physical Exam	704-707	Noted that traumatic injury is suspected if patient is unconscious
Patient Findings	707	No revisions
Cardiopulmonary Resuscitation/AED	707-708	Added AED to title and discussion Noted the importance of CPR for saving firefighters as well as civilians
Bleeding Control and Stock Management	709-714	No revisions
Internal and External Bleeding	709-710	No revisions
Caring for Patients with Internal Bleeding	710	No revisions
Caring for Patients with External Bleeding	710-712	No revisions
Types of Wounds Requiring First Aid	712-713	No revisions
What Is Shock? (Hypoperfusion)	713	No revisions
Recognizing the Signs and Symptoms of Shock (Hypoperfusion)	713	No revisions
Caring for Patients in Shock	713-714	Revised and expanded the treatment procedure
Emergency Care for Common Emergencies	714-718	See subsections

Trouble Breathing	714	Added scene safety assessment and donning BSI to procedure
Chest Pain	714	Added scene safety assessment and donning BSI to procedure
Medical Illnesses	714	Added scene safety assessment and donning BSI to procedure
Allergic Reactions	714-715	Added scene safety assessment and donning BSI to procedure
Thermal Burns	715-716	Thoroughly revised descriptions Added newer terminology for first-, second-, and third-degree burns Added scene safety assessment and donning BSI to procedure
Chemical Burns	716-717	Added scene safety assessment, donning BSI, and additional protective gear to procedure
Poisoning	717-718	Added scene safety assessment and donning BSI to procedure
Fractures and Sprains	718	Added scene safety assessment and donning BSI to procedure
Lessons Learned	718-719	No revisions
Key Terms	719-720	Added definitions for automatic external defibrillator, exposure, and hypoperfusion Removed bloodborne pathogens and universal precautions as outdated terms
Review Questions	720	No revisions
Additional Resources	720	Updated with entirely new set of references
CHAPTER 23: FIREFIGHTER SURVIVAL		
Objectives	723	No revisions
Introduction	723	No revisions
Incident Readiness	723-728	See subsections
Personal Protective Equipment	723-724	Added discussion of when to don PPE in relation to driving
Personal Accountability	725-726	Added information on first-arriving unit's accountability tags
Fitness for Duty	726-728	Added discussion of five elements of a fit lifestyle Added precaution to hydrate on the way to the scene
Safety at Incidents	728-733	See subsections
Team Continuity	728	No revisions
Orders/Communication	729	Slight revision
Risk/Benefit	730	No revisions
Personal Size-Up	730	New
Rehabilitation	730-732	Revised to note specific hazards Added discussion of active cooling
Rapid Intervention Teams	732-733	Added mention of "two-in, two-out" rule
Firefighter Emergencies	733-738	See subsections
Rapid Escape	733-734	No revisions
Rapid Escape Steps	734-735	Added discussion of ladder escape

Lost, Trapped, and Injured Firefighters	735-736	Added mention of emergency assistance button on some radios Revised and expanded discussion of RIT
Post-Incident Survival	736-738	No revisions
Lessons Learned	738-739	No revisions
Key Terms	739	No revisions
Review Questions	739	No revisions
Endnotes	739	Expanded
Additional Resources	740	Expanded
CHAPTER 24: HAZARDOUS MATERIALS: LAWS, REGULATIONS, AND STANDARDS		
Objectives	743	No revisions
Introduction	743-744	Eliminated labels distinguishing objectives by NFPA 1001 training level, because both Awareness and Operations levels are important to firefighter survival Revised informal definition of hazardous material to match original source of the definition
Laws, Regulations, and Standards	744-745	No revisions
Development Process	744-745	No revisions
Emergency Planning	745-746	No revisions
State and Local Emergency Response Committees	745	No revisions
Local Emergency Response Plans	745	No revisions
Chemical Inventory Reporting	745-746	No revisions
OSHA HAZWOPER Regulation	747-748	See subsections
Paragraph q	748	Slight revision
Medical Monitoring	748	Added information on records retention
Standards	749-750	See subsections
NFPA 471	749	No revisions
NFPA 472	749	Noted NFPA adoption of terrorism response objectives previously listed as tentative interim amendments
NFPA 473	749	No revisions
Standard of Care	749-750	No revisions
Additional Laws, Regulations, and Standards	750-751	See subsections
Hazard Communication	750	No revisions
Superfund Act	750	No revisions
Clean Air Act	750	No revisions
Respiratory Protection	750-751	No revisions
Firefighter Safety	751	No revisions
NFPA Chemical Protective Clothing	751	Added mention of NFPA 1994
Lessons Learned	751	No revisions
Key Terms	751-752	No revisions
Review Questions	752	No revisions
Endnotes	752	No revisions
Additional Resources	752	Expanded

CHAPTER 25: HAZARDOUS MATERIALS: RECOGNITION AND IDENTIFICATION		
Objectives	755	Eliminated labels distinguishing objectives by NFPA 1001 training level, because both Awareness and Operations levels are important to firefighter survival
Introduction	755	No revisions
Location and Occupancy	755-757	No revisions
Placards, Labels, and Markings	757-768	See subsections
Placards	757-767	Made placarding requirements tables more complete Updated title of Emergency Response Guidebook by deleting "North American" Deleted reference to Residue placard Revised information on use of placard with white square background
Labels	767-768	No revisions
Other Identification Systems	768-771	Added introductory text (Also see subsections)
NFPA 704 System	768-769	No revisions
Hazardous Materials Information System	769	Slight revision
Military Warning System	769	Slight revision
Pipeline Markings	770-771	No revisions
Container Markings	771	Deleted DOT bulk shipment requirement
Pesticide Container Markings	771	No revisions
Containers	771-794	See subsections
General	772-775	No revisions
Pipeline	776	No revisions
Highway Transportation Containers	776-781	Replaced the term "pot" with "compartment"
Boiling Liquid Expanding Vapor Explosion (BLEVE)	782-784	New
Specialized Tank Trucks	784-788	Corrected method of liquefaction Deleted information on piping on intermodal tanks
Rail Transportation	788-790	Revised information on corrosive cars Changed "dome" to "protective housing"
Bulk Storage Tanks	790-794	No revisions
Senses	794-795	No revisions
Chemical and Physical Properties	795-801	See subsections
States of Matter	795-796	Added note on solids that have vapor pressure
Vapor Pressure	796-797	No revisions
Vapor Density	797	No revisions
Specific Gravity	798	No revisions
Corrosivity	798-799	Expanded discussion of pH
Chemical Reactivity	799-800	Slight revision
Flash Point	800	No revisions
Autoignition Temperature	800	No revisions

Flammable Range	800	No revisions
Toxic Products of Combustion	800-801	No revisions
Lessons Learned	801-802	No revisions
Key Terms	802-803	No revisions
Review Questions	803	Slight revision
Endnotes	803	Expanded
Additional Resources	803-804	Expanded
CHAPTER 26: HAZARDOUS MATERIALS: INFORMATION RESOURCES		
Objectives	807	Eliminated labels distinguishing objectives by NFPA 1001 training level, because both Awareness and Operations levels are important to firefighter survival
Introduction	807	No revisions
Emergency Response Guidebook	807-818	Deleted "North American" from title of guidebook
Material Safety Data Sheets	818-824	See subsections
Using the MSDS Wisely	823	New
Accidents and How the MSDS Relates	823	New
MSDS in the Workplace	823	New
Shipping Papers	825-826	No revisions
Mode of Transportation	825-826	No revisions
Facility Documents	826	No revisions
Computer Resources	826	No revisions
Chemtrec	826-827	Updated name of Chemtrec publisher
Reference and Information Texts	827-829	Added NIOSH reference to information sources table
Industrial Technical Assistance	829	No revisions
Lessons Learned	829	No revisions
Key Terms	829	No revisions
Review Questions	830	No revisions
Additional Resources	830	Expanded
CHAPTER 27: HAZARDOUS MATERIALS: PERSONAL PROTECTIVE EQUIPMENT		
Objectives	833	No revisions
Introduction	833	No revisions
Health Hazards	833-838, 848	Added introductory text (Also see subsections)
Toxicology	834	No revisions
Types of Exposure	834	No revisions
Types of Hazards	834	No revisions
Categories of Health Hazards	834-838	Updated the number of chemicals in existence and the number of carcinogens
Exposure Levels	838-840	No revisions
Types of Personal Protective Equipment	840-848	No revisions
Self-Contained Breathing Apparatus	840-842	No revisions

Chemical Protective Clothing	842-846	No revisions
Limitations of Personal Protective Equipment	846-848	No revisions
Lessons Learned	849	No revisions
Key Terms	849-850	No revisions
Review Questions	850	No revisions
Endnote	850	No revisions
Additional Resources	850	No revisions
CHAPTER 28: HAZARDOUS MATERIALS: PROTECTIVE ACTIONS		
Objectives	853	Eliminated labels distinguishing objectives by NFPA 1001 training level, because both Awareness and Operations levels are important to firefighter survival
Introduction	853	No revisions
Hazardous Materials Management Processes	853-864	Changed title from "Hazardous Materials Management Systems" (Also see subsections)
Isolation and Protection	853-854	No revisions
Rescue	854-857	Added information on military study of turnout gear effectiveness in the presence of nerve and blister agents Updated list of top ten chemicals spilled Added information on air monitoring in Risk Based Response
Site Management	857-859	No revisions
Establishment of Zones	859-862	Added alternative terms for hot, warm, and cold zones Added information on the importance of isolating the scene
Evacuations and Sheltering in Place	862-864	No revisions
Common Incidents	864-877	See subsections
Types of Releases	864-866	No revisions
Explosives	866-868	Added more precautions regarding equipment that should not be used around a suspected device
Gases	868-871	Deleted a portion of BLEVE information, consolidated in Chapter 25 Added information on cars powered by compressed natural gas (CNG)
Flammable and Combustible Liquids	871-872	No revisions
Flammable Solids, Water Reactives, and Spontaneously Combustible Materials	872-874	No revisions
Oxidizers and Organic Peroxides	874	No revisions
Poisons	874-875	No revisions
Radioactive Materials	875-876	Added information on ionizing and non-ionizing radiation Added discussion of time, distance, and shielding as protection against radiation
Corrosives	876	No revisions
Other Incidents	876-877	No revisions

Decontamination	877-884	See subsections
Types of Decontamination	877	Added mass decon
Emergency Decontamination	877-878	No revisions
Gross Decontamination	878-879	No revisions
Formal Decontamination	879	No revisions
Fine Decontamination	879	No revisions
Mass Decontamination	879-880	New
Decontamination Process	881-884	No revisions
Methods of Decontamination	885-887	No revisions
Absorption	885	No revisions
Adsorption	885	No revisions
Covering	885	No revisions
Dilution	885-886	No revisions
Disinfection	886	No revisions
Disposal	886	No revisions
Emulsification	886	No revisions
Neutralization	886	No revisions
Overpacking	886	No revisions
Removal	886	No revisions
Solidification	886	No revisions
Vacuuming	886	No revisions
Vapor Dispersion	886-887	No revisions
Lessons Learned	887	No revisions
Key Terms	888	Added definition of psychological decontamination
Review Questions	889	No revisions
Endnotes	889	Updated
Additional Resources	889	Expanded
CHAPTER 29: PRODUCT CONTROL AND AIR MONITORING		
Objectives	892	Eliminated labels distinguishing objectives by NFPA 1001 training level, because both Awareness and Operations levels are important to firefighter survival
Introduction	892	No revisions
Defensive Operations	892-898	No revisions
Absorption	892-893	No revisions
Diking and Damming	893-895	No revisions
Diverting	895-896	No revisions
Retention	896-897	No revisions
Dilution	897	No revisions
Vapor Dispersion	897	No revisions
Vapor Suppression	897-898	No revisions
Remote Shutoffs	898	No revisions
Air Monitoring at the First Responder Operations Levels	898-900	No revisions
Regulations and Standards	899	No revisions
Air Monitor Configurations	899-900	No revisions

Meter Terminology	900-906	See subsections
Bump Test	900	No revisions
Calibration	900-901	No revisions
Reaction Time	901	No revisions
Recovery Time	901	No revisions
Relative Response	901	No revisions
Oxygen Monitors	901-902	No revisions
Flammable Gas Indicators	903-905	Changed title from "Combustible Gas Indicators" Noted both new and alternative terminology Deleted the obsolete Wheatstone Bridge Sensor
Toxic Gas Monitors	905	No revisions
Other Detectors	905-906	No revisions
Carbon Monoxide Incidents	906-908	No revisions
Lessons Learned	908	No revisions
Key Terms	909	No revisions
Review Questions	909-910	No revisions
Additional Resources	910	Expanded
CHAPTER 30: TERRORISM AWARENESS		
Objectives	913	New Street Story Eliminated labels distinguishing objectives by NFPA 1001 training level, because both Awareness and Operations levels are important to firefighter survival
Introduction	913-917	Updated with references to September 11th, anthrax mailings, and sports- and nightclub-related riots Updated history of terrorism and expanded earlier, into the 1980s
Types of Terrorism	917-918	Updated with more recent events Added a five-element thought process for determining whether a threat is credible
Potential Targets	918-920	Slight revision
Indicators of Terrorism	920-922	Updated and expanded
HAZMAT Crimes	922-926	New
Clandestine Labs	922-926	New
Incident Actions	926-927	No revisions
General Groupings of Warfare Agents	927-932	See subsections
Nerve Agents	927-928	Added list of signs and symptoms, with acronym SLUGDEM
Incendiary Agents	928	No revisions
Blister (Vesicants)	929	Added signs and symptoms
Blood and Choking Agents	929	Added signs and symptoms
Irritants (Riot Control)	929	Added signs and symptoms
Biological Agents and Toxins	930-931	Added mention of smallpox Added subsection on anthrax
Radioactive Agents	931	Updated and expanded
Other Terrorism Agents	931-932	No revisions

Detection of Terrorism Agents	932	Updated with a variety of technologies, deleting false positives as a central concern
Federal Assistance	932-934	Updated with additional army Technical Escort Unit locations Updated other military names and locations Updated Domestic Preparedness Training Initiative information Added Metropolitan Medical Response Teams (Also see subsections)
Lessons Learned	934	No revisions
Key Terms	934-935	Added definitions of hazmat crime, radiological dispersion device, and weapon of mass destruction
Review Questions	935	No revisions
Endnotes	935	No revisions
Additional Resources	935-936	Updated and expanded
Glossary	937-956	Updated
Acronyms	957-958	Updated
Other Fire Science Titles from Delmar	959-963	Updated
Index	964-980	Updated