

NFPA®

2500

Standard for Operations and Training for
Technical Search and Rescue Incidents
and Life Safety Rope and Equipment
for Emergency Services

2022

Includes

NFPA 1670 | NFPA 1858 | NFPA 1983



NFPA® 2500

Standard for Operations and Training for Technical Search and Rescue Incidents and Life Safety Rope and Equipment for Emergency Services

2022 Edition



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NFPA® 2500

Standard for

Operations and Training for Technical Search and Rescue Incidents and Life Safety Rope and Equipment for Emergency Services

2022 Edition

This edition of NFPA 2500, *Standard for Operations and Training for Technical Search and Rescue Incidents and Life Safety Rope and Equipment for Emergency Services*, was prepared by the Technical Committees on Special Operations Protective Clothing and Equipment and Technical Search and Rescue, released by the Correlating Committee on Fire and Emergency Services Protective Clothing and Equipment, and acted on by the NFPA membership during the 2021 NFPA Technical Meeting held June 14–July 2. It was issued by the Standards Council on August 26, 2021, with an effective date of September 15, 2021.

This document has been amended by one or more Tentative Interim Amendments (TIAs) and/or Errata. See “Codes & Standards” at www.nfpa.org for more information.

This edition of NFPA 2500 was approved as an American National Standard on September 15, 2021.

Origin and Development of NFPA 1250

For this first edition of NFPA 2500, *Standard for Operations and Training for Technical Search and Rescue Incidents and Life Safety Rope and Equipment for Emergency Services*, both NFPA 1858 and NFPA 1983 were part of a document consolidation plan that was approved during the April 2019 Standards Council meeting that affects all documents in the Emergency Response and Responder Safety (ERRS) project. NFPA 1858 and NFPA 1983 are included, along with NFPA 1670, in the newly formed NFPA 2500. The Technical Committee on Special Operations Protective Clothing and Equipment (FAE-SCE) remained responsible for the revision of NFPA 1858 and NFPA 1983.

There were no changes to the organization of the FAE-SCE. For the 2022 edition, revisions were made to add cleaning procedures to the user information in Chapter 25. The melting requirements were revised for fire escape rope, fire escape webbing, fire escape harnesses, and fire escape belts in Chapter 27. Chapter 27 was also revised to require escape anchors when supplied in an escape and fire escape system, that would meet the minimum performance requirements and be tested individually. Additionally, Chapter 27 has clarifications regarding how slippage should be measured during static testing of belts, life safety harnesses, and victim extrication devices.

The 2022 edition accounts for the first revision of NFPA 1858, the selection, care, and maintenance document that accompanies NFPA 1983. Several revisions were made throughout this document, with the relocation of certain annex material from NFPA 1983 to NFPA 1858. Chapter 32 has revisions and additional cleaning procedures.

The 2022 edition of NFPA 2500 also accounts for revisions to the material that had been included in NFPA 1670. Many of the changes to the material in Chapters 4 through 23 were made for alignment in the consolidated document. The Technical Search and Rescue committee also made changes to the material in Chapter 4 through 23 to bring those requirements into alignment with the newly published NFPA 1006.

For more information about the ERRS consolidation project see nfpa.org/errs.

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Committee Scope: This Committee shall have primary responsibility for documents on technical search and rescue techniques, operations, and procedures to develop efficient, proper, and safe utilization of personnel and equipment.

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Standard for

Operations and Training for Technical Search and Rescue Incidents and Life Safety Rope and Equipment for Emergency Services

2022 Edition

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

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Information on referenced and extracted publications can be found in Chapter 2 and Annex L.

Chapter 1 Administration

1.1 Scope. This standard provides minimum requirements for conducting operations at technical search and rescue incidents, for the design, performance, testing, and certification of life safety rope and equipment for emergency services, and for the selection, care, and maintenance of rope and associated equipment for emergency services personnel.

1.2 Purpose. The purpose of this standard is to specify minimum requirements for the following:

- (1) Identifying and establishing levels of functional capability for conducting operations at technical search and rescue incidents while minimizing threats to rescuers
- (2) Establishing minimum levels of performance for life safety rope, escape and fire escape rope, escape and fire escape webbing, water rescue throwlines, moderate elongation laid life-saving rope, manufacturer-supplied eye terminations, life safety harnesses, belts, victim extrication

devices, end-to-end and multiple configuration straps, belay devices, carabiners and snap links, descent control devices, escape anchors, litters, portable anchors, pulleys, rope grab and ascending devices, escape and fire escape systems, manufactured systems, and other auxiliary equipment for emergency services personnel

- (3) Establishing a program for life safety rope and equipment to reduce the risks and hazards when used for emergency services

1.3* Application. This standard can be applied as follows:

- (1) Chapters 1 through 3, 4 through 23, and Annexes A through J constitute the 2022 edition of NFPA 1670.
- (2) Chapters 1 through 3, 24 through 28, and Annexes A and K constitute the 2022 edition of NFPA 1983.
- (3) Chapters 1 through 3, 29 through 35, and Annex A constitute the 2022 edition of NFPA 1858.

1.4* Units. Values for measurement are followed by an equivalent in parentheses, but only the first stated value shall be regarded as the requirement.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 470, *Hazardous Materials Standards for Responders*, 2022 edition.

NFPA 1006, *Standard for Technical Rescue Personnel Professional Qualifications*, 2021 edition.

NFPA 1091, *Standard for Traffic Incident Management Personnel Professional Qualifications*, 2019 edition.

NFPA 1500™, *Standard on Fire Department Occupational Safety, Health, and Wellness Program*, 2021 edition.

NFPA 1561, *Standard on Emergency Services Incident Management System and Command Safety*, 2020 edition.

NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, 2018 edition.

NFPA 1983, *Standard on Life Safety Rope and Equipment for Emergency Services*, 2017 edition.

2.3 Other Publications.

2.3.1 AATCC Publications. American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.

AATCC 135, *Dimensional Changes of Fabrics after Home Laundering*, 2004.

2.3.2 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM B117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*, 2019.

ASTM D4966, *Standard Test Method for Abrasion Resistance of Textile Fabrics (Martindale Abrasion Tester Method)*, 2012, reapproved 2016.

ASTM D6413/D6413M, *Standard Test Method for Flame Resistance of Textiles (Vertical Test)*, 2015.

ASTM D7138, *Standard Test Method to Determine Melting Temperature of Synthetic Fibers*, 2016.

ASTM E794, *Standard Test Method for Melting and Crystallization Temperatures by Thermal Analysis*, 2006, reapproved 2018.

ASTM F1740, *Standard Guide for Inspection of Nylon, Polyester, or Nylon/Polyester Blend, or Both Kernmantle Rope*, 1996, reapproved 2018.

ASTM F1772, *Standard Specification for Harnesses for Rescue and Sport Activities*, 2017.

ASTM F1956, *Standard Specification for Rescue Carabiners*, 2020.

ASTM F2436, *Standard Test Method for Measuring the Performance of Synthetic Rope Rescue Belay Systems Using a Drop Test*, 2014, reapproved 2019.

ASTM F2821, *Standard Test Methods for Basket Type Rescue Litters*, 2015, reapproved 2020.

ASTM F2894, *Standard Test Method for Evaluation of Materials, Protective Clothing and Equipment for Heat Resistance Using a Hot Air Circulating Oven*, 2019.

2.3.3 CGA Publications. Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA 20151.

ANSI/CGA G7.1, *Commodity Specification for Air*, 2018.

2.3.4 Cordage Institute Publications. The Cordage Institute, 994 Old Eagle School Road, Suite 1019, Wayne, PA 19087.

CI 1202, *Terminology for Fiber Rope*, 2013.

CI 1800, *Test Methods for Life Safety Rope and Accessory Cords for Life Safety Applications*, 2017.

CI 1801, *Performance Requirements for Low Stretch and Static Life Safety Rope*, 2017.

CI 1805, *3-Strand Life Safety Rope, Moderate Stretch*, 2018.

2.3.5 ISO Publications. International Organization for Standardization, ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland.

ISO Guide 27, *Guidelines for corrective action to be taken by a certification body in the event of misuse of its mark of conformity*, 1983, reconfirmed 2014.

ISO 9001, *Quality management systems — Requirements*, 2015.

ISO 17011, *Conformity assessment — Requirements for accreditation bodies accrediting conformity assessment bodies*, 2017.

ISO/IEC 17021, *Conformity assessment — Requirements for bodies providing audit and certification of management systems — Part 1: Requirements*, 2015.

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*, 2017.

ISO/IEC 17065, *Conformity assessment — Requirements for bodies certifying products, processes, and services*, 2012, reconfirmed 2018.

ISO 22159, *Personal equipment for protection against falls — Descending devices*, 2007.

2.3.6 SAE Publications. SAE International, Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.

SAE AMS-2175A, *Castings, Classification and Inspection of*, 2003, reaffirmed 2018.

2.3.7 UL Publications. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 913, *Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, Hazardous (Classified) Locations*, 2013, revised 2018.

2.3.8 US Government Publications. US Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

“FEMA National Response Framework,” US Department of Homeland Security, 2016.

“FEMA National Urban Search and Rescue (US&R) Response System” Fact Sheet, US Department of Homeland Security, 2015.

MIL-DTL-83420N, *Detail Specification: Wire Rope, Flexible, for Aircraft Control, General Specification for 1 March 2016*.

National Search and Rescue Plan of the United States, US Coast Guard National Search and Rescue Committee, 2007.

2.3.9 Additional Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 1006, *Standard for Technical Rescue Personnel Professional Qualifications*, 2021 edition.

NFPA 1021, *Standard for Fire Officer Professional Qualifications*, 2020 edition.

NFPA 1521, *Standard for Fire Department Safety Officer Professional Qualifications*, 2020 edition.

NFPA 1561, *Standard on Emergency Services Incident Management System and Command Safety*, 2020 edition.

NFPA 1855, *Standard on Selection, Care, and Maintenance of Protective Ensembles for Technical Rescue Incidents*, 2018 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.5 Shall. Indicates a mandatory requirement.

3.2.6 Should. Indicates a recommendation or that which is advised but not required.

3.2.7 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase “standards development process” or “standards development activities,” the term “standards” includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

3.3.1 Acceptable Entry Conditions. Conditions that must exist in a space to allow entry and to ensure that employees can safely enter into and work within the space.

3.3.2 Adjusting Device. See 3.3.49.1.

3.3.3 Alternate Air Source. A secondary air supply source system that involves an alternate second-stage regulator provided by either a separate dedicated second-stage or a multipurpose second-stage regulator coupled with a buoyancy compensator inflator valve.

3.3.4 Anchor Point. A single, structural component used either alone or in combination with other components to create an anchor system capable of sustaining the actual and potential load on the rope rescue system.

3.3.5 Anchor System. One or more anchor points rigged in such a way as to provide a structurally significant connection point for rope rescue system components.

3.3.6 Animal Technical Rescue. Rescuing of an animal requiring technical skills; not to be confused with “animal rescue” which typically refers to abuse or neglect.

3.3.7 Ascending Device. See 3.3.49.2.

3.3.8 Ascending (Line). A means of safely traveling up a fixed line with the use of one or more ascent devices.

3.3.9 Assessment Phase (Size-Up). The process of assessing the conditions, the scene, and the subject's condition and ability to assist in his or her own rescue.

3.3.10 Attachment Point.

3.3.10.1* Load-Bearing Attachment Point. Point on a harness, victim extrication device, or escape belt that is used for connection to an anchor system that will provide full support and fall arrest for the designed load.

3.3.10.2* Positioning Attachment Point. Point on a harness or belt that is used for connection to an anchor system that will support a person's weight for work at height.

3.3.11 Auxiliary Equipment. Equipment items that are load-bearing and designed to be utilized with life safety rope and harness.

3.3.12* Avalanche. A mass of snow — sometimes containing ice, water, and debris — that slides down a mountainside.

3.3.13* Belay. The method by which a potential fall distance is controlled to minimize damage to equipment and/or injury to a live load.

3.3.14 Belay Device. See 3.3.49.3.

3.3.15 Belay System. A belay device and any other components required for the belay device to function.

3.3.16 Bell-Bottom Pier Hole. A type of shaft or footing excavation, the bottom of which is made larger than the cross-section above to form a bell shape.

3.3.17 Belt. Compliant equipment items configured as devices that fasten around the waist only and designated as ladder belts or escape belts.

3.3.17.1* Escape Belt. A belt that is intended for use by the wearer only as an emergency self-rescue device.

3.3.17.2 Ladder Belt. A belt that is intended for use as a positioning device for a person on a ladder.

3.3.18 Benching or Benching System. A method of protecting employees from cave-ins by excavating the side of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

3.3.19 Bend. A knot that joins two ropes or webbing pieces together.

3.3.20 Block Creel Construction. See 3.3.186.1.

3.3.21 Body Fluids. Fluids that are produced by the body, including, but not limited to, blood, semen, mucus, feces, urine, vaginal secretions, breast milk, amniotic fluids, cerebrospinal fluid, synovial fluid, and pericardial fluid.

3.3.22* Body Substance Isolation. An infection control strategy that considers all body substances potentially infectious. It utilizes procedures and equipment to protect the responder from communicable diseases that are known to be transmitted through blood and other body substances.

3.3.23 Buckle. A load-bearing connector that is an integral part of an auxiliary equipment item and used to connect two pieces of webbing.

3.3.24 Buoyancy Compensator (BCD). Device worn by a diver containing a bladder that is inflated or deflated by the diver to manage their buoyancy while immersed in a liquid.

3.3.25 Carabiner. An auxiliary equipment system item consisting of a load-bearing connector with a self-closing gate used to join other components.

3.3.26 Care. Cleaning and storage of protective clothing and equipment.

3.3.27* Cave. A natural underground void formed by geologic process. [1006, 2021]

3.3.28 Cave-In. The separation of a mass of soil or rock material from the side of an excavation or trench, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

3.3.29 Certification/Certified. A system whereby a certification organization determines that a manufacturer has demonstrated the ability to produce a product that complies with the requirements of this standard, authorizes the manufacturer to use a label on listed products that comply with the requirements of this standard, and establishes a follow-up program conducted by the certification organization as a check on the methods the manufacturer uses to determine compliance with the requirements of this standard.

3.3.30 Certification Organization. An independent, third-party organization that determines product compliance with the requirements of this standard with a labeling/listing/follow-up program.

3.3.31* Cleaning. The act of removing soiling and contamination from ensembles and ensemble elements by mechanical, chemical, thermal, or combined processes.

3.3.32 Collapse Safety Zone. An area around a collapsed structure or structures that is outside the potential collapse zone of falling debris.

3.3.33 Compass. A device that uses the earth's magnetic field to indicate relative direction.

3.3.34 Competent Person. One who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. [1006, 2021]

3.3.35 Compliant. Certified as meeting or exceeding all applicable requirements of this standard.

3.3.36* Confined Space. A space that is large enough and so configured that a person can enter and perform assigned work, that has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, and pits), and that is not designed for continuous human occupancy.

3.3.37 Confined Space Rescue Service. The confined space rescue team designated by the AHJ to rescue victims from within confined spaces, including operational and technical levels of industrial, municipal, and private sector organizations.

3.3.38 Confined Space Rescue Team. A combination of individuals trained, equipped, and available to respond to confined space emergencies.

3.3.39 Contamination/Contaminated. The process by which life safety rope and equipment are exposed to hazardous materials and body fluids.

3.3.40 Continuous Filament Fiber. See 3.3.83.1.

3.3.41 Corrosion. A condition exhibiting any signs of deterioration, including pitting or loss of metal.

3.3.42* Coverage (sometimes called "coverage factor"). A relative measure of how thoroughly an area has been searched or "covered."

3.3.43 Cribbing. Short lengths of timber/composite materials, usually 4 in. × 4 in. (101.60 mm × 101.60 mm) and 18 in. – 24 in. (457.20 mm – 609.60 mm) long, that are used in various configurations to stabilize loads in place or while load is moving.

3.3.44* Critical Angle. A deflection in two rope rescue system components that increases any force vector beyond that which is acceptable.

3.3.45* Decontamination. The act of removing contamination from or neutralizing contamination in protective clothing and equipment. (See also 3.3.31, *Cleaning*.)

3.3.46 Descending (Line). A means of safely traveling down a fixed line using a descent control device.

3.3.47 Descent Control Device. See 3.3.49.4.

3.3.48 Design Load. See 3.3.121.1.

3.3.49 Device.

3.3.49.1 Adjusting Device. An auxiliary equipment system component; a connector device that allows adjustment to be made to a piece of equipment.

3.3.49.2* Ascending Device. A type of rope grab; auxiliary equipment; a friction or mechanical device utilized to allow ascending a fixed line.

3.3.49.3 Belay Device. An auxiliary equipment item used to catch a falling load by grabbing the rope.

3.3.49.4 Descent Control Device. An auxiliary equipment item; a friction or mechanical device utilized with rope to control descent.

3.3.49.4.1 Escape Descent Control Device. An auxiliary equipment system component; a friction or mechanical device utilized with escape line to control descent.

3.3.49.5* Escape Anchor Device. An auxiliary equipment device that connects to the structure and supports an escape line.

3.3.49.6 Rope Grab Device. An auxiliary equipment device used to grasp a life safety rope for the purpose of supporting loads; includes ascending devices.

3.3.49.7 Victim Extrication Device. A device designed to be secured about the body of a victim in a harness-like manner to provide support in a head-up or horizontal configuration for the purpose of lifting and transporting the victim with a life safety rope.

3.3.50 Diameter (Rope). See 3.3.186.2.

3.3.51 Disentanglement. The cutting of a vehicle and/or machinery away from trapped or injured victims.

3.3.52 Dive. Exposure of an individual to a hyperbaric environment.

3.3.53 Dive Profile. Description and documentation of a diver's potential or actual exposure to a hyperbaric environment, which includes depth, duration of exposure, and, where applicable, intervals between exposures, which is intended to document and communicate the diver's nitrogen load.

3.3.54 Dive Supervisor. The member of a dive team who has the authority and expertise to manage and direct all aspects of the dive operation and has been trained to meet all nondiving job performance requirements of technician-level dive rescue as defined in NFPA 1006.

3.3.55 Dive Tables. Tools used to calculate a diver's nitrogen loading based on depth, length of exposure to a hyperbaric environment, and intervals between exposures of an actual or a planned dive.

3.3.56 Dive Team. A collection of divers and trained support personnel acting under the direction of a single team leader who are trained and equipped to act collectively to achieve a subsurface mission using a common set of practices or guidelines.

3.3.57 Dive Tender. A member of the dive team who is responsible for assisting divers with assembly and donning of equipment, communicating with divers, tracking the diver's status and location, and managing subsurface search operations, and trained to meet all the job performance requirements of operations-level dive rescue as defined in NFPA 1006.

3.3.58 Diver. An individual exposed to a hyperbaric environment while using a compressed gas or supplied breathing gas system.

3.3.58.1* 90 Percent Diver. A diver who is dressed, equipped, and positioned to quickly enter the water and assume the role of safety diver or otherwise assist the operation as necessary.

3.3.58.2* Safety Diver. A diver who is equipped and positioned to immediately submerge and lend assistance to a diver in distress or to engage in a search for a missing diver.

3.3.59 Edge Protection. A means of protecting software components within a rope rescue system from the potentially harmful effects of exposed sharp or abrasive edges.

3.3.60 Elongation. The increase in length, expressed in a percent of the original gauge length, that occurs in a sample of new rope when tested as specified herein.

3.3.61 Emergency Incident. Any situation to which an emergency services organization responds to deliver emergency services, including rescue, fire suppression, emergency medical care, special operations, law enforcement, and other forms of hazard control and mitigation. [1561, 2020]

3.3.62 Emergency Medical Service (EMS). The organization(s) responsible for the care and transport of sick and injured persons to an appropriate emergency care facility. Referred to as Emergency Services in U.S. federal confined space regulations.

3.3.63 End-to-End Straps. Straps with end connection points meant to be loaded in end-to-end fashion, including, but not limited to, pick-off straps, load-releasing straps, and vertical lifting straps.

3.3.64 Engulfment. The surrounding and effective capture of a person by a fluid (e.g., liquid, finely divided particulate) substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

3.3.65 Entry. The action by which a person passes into a confined space. Entry includes ensuing work or rescue activities in that environment and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space, trench, or excavation.

3.3.66* Entry Permit. A written or printed document, established by an employer, for nonrescue entry into confined spaces.

3.3.67 Entry Team. The group of individuals, with established communications and leadership, assigned to perform work or rescue activities beyond the opening of, and within, the space, trench, or excavation.

3.3.68* Environment. A collection of characteristics such as weather, altitude, and terrain contained in an area that are unique to a location.

3.3.69 Escape. Immediate self-rescue of a single fire or emergency services person from a life-threatening emergency situation, generally above ground, using system components or manufactured systems designed for self-rescue escape.

3.3.70 Escape Anchor Device. See 3.3.49.5.

3.3.71 Escape Belt. See 3.3.17.1.

3.3.72 Escape Descent Control Device. See 3.3.49.4.1.

3.3.73 Escape Rope. See 3.3.186.3.

3.3.74 Escape System. A system designed to provide a means of escape from an immediately hazardous environment, above grade, and intended only for emergency self-rescue.

3.3.74.1 Escape System. A system designed to be used for the purpose of self-rescue from an immediately hazardous environment; not intended for use in a hazardous environment involving fire or fire products.

3.3.74.2 Fire Escape System. A system designed to be used for the purpose of self-rescue from an immediately hazardous environment involving fire or fire products.

3.3.75 Escape Webbing. See 3.3.239.1.

3.3.76 Excavation. Any man-made cut, cavity, trench, or depression in an earth surface, formed by the removal of earth.

3.3.77 Extrication. The removal of trapped victims from a vehicle or machinery.

3.3.78 Face(s). The vertical or inclined earth surface formed as a result of excavation work.

3.3.79 Failure. The breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities as it applies to structural collapse search and rescue operations.

3.3.80* Fall Factor. A measure of fall severity calculated by dividing the distance fallen by the length of rope used to arrest the fall.

3.3.81* FEMA Task Force Structure/Hazard Evaluation Marking System. Distinct markings made with international orange spray paint, after performing a building hazard identification, near a collapsed structure's most accessible point of entry.

3.3.82* FEMA Task Force Structure Marking System, Structure Identification Within a Geographic Area. Distinct markings made with international orange spray paint to label buildings with their street number so that personnel can differentiate one building from another.

3.3.83 Fiber.

3.3.83.1 Continuous Filament Fiber. Fiber of indefinite or unmeasurable length.

3.3.83.2 Virgin Fiber. Fiber that is new and previously unused.

3.3.84 Fire Escape Rope. See 3.3.186.3.1.

3.3.85 Fire Escape System. See 3.3.74.2.

3.3.86 Fire Escape Webbing. See 3.3.239.2.

3.3.87 Fixed Line (Fixed Line System). A rope rescue system consisting of a nonmoving rope attached to an anchor system.

3.3.88 Follow-Up Program. The sampling, inspections, tests, or other measures conducted by the certification organization on a periodic basis to determine the continued compliance of labeled and listed products that are being produced by the manufacturer to the requirements of this standard.

3.3.89 Force Multiplier. Any load, object, environmental factor, or system configuration that increases the load on the anchor system(s).

3.3.90 Full-Face Mask. A diving mask that covers the diver's entire face, includes a regulator for breathing, has separate inhalation and exhalation chambers, provides for defogging, free flow if the seal is broken, and provides for a communication module.

3.3.91* General Area. An area surrounding the incident site (e.g., collapsed structure or trench) whose size is proportional to the size and nature of the incident. Within the general area, access by people, heavy machinery, and vehicles is limited and strictly controlled.

3.3.92* General Use. One designation of equipment item or manufactured systems designed for general-use loads, technical-use loads, and escape based on design loads that are calculated and understood.

3.3.93* Hand. The feel of flexibility and smoothness of a rope when tying knots or running it through equipment.

3.3.94 Hardware. Nonfabric components of protective clothing or equipment including, but not limited to, those made of metal or plastic.

3.3.95 Hardware (Rope Rescue). Rigid mechanical auxiliary equipment that can include, but is not limited to, anchor plates, carabiners, and mechanical ascent and descent control devices.

3.3.96 Harness. See 3.3.116, Life Safety Harness.

3.3.97 Hasty Search. An initial deployment of search resources that involves a quick search of areas or segments likely to contain survivors.

3.3.98 Hazard Identification. The process of identifying situations or conditions that have the potential to cause injury to people, damage to property, or damage to the environment.

3.3.99 Hazardous Atmospheres. Any atmosphere that can expose personnel to the risk of death, incapacitation, injury, acute illness, or impairment of ability to self-rescue.

3.3.100 Heavy Object. An item of such size and weight that it cannot be moved without the use of power tools (e.g., hydraulic lifting devices) or complex mechanical advantage systems.

3.3.101 High Angle. Refers to an environment in which the load is predominantly supported by the rope rescue system.

3.3.102 Hitch. A knot that attaches to or wraps around an object so that when the object is removed, the knot will fall apart.

3.3.103 Immediately Dangerous to Life or Health (IDLH). Any condition that would pose an immediate or delayed threat to life, cause irreversible adverse health effects, or interfere with an individual's ability to escape unaided from a hazardous environment.

3.3.104 Imminent Hazard. An act or condition that is judged to present a danger to persons or property and is so immediate and severe that it requires immediate corrective or preventive action.

3.3.105 Impact Load. See 3.3.121.2.

3.3.106 Incident Command System (ICS). The combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure that has responsibility for the management of assigned resources to effectively accomplish stated objectives pertaining to an incident or training exercise.

3.3.107 Incident Management System (IMS). A system that defines the roles and responsibilities to be assumed by personnel and the operating procedures to be used in the management and direction of emergency operations; the system is also referred to as an incident command system (ICS). [1021, 2020]

3.3.108 Incident Response Plan. Written procedures, including standard operating guidelines, for managing an emergency response and operation.

3.3.109* Incident Scene. The location where activities related to a specific incident are conducted.

3.3.110* Isolation System. An arrangement of devices, including isolation devices, applied with specific techniques, that collectively serve to isolate a victim of a trench or excavation emergency from the surrounding product (e.g., soil, gravel, or sand).

3.3.111* Knot. A fastening made by tying rope or webbing in a prescribed way.

3.3.112 Ladder Belt. See 3.3.17.2.

3.3.113* Large Animal. Domesticated livestock including, but not limited to, horses, cows, mules, donkeys, goats, llamas, alpacas, pigs, and excluding wild animals and household pets.

3.3.114 Large Machinery. Complex machines (or machinery systems) constructed of heavy materials, not capable of simple disassembly, and presenting multiple concurrent hazards (e.g.,

control of energy sources, HAZMAT, change in elevation, multiple rescue disciplines, etc.), complex victim entrapment, or partial or complete amputation, and requiring the direct technical assistance of special experts in the design, maintenance, or construction of the device or machine.

3.3.115 Laser Target. A square or rectangular plastic device used in conjunction with a laser instrument to set the line and grade of pipe.

3.3.116 Life Safety Harness. An equipment item; an arrangement of materials secured about the body to support a person.

3.3.117 Life Safety Rope. See 3.3.186.4.

3.3.118 Line. See generic term for rope or webbing.

3.3.119 Litter. A transfer device designed to support and protect a victim during movement.

3.3.120 Litter Tender. A person who both accompanies and physically manages the litter.

3.3.121 Load.

3.3.121.1* Design Load. The load for which a given piece of equipment or manufactured system was engineered for under normal static conditions.

3.3.121.2* Impact Load. Sudden application of a force, which causes kinetic energy and momentum to be converted into other forms of energy.

3.3.121.3* Proof Load. The application of force to a material as a nondestructive test to verify the performance of that material.

3.3.122 Load-Bearing Attachment Point. See 3.3.10.1.

3.3.123 Load-Bearing Connector. An auxiliary equipment system component; a device used to join other system components including, but not limited to, carabiners, rings, quick links, and snap links.

3.3.124* Lockout. A method for keeping equipment from being set in motion and endangering workers. (See also 3.3.219, *Tagout*.)

3.3.125 Lot.

3.3.125.1 Manufacturer's Lot. An identifiable series of products that can be the same as or a subset of a production lot; used by the manufacturer for quality control or identification purposes.

3.3.125.2 Production Lot. An identifiable series of products manufactured with identical design specifications and identical materials and produced without any alterations to technique or procedure.

3.3.126 Low Angle. Refers to an environment in which the load is predominantly supported by itself and not the rope rescue system (e.g., flat land or mild sloping surface).

3.3.127* Lowering System. A rope rescue system used to lower a load under control.

3.3.128 Machine. Human-made system or device made up of fixed and moving parts that perform a task.

3.3.129 Machinery. The moving parts of a particular machine.

3.3.130 Manufactured System. Preassembled system sold as a unit by the manufacturer and tested as a complete assembly.

3.3.131 Manufacturer. The entity that assumes the liability for the compliant product.

3.3.132* Manufacturer-Supplied Eye Termination. A point of fixed or permanent connection to compliant escape line, life safety rope, throwline, or moderate elongation laid rope, other than a knot, provided by the manufacturer for the purpose of connecting a load to a compliant product.

3.3.133 Manufacturer's Lot. See 3.3.125.1.

3.3.134 Manufacturing Facility. A facility that is involved in the production, assembly, final inspection, or labeling of the compliant end product.

3.3.135 Maximum Working Load. Weight supported by the life safety rope and system components that must not be exceeded.

3.3.136* Mechanical Advantage (M/A). A force created through mechanical means including, but not limited to, a system of levers, gearing, or ropes and pulleys usually creating an output force greater than the input force and expressed in terms of a ratio of output force to input force.

3.3.137 Melt. Response of a material to heat resulting in evidence of flowing or dripping.

3.3.138 Member. A person performing the duties and responsibilities of an emergency response organization on a full-time or part-time basis, with or without compensation.

3.3.139 Minimum Breaking Strength (MBS). The result of subtracting three standard deviations from the mean result of the lot being tested using the formula in 28.2.5.2.

3.3.140* Minimum Primary Reserve Pressure. Minimum permissible breathing gas pressure remaining in a SCUBA diver's primary delivery system on reaching the surface and establishing positive buoyancy.

3.3.141 Moderate Elongation Laid Life-Saving Rope. See 3.3.186.4.1.

3.3.142* Multiple Configuration Load Straps. Straps with end connection points that can be configured in multiple loading, including, but not limited to, end-to-end, basket, and choker configurations.

3.3.143* Multiple-Point Anchor System. System configuration providing load distribution over more than one anchor point, either proportionally or disproportionally. (See also 3.3.5, *Anchor System*.)

3.3.144* National Response Framework. An overview of key response principles, roles, and structures that guides the U.S. national response and that describes (a) how communities, states, the federal government, and private sector and nongovernmental partners apply these principles for a coordinated, effective national response; (b) special circumstances where the federal government exercises a larger role, including incidents where federal interests are involved and catastrophic incidents where a state would require significant support; and (c) how these elements come together and are implemented by first responders, decision makers, and supporting entities to provide a unified national response in the United States.

3.3.145* National Search and Rescue Plan. A document that identifies responsibilities of U.S. federal agencies and serves as the basis for the *National Search and Rescue Plan of the United States*, which discusses search and rescue organizations, resources, methods, and techniques utilized by the federal government.

3.3.146 Non-Fire Escape System. See 3.3.74.1, Escape System.

3.3.147 One-Call Utility Location Service. A service from which contractors, emergency service personnel, and others can obtain information on the location of underground utilities in any area.

3.3.148 Organization. The entity that provides the direct management and supervision for the emergency services personnel. [1855, 2018]

3.3.149 Oxygen-Deficient Atmosphere. Air atmospheres containing less than 19.5 percent oxygen by volume at one standard atmosphere pressure.

3.3.150 Oxygen-Enriched Atmosphere. Air atmospheres containing more than 23.5 percent oxygen by volume at one standard atmosphere pressure.

3.3.151 Packaging (Patient Packaging). The process of securing a subject in a transfer device, with regard to existing and potential injuries/illness, so as to avoid further harm during movement.

3.3.152 Panel Team. The group of individuals, with established communications and leadership, assigned to construct (if necessary), move, place, and manage panels (traditional sheeting panels) both inside and outside the space, trench, or excavation.

3.3.153* Personal Protective Equipment (PPE). The equipment provided to shield or isolate personnel from infectious, chemical, physical, and thermal hazards.

3.3.154 Personnel. Any individual participating within the incident scene.

3.3.155* Portable Anchor. A manufactured device with rigid arms, legs, or both designed to support human loads.

3.3.156 Positioning Attachment Point. See 3.3.10.2.

3.3.157 Predeployment Inspection. An inspection performed prior to making the item available for service.

3.3.158 Pre-Entry Briefing. Information passed to all personnel prior to entry into a confined space or trench/excavation environment.

3.3.159 Primary Access. The existing opening of doors and/or windows that provide a pathway to the trapped and/or injured victim(s).

3.3.160* Primary Search. A quick search of the structures likely to contain survivors.

3.3.161* Product Label. A label or marking affixed to a product by the manufacturer that provides general information, warnings, instructions for care and maintenance, and other information.

3.3.162 Production Lot. See 3.3.125.2.

3.3.163 Proof Load. See 3.3.121.3.

3.3.164* Protective System. A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures.

3.3.165 Public Safety Diving. Underwater diving, related to team operations and training, performed by any member, group, or agency of a community or government-recognized public safety diving or water rescue team.

3.3.166 Pulley. A device designed to provide a change of direction for a line while minimizing loss of energy due to friction.

3.3.167* Raising System. A rope rescue system used to raise a load under control.

3.3.168 “Reach, Throw, Row, Go.” The four sequential steps in water rescue with progressively more risk to the rescuer. Specifically, a “go” rescue involves physically entering the medium (e.g., in the water or on the ice).

3.3.169* Reconnaissance (Recon). A preliminary examination or survey; specifically, an examination of an area for the purpose of obtaining information necessary for directing search and rescue operations.

3.3.170 Recovery. Nonemergency operations carried out by responders to retrieve property or remains of victims.

3.3.171* Redundant Air System. A system composed of a compressed breathing gas source, pressure gauge, primary and secondary regulator, and a means of affixing the system to the diver so that it will not be dropped or dislodged; is completely independent of the diver's primary air system and is configured to be accessed without delay when the diver is under duress; and of sufficient capacity to permit the diver to ascend to the surface from the maximum recognized operational depth while complying with a prescribed ascent rate and any necessary safety stops.

3.3.172* Registered Professional Engineer. A person who is registered as a professional engineer in the state where the work is to be performed.

3.3.173 Rescue. Those activities directed at locating endangered persons at an emergency incident, removing those persons from danger, treating the injured, and providing for transport to an appropriate health care facility.

3.3.174* Rescue Area. An area surrounding the incident site (e.g., collapsed structure or trench) whose size is proportional to the hazards that exist.

3.3.175 Rescue Attendant. A person who is qualified to be stationed outside a confined space to monitor rescue entrants, summon assistance, and perform nonentry rescues.

3.3.176 Rescue Entrant. A person entering a confined space for the specific purpose of rescue.

3.3.177 Rescue Incident. An emergency incident that primarily involves the rescue of persons subject to physical danger and that could include the provision of emergency medical care, but not necessarily.

3.3.178 Rescue Shoring. The temporary stabilization or re-support of any part of, section of, or structural element within a structure which is physically damaged, missing, or where the

structure itself is partially or totally collapsed or in danger of collapsing.

3.3.179* Rescue Team. A combination of rescue-trained individuals who are equipped and available to respond to and perform technical rescues.

3.3.180 Rescue Team Leader. The person designated within the incident command system as rescue group/division officer responsible for direct supervision of the rescue team operations.

3.3.181 Retrieval (Confined Space or Hazardous Environment). Removal of entrant(s) for rescue not requiring entry into a confined space or hazardous environment.

3.3.182* Retrieval System. Combinations of rescue equipment used for nonentry (external) rescue of persons from confined spaces.

3.3.183 Ring. An auxiliary equipment system component; an ungated load-bearing connector.

3.3.184 Risk Assessment. An assessment of the likelihood, vulnerability, and magnitude of incidents that could result from exposure to hazards.

3.3.185* Risk/Benefit Analysis. A decision made by a responder based on a hazard identification and situation assessment that weighs the risks likely to be taken against the benefits to be gained for taking those risks.

3.3.186 Rope. A compact but flexible, torsionally balanced, continuous structure of fibers produced from strands that are twisted, plaited, or braided together and that serve primarily to support a load or transmit a force from the point of origin to the point of application.

3.3.186.1* Block Creel Construction. Rope constructed without knots or splices in the yarns, ply yarns, strands or braids, or rope.

3.3.186.2 Diameter (Rope). The length of a straight line through the center of the cross section of the rope.

3.3.186.3 Escape Rope. Rope dedicated solely for the purpose of supporting people during emergency self-escape (self-rescue); not intended for use in a hazardous environment involving fire or fire products; not classified as a life safety rope.

3.3.186.3.1 Fire Escape Rope. Rope dedicated solely for the purpose of supporting people during emergency self-rescue (self-escape) from an immediately hazardous environment involving fire or fire products; not classified as a life safety rope.

3.3.186.4* Life Safety Rope. Rope dedicated solely for the purpose of supporting people during rescue, fire-fighting, other emergency operations, or during training evolutions.

3.3.186.4.1 Moderate Elongation Laid Life-Saving Rope. Rope dedicated solely for the purpose of supporting people during rescue at fire-fighting operations or training evolutions.

3.3.186.5 Line. See 3.3.186, Rope or 3.3.239, Webbing.

3.3.186.5.1 Throwline. A floating rope that is intended to be thrown to a person during water rescues or as a tether for rescuers entering the water.

3.3.187 Rope Grab Device. See 3.3.49.6.

3.3.188 Rope Rescue Equipment. Components used to build rope rescue systems including life safety rope, life safety harnesses, and auxiliary equipment.

3.3.189 Rope Rescue System. A system comprised of rope rescue equipment and an appropriate anchor system intended for use in the rescue of a subject.

3.3.190 Routine Inspection. An inspection performed at least prior to using an item.

3.3.191 Safety Officer. An individual appointed by the AHJ as qualified to maintain a safe working environment.

3.3.192 Sample. The element, item, component, or composite that is conditioned for subsequent testing. An amount of the material, product, or assembly to be tested that is representative of the item as a whole. (See also 3.3.206, *Specimen*.)

3.3.193 Secondary Access. Openings created by rescuers that provide a pathway to trapped and/or injured victims.

3.3.194* Secondary Search. A detailed, systematic search of an area.

3.3.195 Self-Destructive Action. Interaction of materials in a manner that leads to deterioration.

3.3.196 Sheeting. The members of a shoring system that support the sides of an excavation and are in turn supported by other members of the shoring system.

3.3.197* Shield (or Shield System). A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structures.

3.3.198 Shoring Team. The group of individuals, with established communications and leadership, assigned to construct, move, place, and manage the shoring or shoring system inside a structure, space, trench, or excavation.

3.3.199 Single-Point Anchor System. An anchor system configuration utilizing a single anchor point to provide the primary support for the rope rescue system. A single-point anchor system includes those anchor systems that utilize one or more additional nonloaded anchor points as backup to the primary anchor point.

3.3.200 Size-Up. A mental process of evaluating the influencing factors at an incident prior to committing resources to a course of action.

3.3.201 Small Machine. Machinery or equipment capable of simple disassembly, or constructed of lightweight materials, presenting simple hazards, which are capable of being controlled by the rescuer(s).

3.3.202 Snap Link. An auxiliary equipment system component; a self-closing, gated, load-bearing connector.

3.3.203 Software. Flexible textile components of protective clothing or equipment, including, but not limited to, end-to-end straps and multiple configuration straps.

3.3.204* Soiling. The accumulation of sweat, dust, dirt, debris, and other nonhazardous materials on or in an ensemble or ensemble element that could degrade its performance or cause hygiene issues.

3.3.205 Special Operations. Those emergency incidents to which the responding agency responds that require specific and advanced technical training and specialized tools and equipment.

3.3.206 Specimen. The conditioned element, item, component, or composite that is tested. Specimens are taken from samples. (See also 3.3.192, *Sample*.)

3.3.207* Standard Deviation. A parameter that indicates the way in which a probability function is centered around its mean.

3.3.208 Standard Operating Guideline. An organizational directive that establishes a course of action or policy.

3.3.209 Standard Operating Procedure. A written organizational directive that establishes or prescribes specific operational or administrative methods to be followed routinely for the performance of designated operations or actions. [1521, 2020]

3.3.210* Strongback. The vertical members of a trench shoring system placed in contact with the earth, usually held in place against sections of sheeting with shores and positioned so that individual members do not contact each other.

3.3.211 Structural Marking System. A building marking system used to identify and display information related to structure identification, structure hazards evaluation, search assessment, and victim location.

3.3.212* Supplemental Sheeting and Shoring. Sheeting and shoring operations that involve the use of commercial sheeting/shoring systems and/or isolation devices or that involve cutting and placement of sheeting and shoring when greater than 2 ft (0.61 m) of shoring exists below the bottom of the strongback.

3.3.213 Support System. A structure, such as underpinning, bracing, or shoring, that provides support to an adjacent structure, underground installation, or the sides of an excavation.

3.3.214 Surcharge Load. Any weight near the lip of the trench that increases the likelihood of instability or secondary cave-in.

3.3.215 Swift Water. Water moving at a rate greater than one knot [1.15 mph (1.85 km/hr)].

3.3.216* System Safety Factor. The weakest point within a system, expressed as a ratio between the minimum breaking strength of that point (component) as compared to the force placed upon it.

3.3.217 System Stress. Any condition creating excessive force (i.e., exceeding the maximum working load of any component) to components within a rope rescue system that could lead to damage or failure of the system.

3.3.218* Tabulated Data. Any set of site-specific design data used by a professional engineer to design a protective system at a particular location.

3.3.219 Tagout. A method of tagging, labeling, or otherwise marking an isolation device during hazard abatement operations to prevent accidental removal of the device. (See also 3.3.124, *Lockout*.)

3.3.220 Technical Search and Rescue. The application of special knowledge, skills, and equipment to resolve unique and/or complex search and rescue situations.

3.3.221* Technical Search and Rescue Incident. Complex search and/or rescue incidents requiring specialized training of personnel and special equipment to complete the mission.

3.3.222* Technical Use. One designation of an equipment item or manufactured systems designed for technical-use loads, and escape based on design loads that are calculated and understood.

3.3.223 Tender. An individual trained in the responsibilities of diver safety who provides control of search patterns from the surface of the water.

3.3.224* Terrain. Specific natural and topographical features within an environment.

3.3.225* Terrain Hazard. Specific terrain feature, or feature-related condition, that exposes one to danger and the potential for injury and/or death.

3.3.226 Thorough Inspection. An in-depth inspection performed at intervals.

3.3.227 Throwline. See 3.3.186.5.1.

3.3.228* Traditional Sheeting and Shoring. The use of 4 ft × 8 ft (1.2 m × 2.4 m) sheet panels, with a strongback attachment, supplemented by a variety of conventional shoring options such as hydraulic, screw, and/or pneumatic shores.

3.3.229 Transfer Device. Various devices, including litters and harnesses, used with rope rescue systems to package and allow safe removal of a subject from a specific rescue environment.

3.3.230* Trench (or Trench Excavation). A narrow (in relation to its length) excavation made below the surface of the earth.

3.3.231 Trench Box (or Trench Shield). A manufactured protection system unit made from steel, fiberglass, or aluminum that is placed in a trench to protect workers from cave-in and that can be moved as a unit. [See also 3.3.197, *Shield (or Shield System)*.]

3.3.232* Tunnel. A covered excavation used for the conveyance of people or materials, typically no smaller than 36 in. (0.91 m) in diameter and within 20 degrees of horizontal.

3.3.233* Universal Precautions. An approach to infection control in which human blood and certain human body fluids are treated as if known to be infectious for HIV, HBV, and other bloodborne pathogens.

3.3.234 Vehicle. A device or structure for transporting persons or things; a conveyance.

3.3.235 Victim Extrication Device. See 3.3.49.7.

3.3.236 Virgin Fiber. See 3.3.83.2.

3.3.237 Waist. The area above the hips and below the xiphoid process.

3.3.238 Watermanship Skills. Capabilities that include swimming, surface diving, treading water, and staying afloat with a reasonable degree of comfort appropriate to the required task.

3.3.239 Webbing. Woven material of flat or tubular weave in the form of a long strip.

3.3.239.1 Escape Webbing. Webbing dedicated solely for the purpose of supporting people during emergency self-escape (self-rescue); not intended for use in a hazardous environment involving fire or fire products.

3.3.239.2 Fire Escape Webbing. Webbing dedicated solely for the purpose of supporting people during emergency self-escape (self-rescue) from an immediately hazardous environment involving fire or fire products.

3.3.240* Wilderness. A setting in which the delivery of services including search, rescue, and patient care by response personnel is adversely affected by logistical complications, such as an environment that is physically stressful or hazardous to the patient, response personnel, or both; remoteness of the patient's location, such that it causes a delay in the delivery of care to the patient; anywhere the local infrastructure has been compromised enough to experience wilderness-type conditions, such as lack of adequate medical supplies, equipment, or transportation; remoteness from public infrastructure support services; poor to no medical services or potable water; compromised public safety buildings, public utilities or communications systems; city, county, state, provincial, tribal, or national recreational areas or parks with mountains, trails; areas they define as wilderness.

Chapter 4 General Requirements (NFPA 1670)

4.1 Administration.

4.1.1 Scope.

4.1.1.1* Chapters 4 through 23 shall identify and establish levels of functional capability for conducting operations at technical search and rescue incidents while minimizing threats to rescuers.

4.1.1.2* The requirements of Chapters 4 through 23 shall apply to organizations that provide response to technical search and rescue incidents, including those not regulated by governmental mandates.

4.1.1.3* It is not the intent of Chapters 4 through 23 to be applied to individuals and their associated skills and/or qualifications.

4.1.2* Purpose.

4.1.2.1 The purpose of Chapters 4 through 23 shall be to assist the AHJ in assessing a technical search and rescue hazard within the response area, to identify the level of operational capability, and to establish operational criteria.

4.1.2.2 The functional capabilities of Chapters 4 through 23 shall be permitted to be achieved in a variety of ways.

4.1.3 Equivalency. Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

4.1.3.1 Technical documentation shall be submitted to the AHJ to demonstrate equivalency.

4.1.3.2 The system, method, or device shall be approved for the intended purpose by the AHJ.

4.2 General.

4.2.1* The AHJ shall establish levels of operational capability needed to conduct operations at technical search and rescue incidents, based on hazard identification, risk assessment, training level of personnel, and availability of internal and external resources.

4.2.1.1* Organizations shall be capable of applying the requirements of any combination of technical rescue disciplines based on the need identified within their area of operations.

4.2.1.2* Organizations shall identify hazards, their likeliness and severity, so that capabilities can be established.

4.2.2 At a minimum, all technical search and rescue organizations shall meet the awareness level for each type of search and rescue incident for which the AHJ has identified a potential hazard (*see 4.3.1*).

4.2.3* In jurisdictions where identified hazards might require a search and rescue capability at a level higher than awareness, a plan to address this situation shall be written.

4.2.3.1 The AHJ shall determine distribution of roles and responsibilities in order to focus training and resources at the designated level to maintain proficiency.

4.2.3.2 Where an advanced level of search and rescue capability is required in a given area, organizations shall have a system in place to utilize the most appropriate resource(s) available, through the use of local experts, agreements with specialized resources, and mutual aid.

4.2.4 The AHJ shall establish written standard operating procedures (SOPs) consistent with one of the following operational levels for each of the disciplines defined in this document:

- (1)* *Awareness Level.* This level represents the minimum capability of organizations that provide response to technical search and rescue incidents.
- (2)* *Operations Level.* This level represents the capability of organizations to respond to technical search and rescue incidents and to identify hazards, use equipment, and apply limited techniques specified in this standard to support and participate in technical search and rescue incidents.
- (3) *Technician Level.* This level represents the capability of organizations to respond to technical search and rescue incidents and to identify hazards, use equipment, and apply advanced techniques specified in this standard necessary to coordinate, perform, and supervise technical search and rescue incidents.

4.2.5 It is not the intent of this document that an organization shall deem itself capable of an advanced skill level in any of the disciplines defined herein simply by training or adhering to the requirements set forth.

4.2.6* Maintaining an operations- or technician-level capability in any discipline shall require a combination of study, training, skill, and frequency of operations in that discipline.

4.2.7 The AHJ shall establish operational procedures consistent with the identified level of operational capability to ensure that technical search and rescue operations are performed in a manner that minimizes threats to rescuers and others.

4.2.8 The same techniques used in a search and rescue operation shall be considered equally useful for training, body recovery, evidence search, and other operations with a level of urgency commensurate with the risk/benefit analysis.

4.2.9 Operational procedures shall not exceed the identified level of capability established in 4.2.4.

4.2.10* At a minimum, medical care at the emergency medical technician (EMT) level of certification shall be provided by the organization at technical search and rescue incidents.

4.2.11 Training.

4.2.11.1 The AHJ shall provide for training in the responsibilities that are commensurate with the operational capability of the organization.

4.2.11.1.1 The minimum training for an organization shall be at the awareness level.

4.2.11.1.2 Organizations expected to perform at a higher operational level shall be trained to that level.

4.2.11.1.3* Any member of the organization who could be expected to perform at the awareness, operations, or technician level in a specific discipline shall be provided training to meet the job performance requirements for the identified performance level for that specific discipline as defined in NFPA 1006.

4.2.11.1.4 Each member of an organization operating at the awareness level shall be a competent person as defined in 3.3.34.

4.2.11.2* The AHJ shall provide for the continuing education necessary to maintain all requirements of the organization's identified level of capability.

4.2.11.3 An annual performance evaluation of the organization based on requirements of this standard shall be performed.

4.2.11.4* The AHJ shall evaluate its training program to determine whether the current training has prepared the organization to function at the established operational level under abnormal weather conditions, extremely hazardous operational conditions, and other difficult situations.

4.2.11.5* Documentation.

4.2.11.5.1 The AHJ shall be responsible for the documentation of all required training.

4.2.11.5.2 This documentation shall be maintained and available for inspection by individual team members and their authorized representatives.

4.2.12 Prior to operating at a technical search and rescue incident, an organization shall meet the requirements specified in Chapter 4 as well as all relevant requirements of Chapters 5 through 9 for the specific technical rescue incident.

4.2.13 Standard Operating Procedure.

4.2.13.1 The AHJ shall ensure that there is a standard operating procedure to evacuate members from an area and to account for their safety when an imminent hazard condition is discovered.

4.2.13.2 This procedure shall include a method to notify all members in the affected area immediately by any effective

means, including audible warning devices, visual signals, and radio signals.

4.2.14* The AHJ shall comply with all applicable local, state, tribal, provincial, and federal laws.

4.2.15* The AHJ shall train responsible personnel in procedures for invoking, accessing, and using relevant components of the *National Search and Rescue Plan of the United States*, the "FEMA National Response Framework," and other national, state, and local response plans, as applicable.

4.3 Hazard Identification and Risk Assessment.

4.3.1* The AHJ shall conduct a hazard identification and risk assessment of the response area and shall determine the feasibility of conducting technical search and rescue operations.

4.3.2 The hazard identification and risk assessment shall include an evaluation of the environmental, physical, social, and cultural factors influencing the scope, frequency, and magnitude of a potential technical search and rescue incident and the impact they might have on the ability of the AHJ to respond to and to operate while minimizing threats to rescuers at those incidents.

4.3.3* The AHJ shall identify the type and availability of internal resources needed for technical search and rescue incidents and shall maintain a list of those resources.

4.3.4* The AHJ shall identify the type and availability of external resources needed to augment existing capabilities for technical search and rescue incidents and shall maintain a list of these resources, which shall be updated at least once a year.

4.3.5* The AHJ shall establish procedures for the acquisition of those external resources needed for technical search and rescue incidents.

4.3.6 The hazard identification and risk assessment shall be documented.

4.3.7 The hazard identification and risk assessment shall be reviewed and updated on a scheduled basis and as operational or organizational changes occur.

4.3.8 At intervals determined by the AHJ, the AHJ shall conduct surveys in the organization's response area for the purpose of identifying the types of technical search and rescue incidents that are most likely to occur.

4.4 Incident Response Planning.

4.4.1 The procedures for a technical search and rescue emergency response shall be documented in the special operations incident response plan.

4.4.1.1 The plan shall be a formal, written document.

4.4.1.2 Where external resources are required to achieve a desired level of operational capability, mutual aid agreements shall be developed with other organizations.

4.4.2 Copies of the technical search and rescue incident response plan shall be distributed to agencies, departments, and employees having responsibilities designated in the plan.

4.4.3 A record shall be kept of all holders of the technical search and rescue incident response plan, and a system shall be implemented for issuing all changes or revisions.

4.4.4 The technical search and rescue incident response plan shall be approved by the AHJ through a formal, documented approval process and shall be coordinated with participating agencies and organizations.

4.5 Equipment.

4.5.1 Operational Equipment.

4.5.1.1* The AHJ shall ensure that equipment commensurate with the respective operational capabilities for operations at technical search and rescue incidents and training exercises is provided.

4.5.1.2 Training shall be provided to ensure that all equipment is used and maintained in accordance with the manufacturers' instructions.

4.5.1.3 Procedures for the inventory and accountability of all equipment shall be developed and used.

4.5.2 Personal Protective Equipment (PPE).

4.5.2.1* The AHJ shall ensure that the protective clothing and equipment are supplied to provide protection from those hazards to which personnel are exposed or could be exposed.

4.5.2.2 Personnel shall be trained in the care, use, inspection, maintenance, and limitations of the protective clothing and equipment assigned or available for their use.

4.5.2.3 The AHJ shall ensure that all personnel wear and use PPE while working in known or suspected hazardous areas during technical search and rescue incidents and training exercises.

4.5.2.4 The AHJ shall ensure that atmosphere-supplying respirators in the form of supplied air respirators (SAR) or self-contained breathing apparatus (SCBA) are available when required for technical search and rescue operations and that they meet the requirements specified in Chapter 7 of NFPA 1500.

4.5.2.4.1 Breathing apparatus shall be worn in accordance with the manufacturer's recommendations.

4.5.2.4.2 A supply source of breathing air meeting the requirements of ANSI/CGA G7.1, *Commodity Specification for Air*, with a minimum air quality of Grade D shall be provided for all atmosphere-supplying respirators.

4.5.2.4.3 A supply source of breathing air meeting the requirements of ANSI/CGA G7.1, *Commodity Specification for Air*, with a minimum air quality of Grade E shall be provided for all atmosphere-supplying respirators used for dive operations.

4.5.2.4.4 Supplied air respirators shall be used in conjunction with a self-contained breathing air supply capable of providing enough air for egress in the event of a primary air supply failure.

4.6 Safety.

4.6.1 General.

4.6.1.1 All personnel shall receive training related to the hazards and risks associated with technical search and rescue operations.

4.6.1.2 All personnel shall receive training for conducting search and rescue operations while minimizing threats to rescuers and using PPE.

4.6.1.3 The AHJ shall ensure that members assigned duties and functions at technical search and rescue incidents and training exercises meet the relevant requirements of the following chapters and sections of NFPA 1500:

- (1) Section 5.4, Special Operations Training
- (2) Chapter 7, Protective Clothing and Protective Equipment
- (3) Chapter 8, Emergency Operations

4.6.1.4* Where members are operating in positions or performing functions at an incident or training exercise that pose a high potential risk for injury, members qualified in BLS shall be standing by.

4.6.1.5* Rescuers shall not be armed except when it is required to meet the objectives of the incident as determined by the AHJ.

4.6.2 Safety Officer. At technical search and rescue training exercises and in actual operations, the incident commander shall assign a member to fulfill the duties of a safety officer with the specific technical knowledge and responsibility for the identification, evaluation, and, where possible, correction of hazardous conditions and unsafe practices specific to the operational capabilities employed.

4.6.3 Incident Management System (IMS).

4.6.3.1* The AHJ shall provide for and use training on the implementation of an IMS that meets the requirements of NFPA 1561 with written SOPs applying to all members involved in emergency operations.

4.6.3.2 All members involved in emergency operations shall be familiar with the IMS.

4.6.3.3 The AHJ shall provide for training on the implementation of an incident accountability system that meets the requirements of NFPA 1561.

4.6.3.4 The incident commander shall ensure rotation of personnel to reduce stress and fatigue.

4.6.3.5 The incident commander shall ensure that all personnel are aware of the potential impact of their operations on the safety and welfare of rescuers and others, as well as on other activities at the incident site.

4.6.3.6 At all technical search and rescue incidents, the organization shall provide supervisors who possess skills and knowledge commensurate with the operational level identified in 4.2.4.

4.6.4* Fitness. The AHJ shall ensure that members are psychologically, physically, and medically capable to perform assigned duties and functions at technical search and rescue incidents and to perform training exercises in accordance with Chapter 11 of NFPA 1500.

4.6.5 Nuclear, Biological, and Chemical Response.

4.6.5.1* The AHJ, as part of its hazard identification and risk assessment, shall determine the potential to respond to technical search and rescue incidents that might involve nuclear or biological weapons, chemical agents, or weapons of mass destruction, including those with the potential for secondary devices.

4.6.5.2 If the AHJ determines that a valid risk exists for technical search and rescue response into a nuclear, biological, and/or chemical environment, it shall provide training and equipment for response personnel.

Chapter 5 Rope Rescue (NFPA 1670)

5.1 General Requirements.

5.1.1 Organizations operating at rope rescue incidents shall meet the requirements specified in Chapter 4.

5.1.2* The AHJ shall evaluate the need for missing person search where rope rescues might occur within its response area and shall provide a search capability commensurate with the identified needs.

5.1.3* All techniques required of the rope rescue team within this standard shall be demonstrated by the team and/or team members on at least an annual basis to a level that assures their ability to perform the practice in a manner that will result in rapid access to and successful rescue of the victim while minimizing further injury and without sacrificing the safety of rescue team members.

5.2 Awareness Level.

5.2.1 Organizations operating at the awareness level for rope rescue incidents shall meet the requirements specified in Section 5.2.

5.2.2 Organizations operating at the awareness level for rope rescue incidents shall develop and implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs at a rope rescue incident
- (2)* Identifying resources necessary to conduct rope rescue operations
- (3)* Carrying out the emergency response system where rope rescue is required
- (4)* Carrying out site control and scene management
- (5)* Recognizing general hazards associated with rope rescue and the procedures necessary to mitigate these hazards
- (6)* Identifying and using PPE assigned for use at a rope rescue incident
- (7) Supporting an organization at the operations or technician level while functioning within an IMS
- (4) Establishing a method of command and communications so control of the rope rescue systems is established and maintained throughout the operation of rope rescue system
- (5)* Identifying rope rescue techniques for use by the agency that facilitate the objective of moving a rescue load from one stable location to another in a low-angle environment
- (6) Identifying rope rescue techniques for use by the agency that facilitate the objective of moving a rescue load from one stable location to another in a high-angle environment
- (7) Selecting and identifying methods of constructing rope rescue mechanical advantage systems
- (8) Selecting and identifying methods for lowering a load in a manner so that the speed of descent is controlled or can be stopped as desired
- (9) Selecting and identifying methods for changing from a lowering or raising operation while the system is loaded
- (10)* Identifying methods for selection and construction of anchors and anchor system(s) for rope rescue systems
- (11) Identifying methods for the construction of fixed-line rope rescue systems
- (12) Selecting, using, maintaining, and inspecting rope rescue equipment and hazard specific PPE according to the manufacturer's instructions and best practices
- (13)* Providing redundancy in rope rescue systems in a manner that prevents an uncontrolled fall and limits the energy transmitted to the load and anchor system(s) in the event of a failure of any singular component within the system
- (14) Implementing methods for the use of litters or other adjuncts identified by the AHJ for the movement of victims as part of a rope rescue system
- (15) Selecting and identifying methods of connecting rescuers to the rope rescue system
- (16)* Developing and implementing methods to provide for the retrieval of a rescuer who has become stranded while suspended from a rope rescue system
- (17) Developing and implementing methods to prevent rescuers from falling while working on or near unprotected edges
- (18) Developing and implementing methods for rescuers to negotiate an edge in a manner that minimizes dynamic forces and prevents equipment damage
- (19)* Developing and implementing methods for negotiating a loaded litter over various types of edges, including those that must pass directly over an edge without the advantage of overhead anchors

5.3 Operations Level.

5.3.1 Organizations operating at the operations level for rope rescue incidents shall meet the requirements specified in Sections 5.2 and 5.3.

5.3.2* Organizations operating at the operations level for rope rescue incidents shall, commensurate with the identified needs of the organization, develop and implement procedures for the use of ropes and rope rescue systems for the movement of persons from one stable location to another, including, but not limited to, the following:

- (1) Conducting size-up of operations level rope rescue incidents
- (2) Ensuring risk management techniques for rope rescue incidents are identified and complied with
- (3)* Incorporating procedures or methods to ensure systems are constructed as prescribed and function as intended prior to use

5.4 Technician Level.

5.4.1 Organizations operating at the technician level for rope rescue incidents shall meet the requirements specified in Sections 5.2, 5.3, and 5.4.

5.4.2* Organizations operating at the technician level for rope rescue incidents shall develop and implement procedures, commensurate with the identified needs of the organization, for the following:

- (1)* Accessing a patient using techniques that require rescuers to climb up or down natural or man-made structures, which can expose the climber to a significant fall hazard

- (2)* Using rope rescue systems to move a rescuer and a patient along a horizontal path above an obstacle or projection
- (3)* Performing a high-angle rope rescue of a person suspended from, or stranded on, a structure or landscape feature
- (4) Applying the principles of the physics involved in constructing rope rescue systems, including system safety factors, critical angles, and the causes and effects of force multipliers
- (5) Performing a high-angle rope rescue with a litter using tender(s) to negotiate obstacles, manipulate or position the patient, or provide medical care while being raised and lowered
- (6) Performing rope rescue operations where the subject is in emotional or psychological crisis or distress

Chapter 6 Structural Collapse Search and Rescue (NFPA 1670)

6.1 General Requirements. Organizations operating at structural collapse incidents shall meet the requirements specified in Chapter 4.

6.2 Awareness Level.

6.2.1 Organizations operating at the awareness level for structural collapse incidents shall meet the requirements specified in Sections 6.2 and 7.2.

6.2.2 Organizations operating at the awareness level for structural collapse incidents shall implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs at a structural collapse search and rescue
- (2)* Identifying the resources necessary to conduct structural collapse search and rescue operations
- (3)* Initiating the emergency response system for structural collapse incidents
- (4)* Initiating site control and scene management
- (5)* Recognizing the general hazards associated with structural collapse incidents, including the recognition of applicable construction types and categories and the expected behaviors of components and materials in a structural collapse
- (6)* Identifying all types of collapse patterns and potential victim locations
- (7)* Recognizing the potential for secondary collapse
- (8)* Conducting visual and verbal searches at structural collapse incidents, while using approved methods for the specific type of collapse
- (9)* Recognizing and implementing a search and rescue/search assessment marking system, building marking system (structure/hazard evaluation), victim location marking system, and structure marking system (structure identification within a geographic area), such as the ones used by the "FEMA National Urban Search and Rescue (US&R) Response System"
- (10) Removing readily accessible victims from structural collapse incidents
- (11)* Identifying and establishing a collapse safety zone
- (12)* Conducting reconnaissance (recon) of the structure(s) and surrounding area
- (13) Supporting an organization at the operations or technician level while functioning within an IMS

6.3 Operations Level.

6.3.1 Organizations operating at the operations level for structural collapse incidents shall meet the requirements specified in Sections 5.3, 6.2, 6.3, 7.3, 8.3, 11.3, 12.3, and 16.2.

6.3.2 The organization shall have members capable of recognizing hazards, using equipment, and implementing techniques necessary to operate at structural collapse incidents involving the collapse or failure of ordinary construction (light frame, unreinforced masonry construction, and reinforced masonry construction).

6.3.3 Organizations operating at the operations level for structural collapse incidents involving light frame ordinary construction and reinforced and unreinforced masonry construction shall develop and implement procedures for the following:

- (1)* Sizing up existing and potential conditions at structural collapse incidents
- (2)* Recognizing unique collapse or failure hazards
- (3)* Conducting hasty primary and secondary search operations (low and high coverage) intended to locate victims trapped on, inside, and beneath collapse debris
- (4)* Accessing victims trapped inside and beneath collapse debris
- (5)* Performing extrication operations involving packaging, treating, and removing victims trapped within and beneath collapse debris
- (6)* Stabilizing the structure and performing rescue shoring operations using shores that include T shore, double T shore, two-post vertical shore, multiple-post vertical shore, door and window shore, horizontal shore, flying raker shore, split sole raker shore, solid sole raker shore, and box cribbing to make safe for rescue operations

6.4 Technician Level.

6.4.1 Organizations operating at the technician level for structural collapse incidents shall meet the requirements specified in Sections 5.4, 6.2, 6.3, 6.4, 7.4, 8.4, 11.4, and 12.4.

6.4.2 The organization shall have members capable of recognizing hazards, using equipment, and implementing techniques necessary to operate at structural collapse incidents involving all types of construction.

6.4.3 Organizations operating at the technician level for structural collapse incidents for all types of construction shall develop and implement procedures for the following:

- (1) Evaluating existing and potential conditions at structural collapse incidents
- (2) Recognizing unique collapse or failure hazards
- (3)* Conducting search operations intended to locate victims trapped inside and beneath collapse debris
- (4)* Accessing victims trapped inside and beneath collapse debris
- (5)* Performing extrication operations involving packaging, treating, and removing victims trapped within and beneath collapse debris
- (6)* Stabilizing the structure and performing rescue shoring operations using shores that include laced post shore, plywood laced post shore, sloped floor shores (Type 2 and Type 3), double raker shore, and flying shore to make safe for rescue operations

Chapter 7 Confined Space Search and Rescue (NFPA 1670)

7.1 General Requirements.

7.1.1 Organizations operating at confined space incidents shall meet the requirements specified in Chapter 4.

7.1.2* The requirements of this chapter shall apply to organizations that provide varying degrees of response to confined space emergencies.

7.1.3* The rescue service shall be capable of responding in a timely manner to rescue summons.

7.2 Awareness Level.

7.2.1 Organizations operating at the awareness level for confined space search and rescue incidents shall meet the requirements specified in Sections 5.2 and 7.2.

7.2.2 The organization shall have an appropriate number of personnel meeting the requirements of Chapter 4 of NFPA 470 commensurate with the organization's needs.

7.2.3 Organizations at the awareness level shall be responsible for performing certain nonentry rescue (retrieval) operations.

7.2.4 Organizations operating at the awareness level for confined space search and rescue incidents shall implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs at a confined space rescue incident
- (2) Initiating contact and establishing communications with victims where possible
- (3)* Recognizing and identifying the hazards associated with nonentry confined space emergencies
- (4)* Recognizing confined spaces
- (5)* Performing a nonentry retrieval
- (6)* Implementing the emergency response system for confined space emergencies
- (7)* Implementing site control and scene management
- (8) Supporting an organization at the operations or technician level while functioning within an IMS

7.3 Operations Level.

7.3.1 Organizations operating at the operations level for confined space search and rescue incidents shall meet the requirements specified in Sections 5.3, 7.2, and 7.3.

7.3.2 The organization operating at this level shall be responsible for the development and training of a confined space rescue service that is trained, equipped, and available to respond to confined space emergencies of a type and complexity that require an operations-level organization.

7.3.2.1* The role of a confined space rescue service is intended to include entry into the space to perform a rescue and, as a minimum, shall be staffed to provide sufficient members with the following exclusive functions:

- (1)* Rescue entrant/entry team of sufficient size and capability to perform the rescue
- (2)* Backup rescue entrants of a sufficient number to provide immediate assistance to, or rescue of, rescue entrants who become ill or injured and are unable to perform self-rescue
- (3) Rescue attendant whose function is to deny unauthorized persons access and to monitor the conditions in the space and the status of all entrants

- (4) Rescue team leader (supervisor) whose function is to maintain control of the entire operation and be knowledgeable in all rescue service functions

7.3.2.2 Operations-level organizations shall be restricted to rescue inside confined spaces with the following characteristics:

- (1)* Where the internal configuration of the space is clear and unobstructed so retrieval systems can be used for rescuer entrants without possibility of entanglement
- (2)* Where the victim can be easily seen from the outside of the space's primary access opening
- (3)* Where rescue entrants can pass easily through the access/egress opening(s) with room to spare when PPE is worn in the manner recommended by the manufacturer
- (4)* Where the space can accommodate two or more rescue entrants in addition to the victim
- (5)* Where all hazards in and around the confined space have been identified, isolated, and controlled

7.3.3 The operations-level organization shall ensure that each member of the rescue service meets the minimum requirements of operations-level confined space rescue in NFPA 1006.

7.3.4 If required to provide confined space rescue within regulated industrial facilities, the organization shall ensure the rescue service has access to all confined spaces from which rescue could be necessary so that they can develop rescue plans and practice rescue operations according to their designated level of competency.

7.3.5* The organization shall ensure that each member of the rescue service practices confined space rescues once every 12 months, in accordance with the requirements of 4.2.11 of this document, by means of simulated rescue operations in which he or she removes dummies, mannequins, or persons from actual confined spaces or from representative confined spaces resembling all those to which the rescue service could be required to respond in an emergency within their jurisdiction.

7.3.6 Representative confined spaces shall — with respect to opening size, configuration, and accessibility — simulate the types of confined spaces from which rescue is to be performed.

7.3.7 Organizations operating at the operations level shall develop and implement procedures for the following:

- (1)* Sizing up existing and potential conditions at confined space emergencies
- (2)* Protecting rescue personnel from hazards within and adjacent to the confined space
- (3)* Ensuring that rescue personnel are capable of managing the physical and psychological challenges that affect rescuers entering confined spaces
- (4)* Identifying the duties of the rescue entrant(s) and backup rescue entrant(s), rescue attendant, and rescue team leader as defined herein
- (5)* Monitoring continuously, or at frequent intervals, the atmosphere in all parts of the space to be entered for oxygen content, flammability [lower explosive limit/lower flammable limit (LEL/LFL)], and toxicity, in that order
- (6)* Performing entry-type rescues into confined spaces
- (7)* Using victim packaging devices that could be employed in large, unobstructed confined spaces
- (8)* Selecting, constructing, and using a rope-based lowering and -raising system in the high-angle environment

7.4 Technician Level.

7.4.1 Organizations operating at the technician level for confined space search and rescue emergencies shall meet the requirements of Sections 7.2, 7.3, and 7.4.

7.4.2 The organization operating at this level shall be responsible for the development of a confined space rescue service that is trained, equipped, and available to respond to emergencies within confined spaces of a type and complexity that requires a technician-level organization.

7.4.2.1 A technician-level rescue service shall be required for confined spaces with one or more of the following characteristics:

- (1) Where the internal configuration of the space might create entanglement hazards and retrieval might not be effective
- (2) Where the victim cannot be seen from the outside of the space's primary access opening
- (3)* Where the portal size and configuration will not allow a rescuer to pass through the access/egress opening(s) using SCBA when worn in the manner recommended by the manufacturer
- (4) Where all hazards in and around the confined space have been identified and can be mitigated by using respiratory protection

7.4.3 Organizations operating at the technician level for confined space search and rescue emergencies shall develop and implement procedures for the following:

- (1) Developing hazard isolation and control requirements
- (2)* Planning response for entry-type rescues in hazardous environments
- (3)* Implementing the planned response
- (4) Using victim packaging devices suitable for confined spaces with small entry portals and/or that are internally congested

Chapter 8 Vehicle Search and Rescue (NFPA 1670)

8.1* General Requirements. Organizations operating at vehicle search and rescue incidents shall meet the requirements specified in Chapter 4.

8.2 Awareness Level.

8.2.1 Organizations operating at the awareness level for vehicle emergencies shall meet the requirements specified in Section 8.2.

8.2.2 All members of the organization shall meet the requirements specified in Chapter 4 of NFPA 470 commensurate with the organization's needs.

8.2.3 Organizations operating at the awareness level for vehicle emergencies shall implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs at a vehicle search and rescue incident
- (2)* Identifying the resources necessary to conduct operations
- (3)* Initiating the emergency response system for vehicle search and rescue incidents
- (4)* Initiating site control and scene management in accordance with NFPA 1091
- (5)* Recognizing general hazards associated with vehicle search and rescue incidents

- (6) Initiating traffic control and implementing a traffic incident management area (TIMA) as defined in NFPA 1091
- (7) Establishing that individuals responsible for implementing the TIMA do so in accordance with NFPA 1091
- (8) Supporting an organization at the operations or technician level while functioning within an IMS

8.3 Operations Level.

8.3.1 Organizations operating at the operations level for vehicle emergencies shall meet the requirements specified in Sections 8.2 and 8.3.

8.3.2 All members of the organization shall meet the requirements of Chapter 6 of NFPA 470 commensurate with the organization's needs.

8.3.3* The organization shall have members capable of recognizing hazards, using equipment, and implementing techniques necessary to operate safely and effectively at incidents involving persons injured or entrapped in a typical vehicle commonly found in the jurisdiction.

8.3.4 Organizations operating at the operations level for vehicle emergencies shall develop and implement procedures for the following:

- (1)* Sizing up existing and potential conditions at vehicle search and rescue incidents
- (2) Identifying probable victim locations and survivability
- (3)* Making the search and rescue area safe, including identifying and controlling the hazards presented by the vehicle, its position, or its systems
- (4)* Identifying, containing, and stopping fuel release
- (5) Protecting a victim during extrication or disentanglement
- (6) Packaging a victim prior to extrication or disentanglement
- (7)* Accessing victims trapped in a typical vehicle commonly found in the jurisdiction
- (8)* Performing extrication and disentanglement operations involving packaging, treating, and removing victims trapped in a common passenger vehicle, or other types of vehicles as identified by the AHJ as being commonly found in the jurisdiction, through the use of hand and power tools
- (9)* Mitigating and managing general and specific hazards associated with vehicle search and rescue incidents that involve common passenger vehicles or other vehicles typically found in the jurisdiction
- (10) Procuring and utilizing the resources necessary to conduct vehicle search and rescue operations
- (11) Maintaining control of traffic at the scene of vehicle search and rescue incidents
- (12) Stabilizing a vehicle that has come to rest on its tires on the road surface or similar flat and stable surface and managing the hazards related to vehicle movement resulting from extrication operations

8.3.5 Any member of the organization who could be expected to perform at the operations level for vehicle search and rescue shall be provided training to meet the job performance requirements for operations-level vehicle rescue as defined in NFPA 1006.

8.4 Technician Level.

8.4.1 Organizations operating at the technician level for vehicle emergencies shall meet the requirements specified in Chapter 8.

8.4.2 Organizations operating at the technician level for vehicle emergencies shall develop and implement procedures for the following:

- (1) Evaluating existing and potential conditions at vehicle search and rescue incidents
- (2)* Performing extrication and disentanglement operations involving packaging, treating, and removing victims injured or trapped in large commercial or industrial vehicles or any vehicles that present unique, complex, exotic, or unfamiliar hazards or extrication challenges
- (3)* Using all specialized search and rescue equipment immediately available and in use by the organization
- (4) Using specialized outside resources, including heavy equipment
- (5) Stabilizing a vehicle that, because of its cargo, contents, position, location, or type, presents multiple concurrent hazards or requires advanced stabilization techniques prior to extrication operations or to protect against unwanted movement during extrication

8.4.3 Any member of the organization who could be expected to perform at the technician level for vehicle search and rescue shall be provided training to meet the job performance requirements for technician-level vehicle rescue in both common passenger vehicles and heavy vehicles as defined in NFPA 1006.

Chapter 9 Animal Technical Rescue (NFPA 1670)

9.1* General Requirements.

9.1.1 Organizations operating at animal rescue incidents shall meet the requirements specified in Chapter 4.

9.1.2 Each member of an organization operating at the awareness level shall be a competent person as defined in 3.3.34.

9.2 Awareness Level.

9.2.1 Organizations operating at the awareness level for animal rescue incidents shall meet the requirements specified in Section 9.2.

9.2.2 Organizations at the awareness level for animal rescues in situations covered within this document shall also meet the requirements of those specific chapters at the awareness level.

9.2.3 Organizations operating at the awareness level for animal rescue incidents shall develop and implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs at an animal rescue incident
- (2) Identifying resources necessary to conduct animal rescue operations
- (3) Carrying out the emergency response system where animal rescue operations are required
- (4) Carrying out site control and scene management; to include mitigating hazards presented by animals and how to contain them in all phases of the incident; to include portable fencing, cages, traps, or other equipment as available

- (5) Recognizing general hazards associated with animal rescue operations and the procedures necessary to mitigate these hazards
- (6) Identifying and using PPE assigned for use at an animal rescue incident
- (7) Requesting the appropriate assistance to determine if a technical rescue vs. recovery will be conducted
- (8) Recognizing and identifying the special equipment and personnel used in animal rescue incidents
- (9) Understanding the social, political, and public safety issues related to effective animal rescue services
- (10) Recognizing hazmat considerations involving animal rescue and requesting resources to deal with those issues
- (11) Supporting an organization at the operations or technician level while functioning within an IMS

9.3 Operations Level.

9.3.1 Organizations performing animal rescue at the operations level shall meet all requirements of Sections 5.3, 9.2, and 9.3.

9.3.2 Organizations performing animal rescue for animals not readily accessible shall meet all requirements of Sections 5.3, 9.2, and 9.3.

9.3.3 Organizations at the operations level performing animal rescue in situations covered within this document shall also meet the requirements of those specific chapters at the operations level.

9.3.4 Organizations operating at the operations level for animal rescue incidents shall, commensurate with the identified needs of the organization, develop and implement procedures for the following:

- (1) Identifying hazards to rescuers posed by the animal (perform risk assessment)
- (2) Identifying behavioral body posture cues to determine the disposition of the animal
- (3) Creating an improvised restraint device to establish physical restraint/control of an animal, both ambulatory and nonambulatory
- (4) Identifying appropriate attachment points to the animal and appropriate positioning of the animal for extrication with minimal injury to the animal and responders
- (5) Using a harness, halter, leash, webbing, sack, or cage, whether improvised, custom, or commercially manufactured, to assist in the movement of an ambulatory animal from one stable location to another in a low-angle environment
- (6) Using an animal packaging device or system to move a recumbent animal from one stable location to another in a low-angle environment
- (7) Performing a low-angle and high-angle lower and raise of an animal using an improvised, custom, or commercially manufactured system, to include safely accessing, managing, and packaging the patient
- (8) Recognizing when chemical restraint is needed or contraindicated and requesting if needed
- (9) In rescues from soil or other adhesive material environments, recognizing the need to alleviate suction on an animal's limbs
- (10) Using behavioral cues and "fight or flight" or "tipping point" behavior characteristics to assist in a rescue

- (11) Using containment techniques for animals that cannot be immediately handled or which require greater control and attention to behavior
- (12) Using auxiliary equipment to facilitate the safe placement of rescue devices on the animal
- (13) Constructing and operating a portable high-point anchor system
- (14) Mitigating the hazards to animals and responders in trailer extrication

9.4 Technician Level.

9.4.1 Organizations performing animal rescue at the technician level shall meet all requirements of Sections 5.4, 9.2, 9.3, and 9.4.

9.4.2 Organizations performing animal rescue at the technician level for animals not readily accessible shall meet all requirements of Sections 5.4, 9.2, 9.3, and 9.4.

9.4.3 Organizations at the technician level performing animal rescue in situations covered within this document shall also meet the requirements of those specific chapters at the level appropriate for the situation.

9.4.4 Organizations at the technician level performing animal rescue of animals that have broken through ice on frozen bodies of water shall develop and implement procedures for cutting a path through ice and providing water rescue or performing a sideways drag with edge protection or cantilevering of the animal to safety.

9.4.5 Organizations operating at the technician level for animal rescue incidents shall develop and implement procedures, commensurate with the identified needs of the organization, for the following:

- (1) Using a tested harness device designed for animals and extended use in the high-angle environment
- (2) Performing a high-angle rescue of an animal stranded on a structure or landscape feature
- (3)* Negotiating an obstacle or projection along a horizontal path with an animal packaged in a litter or sling system
- (4) Applying the principles of the physics involved in constructing rope rescue systems, including system safety factors, critical angles, and the causes and effects of force multipliers
- (5)* Using high-angle rescue techniques to negotiate obstacles or otherwise manipulate the position of an animal packaged in an animal litter or sling system
- (6) Moving an animal packaged in a litter or sling system up and over an edge during a raising or vertical lift operation with a rope system
- (7) Mitigating dynamic loads associated with animal behaviors in a rope rescue system

Chapter 10 Wilderness Search and Rescue (NFPA 1670)

10.1 General Requirements.

10.1.1 Organizations operating at wilderness search and rescue incidents shall meet the requirements specified in Chapter 4.

10.1.2* The AHJ, as part of its hazard identification and risk assessment (*see 4.3.2*), shall identify all locations and situations in the jurisdiction that meet the definition of *wilderness*.

10.2 Awareness Level.

10.2.1 Organizations operating at the awareness level at wilderness search and rescue incidents shall meet the requirements specified in Section 10.2.

10.2.2 Members of organizations at the awareness level shall be permitted to assist in support functions on a wilderness search and rescue operation but shall not be deployed into the wilderness.

10.2.3 Organizations operating at the awareness level at any wilderness search and rescue incident shall have the following capabilities:

- (1) Initiating size-up to ascertain the need for wilderness search and rescue response, the number of subjects, and their reported location
- (2)* Initiating the emergency response system for wilderness search and rescue
- (3)* Initiating site control and scene management
- (4)* Recognizing the general hazards associated with wilderness search and rescue incidents
- (5) Recognizing the environment and type of terrain involved in wilderness search and rescue incidents
- (6)* Recognizing the limitations of conventional emergency response skills and equipment in various wilderness environments
- (7)* Initiating the collection and recording of information necessary to assist operational personnel in a wilderness search and rescue
- (8)* Identifying and isolating any reporting parties and witnesses
- (9) Supporting an organization at the operations or technician level while functioning within an IMS

10.3 Operations Level.

10.3.1 Organizations operating at the operations level at wilderness search and rescue incidents shall meet the requirements specified in Sections 5.3, 10.2, and 10.3.

10.3.2* The AHJ shall establish standard operating procedures (SOPs) that identify the specific environments in which operations-level organizations are permitted to operate.

10.3.3 Organizations operating at the operations level at wilderness search and rescue incidents shall be trained and equipped to operate in the following environments:

- (1) Where the general location of the subject is known
- (2) Where travel is limited to walking along trails or uneven or off-trail terrain
- (3) Where water obstacles, if present, are no more than 2 ft (0.61 m) deep
- (4) Where terrain is negotiable without undue exposure
- (5) Where terrain is walkable and can be negotiated without scrambling or climbing
- (6) Where the incident spans one operational period of 8 hours or less
- (7) Where routes are obvious, and specialized map skills are not required
- (8) Where travel might involve low-angle travel or patient evacuation on slopes where a rope system could be used for safety but not for suspension
- (9) Where weather conditions are stable and do not pose a hazard for rescuers or subject

- (10) Where environmental conditions, such as altitude, snow and scree slopes, exposure, and other terrain factors do not pose a hazard to rescuers or subjects

10.3.4 Organizations operating at the operations level at wilderness search and rescue incidents shall be capable of the following:

- (1)* Sizing up existing and potential conditions at incidents where wilderness search and rescue will be performed
- (2)* Requesting and interfacing with wilderness search and rescue resources
- (3) Providing the specialized medical care and protocols that are unique to the wilderness environment
- (4)* Using personal survival, body management, and preparedness skills for the specific wilderness environments in which the rescuer could become involved
- (5) Operating for an 8-hour period without support
- (6) Recognizing the need for, and procedures and equipment for the provision of, environmental protection through clothing systems applicable to the specific wilderness environments in which the rescuer could become involved
- (7)* Selecting, caring for, and using personal medical and support equipment and packing it with due regard to how it will be carried
- (8) Conducting an interview of a reporting party; documenting and transmitting pertinent information
- (9) Recognizing and preserving evidence at a point last seen (PLS) or a last known point (LKP)
- (10) Locating a subject in the operational environment based on reporting party information when the general location of the subject is known
- (11)* Traveling through various wilderness environments in which the rescuer could become involved while minimizing threats to safety
- (12)* Using land navigation techniques on well-marked terrain that include map and compass as well as any methods of navigation and position reporting used by the responding organizations with which the organization could become involved
- (13) Procuring the necessary maps and navigational and topographical information
- (14) Modifying actions and urgency as applicable to a rescue versus a recovery
- (15) Acquiring information on current and forecast environmental factors, including weather, temperature, precipitation, winds, avalanche risk, and tide levels
- (16)* Participating in and supporting wilderness search operations intended to locate victims whose exact location is unknown
- (17) Accessing, packaging, and caring for a patient in the operational environment
- (18) Recognizing, identifying, and utilizing the rescue hardware and software used by the responding organizations with which the organization could become involved
- (19) Working in and around any aircraft, watercraft, and special vehicles used for SAR operations while minimizing threats to rescuers
- (20) Integrating specialized transport into the operational environment
- (21)* Recognizing the organization's limitations regarding accessing and/or evacuating a victim
- (22) Recognizing when the incident requires a technician-level response or when other specialized resources are required

10.4 Technician Level.

10.4.1 Organizations operating at the technician level at wilderness search and rescue incidents shall meet the requirements specified in Sections 5.4, 10.2, 10.3, 10.4, 15.2, and 16.2.

10.4.2* Each member of the wilderness search and rescue organization at the technician level shall be trained to, as a minimum, a Mountain Rescue Association team member or the equivalent.

10.4.3 Organizations operating at the technician level shall be capable of performing and supervising all aspects of wilderness search and rescue operations with which the organization could become involved.

10.4.4* Wilderness search and rescue organizations at the technician level shall not be required to develop and maintain capabilities in all types of wilderness search and rescue operations.

10.4.5 The ability of the organization to respond at the technician level in one type of wilderness search and rescue operation shall not imply the ability to respond at the technician level in all types of wilderness search and rescue operations.

10.4.6 Organizations operating at the technician level at wilderness search and rescue incidents shall be capable of operating in the following environments in which special search and rescue training and equipment are required or where the capabilities of operations-level equipment and training are exceeded:

- (1) Where the general location of the subject might or might not be known
- (2) Where an extensive search and rescue capabilities are required
- (3) That might involve terrain that requires difficult scrambling or climbing
- (4) That might involve water deeper than 2 ft (0.61 m)
- (5) That might involve terrain that is difficult if exposed or dangerous and requires special skills for travel
- (6) That might involve terrain that requires technical rock- or snow-climbing skills and equipment or other rope access techniques
- (7) Where the incident might span more than one operational period of 8 hours
- (8) Where locating routes requires the use of navigational technology
- (9) That might involve travel or patient evacuation on steep to vertical slopes where rope systems are essential for security or suspension
- (10) That might involve weather conditions that require specialized clothing, travel methods, and equipment
- (11) Where environmental conditions, such as altitude, snow or scree slopes, exposure, and other terrain factors require specialized clothing, travel methods, and equipment

10.4.7 Organizations operating at the technician level at wilderness search and rescue incidents shall develop and implement procedures for the following:

- (1) Evaluating existing and potential conditions at incidents where wilderness search and rescue will be performed and determining the need for technician-level teams
- (2) Acquiring, using, and coordinating technician-level wilderness search and rescue resources

- (3) Providing input to standard operating procedures for anticipated wilderness responses
- (4)* Initiating and, where qualified, coordinating and performing technician-level wilderness search and rescue operations
- (5)* Writing and using an operational plan for search and rescue in the extreme environment

10.4.8* The AHJ shall base the specialized training and equipment that is required for its jurisdiction on the following factors:

- (1) Temperature
- (2) Weather
- (3) Terrain
- (4) Flora and fauna
- (5) Altitude
- (6) Travel time
- (7) Patient care issues
- (8) Duration of incident
- (9) Logistics
- (10) Communications
- (11) Navigation
- (12) Management needs

10.4.9 Organizations operating at the technician level at wilderness search and rescue incidents shall be capable of the following:

- (1) Conducting an interview of a reporting party; documenting and transmitting pertinent information
- (2) Recognizing and preserving evidence at a point last seen (PLS) or a last known point (LKP)
- (3) Operating for a 24-hour period without support
- (4) Navigating with specialized navigation equipment
- (5) Locating a subject in the operational environment based on reporting party information when the general location of the subject might or might not be known
- (6) Packaging, transporting, and caring for a patient in the operational environment
- (7) Determining when other specialized resources are required
- (8) Knowing the specialized resources available to the jurisdiction

Chapter 11 Trench Search and Rescue (NFPA 1670)

11.1 General Requirements. Organizations operating at trench and excavation search and rescue incidents shall meet the requirements specified in Chapter 4.

11.2 Awareness Level.

11.2.1 Organizations operating at the awareness level at trench and excavation emergencies shall meet the requirements specified in Sections 7.2 and 11.2.

11.2.2 Each member of the organization shall meet the requirements specified in Chapter 4 of NFPA 470 and shall be a competent person as defined in 3.3.34.

11.2.3 Organizations operating at the awareness level at trench and excavation emergencies shall implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs for a trench rescue
- (2) Recognizing the need for technical resources

- (3)* Identifying the resources necessary to conduct safe and effective trench and excavation emergency operations
- (4)* Initiating the emergency response system for trenches and excavations
- (5)* Initiating site control and scene management
- (6)* Recognizing general hazards associated with trench and excavation emergency incidents and the procedures necessary to mitigate these hazards within the general rescue area
- (7)* Recognizing typical trench and excavation collapse patterns, the reasons trenches and excavations collapse, and the potential for secondary collapse
- (8)* Initiating a rapid, nonentry extrication of noninjured or minimally injured victim(s)
- (9)* Recognizing the unique hazards associated with the weight of soil and its associated entrapping characteristics
- (10) Implementing a hazard identification and isolation plan, including securing hazardous equipment, contacting utility location services, establishing control of affected utilities, and using methods for protecting bystanders and rescuers from accidentally falling into the excavation or increasing the likelihood of additional collapse
- (11)* Identifying and implementing methods for approaching and working around the excavation in a manner that minimizes the potential of collapse resulting from additional imposed loads on the lip of the trench
- (12) Supporting an organization at the operations or technician level while functioning within an IMS

11.3 Operations Level.

11.3.1 Organizations operating at the operations level at trench and excavation emergencies shall meet the requirements specified in Sections 11.2 and 11.3.

11.3.2 Each member of the organization shall meet the requirements specified in Chapter 4 of NFPA 470.

11.3.3* Members shall be capable of recognizing the hazards of using equipment and operating at trench and excavation emergencies that include the collapse or failure of individual, nonintersecting trenches with an initial depth of 8 ft (2.4 m) or less under the following conditions:

- (1) No severe environmental conditions exist.
- (2) Digging operations do not involve supplemental sheeting and shoring.
- (3) Only traditional sheeting and shoring are used.

11.3.4 Organizations operating at the operations level at trench and excavation emergencies shall develop and implement procedures for the following:

- (1)* Sizing up existing and potential conditions at trench and excavation emergencies
- (2) Identifying potential hazards to victims and rescuers
- (3) Implementing a hazard control plan
- (4) Initiating entry into a trench or excavation rescue area
- (5)* Recognizing unstable areas associated with trench and excavation emergencies and adjacent structures
- (6)* Identifying probable victim locations and survivability
- (7)* Initiating a one-call utility location service
- (8)* Identifying soil types using accepted visual or manual tests
- (9) Ventilating the trench or excavation space
- (10) Identifying and recognizing a bell-bottom pier hole excavation and its associated unique hazards

- (11)* Minimizing the effect the impact of rescuers and related equipment have on the forces in the soil around the trench and the increased potential they might pose for additional collapse
- (12)* Providing entry and egress paths for entry personnel
- (13)* Implementing a shoring plan for a straight, nonintersecting trench no more than 8 ft (2.4 m) in depth to protect the rescue area from additional collapse using conventional sheet and panel shoring systems whose capacities and methods of assembly are based on tabulated data or other applicable engineered system documentation
- (14)* Conducting a pre-entry briefing
- (15)* Initiating record keeping and documentation during entry operations
- (16) Selecting, using, and applying shield systems
- (17)* Selecting, using, and applying sloping and benching systems
- (18) Identifying the duties of panel teams, entry teams, and shoring teams
- (19) Assessing the mechanism of entrapment and the method of victim removal
- (20)* Performing extrication
- (21) Dismantling support systems
- (22) Monitoring continuously or at frequent intervals all areas of the trench to be entered for oxygen content, flammability, and toxicity, in that order

11.4 Technician Level.

11.4.1 Organizations operating at the technician level at trench and excavation emergencies shall meet the requirements specified in Sections 7.4 and 11.4.

11.4.2* Members shall be capable of recognizing hazards, using equipment, and operating at trench and excavation emergencies that include the collapse or failure of individual or intersecting trenches with an initial depth of more than 8 ft (2.4 m) or where severe environmental conditions exist, digging operations involve supplemental sheeting and shoring, or manufactured trench boxes or isolation devices would be used.

11.4.3 Organizations operating at the technician level at trench and excavation emergencies shall develop and implement procedures for the following:

- (1) Evaluating existing and potential conditions at trench and excavation emergencies
- (2) Developing and implementing a shoring plan for intersecting trenches
- (3)* Implementing alternative shoring or support methods, including the use of single point shores, backfilling, and load transfer elements such as walers, for supporting irregular soil contours or other areas of the trench, where conventional sheeting and panel shoring cannot be properly installed to provide the adequate soil contact needed to minimize or prevent soil movement
- (4) Supporting an intersecting trench as part of a team
- (5) Installing supplemental sheeting or shoring for every 2 ft (0.609 m) of depth below existing established shoring
- (6) Constructing a load stabilization system
- (7) Lifting a stabilized load
- (8) Coordinating the use heavy equipment
- (9)* Identifying, constructing, and removing manufactured protective systems consistent with the application and

limitations of such systems using tabulated data and approved engineering practices

- (10)* Monitoring continuously or at frequent intervals the atmosphere in all parts of the trench to be entered for oxygen content, flammability (LEL/LFL), and toxicity, in that order
- (11) Identifying the construction, application, limitations, and removal of supplemental sheeting and shoring systems designed to create approved protective systems
- (12) Adjusting the protective systems based on digging operations and environmental conditions
- (13)* Rigging and placement of isolation systems
- (14) Releasing and extricating the victim
- (15) Dismantling support systems
- (16)* Applying engineering principles to aid in identifying incompatible soil conditions or where alternative shoring methods might pose increased risk of collapse due to increased loads imposed on individual structural elements

Chapter 12 Machinery Search and Rescue (NFPA 1670)

12.1 General Requirements. Organizations operating at machinery search and rescue incidents shall meet the requirements specified in Chapter 4.

12.2 Awareness Level.

12.2.1 Organizations operating at the awareness level for machinery emergencies shall meet the requirements specified in Section 12.2.

12.2.2 All members of the organization shall meet the requirements specified in Chapter 4 of NFPA 470 commensurate with the organization's needs.

12.2.3 Organizations operating at the awareness level for machinery emergencies shall implement procedures for the following:

- (1)* Initiating size-up to ascertain immediate response needs at a machinery rescue incident
- (2)* Recognizing the need for a machinery search and rescue
- (3)* Identifying the resources necessary to conduct operations
- (4)* Initiating the emergency response system for machinery search and rescue incidents
- (5)* Initiating site control and scene management
- (6)* Recognizing general hazards associated with machinery search and rescue incidents
- (7)* Supporting an operations- or technician-level machinery rescue incident while functioning within an IMS

12.3 Operations Level.

12.3.1 Organizations operating at the operations level for machinery emergencies shall meet the requirements specified in Sections 12.2 and 12.3.

12.3.2 All members of the organization shall meet the requirements of Chapter 6 of NFPA 470 commensurate with the organization's needs.

12.3.3 The organization shall have members capable of recognizing hazards, using equipment, and implementing techniques necessary to operate safely and effectively at incidents involving persons injured or entrapped in a small machine. (Refer to the definition for small machine in NFPA 1006.)

12.3.4 Organizations operating at the operations level for machinery emergencies shall develop and implement procedures for the following:

- (1)* Sizing up and planning for existing and potential conditions at machinery search and rescue incidents
- (2) Identifying probable victim locations and survivability
- (3)* Making the search and rescue area safe, including the stabilization and isolation of all machinery involved
- (4)* Identifying and controlling the hazards presented by the release of fluids as gases associated with the machinery, which include, but are not limited to, fuel, cutting or lubricating oil, and cooling water
- (5) Protecting a victim during extrication or disentanglement
- (6) Packaging a victim prior to extrication or disentanglement
- (7) Accessing victims trapped in machinery via access and egress points
- (8)* Performing extrication and disentanglement operations involving packaging, treating, and removing victims trapped in machinery where the entrapment is limited to digits or where the machine can be simply disassembled, or is constructed of lightweight materials that can be cut, spread, or lifted and has only simple hazards that are readily controlled
- (9)* Mitigating and managing general and specific hazards associated with machinery search and rescue incidents, to include fire protection
- (10) Procuring and using the resources, to include subject matter experts, necessary to conduct machinery search and rescue operations
- (11)* Identifying potential emergency events in buildings where mechanical equipment exists, such as elevators, and developing preplans
- (12)* Terminating a machinery rescue emergency
- (13) Supporting a technician-level machinery rescue incident while functioning within an IMS

12.3.5 Rescue members shall make provisions for fall prevention or protection for both rescuers and subjects when working in areas where potential falls can occur.

12.4 Technician Level.

12.4.1 Organizations operating at the technician level for machinery emergencies shall meet the requirements specified in Sections 12.2, 12.3, and 12.4.

12.4.2 All members of the organization shall meet the requirements of Chapter 6 of NFPA 470 commensurate with the organization's needs.

12.4.3* The organization shall have members capable of recognizing hazards, using equipment, and implementing techniques necessary to operate safely and effectively at incidents involving persons injured or entrapped in a large machine.

12.4.4 Organizations operating at the technician level for machinery emergencies shall develop and implement procedures for the following:

- (1) Evaluating existing and planning potential conditions at machinery search and rescue incidents, within IMS
- (2)* Performing extrication and disentanglement operations from large machines
- (3)* Stabilizing large machines and their components at machinery search and rescue incidents

- (4)* Using all specialized search and rescue equipment immediately available and in use by the organization
- (5)* Removing the occupants of a stranded elevator by way of the car doors when the floor of the elevator is more than 3 ft (914.4 mm) from any floor served, the top hatch, or a service door or when occupants or rescuers are otherwise exposed to the hazards of the inside of the shaft or the machinery to propel the elevator
- (6) Determine existing or creating new egress and access openings for large machinery

12.4.5* In elevator rescue, when there are other elevators operating in a common hoistway, all adjacent elevator(s) shall be cleared of passenger(s) and positioned alongside of the stalled elevator.

12.4.6* Adjacent elevators that share a common hoistway shall be secured and prevented from unintentional movement whenever rescuers or victims are exposed to the movement of cars or counterweights in the shaft.

Chapter 13 Cave Search and Rescue (NFPA 1670)

13.1 General Requirements.

13.1.1 Organizations operating at cave search and rescue incidents shall meet the requirements specified in Chapter 4.

13.1.2 The AHJ, as part of its hazard identification and risk assessment (*see 4.3.2*), shall identify locations and situations in the jurisdiction that meet the definition of *cave*.

13.2 Awareness Level.

13.2.1 Organizations operating at the awareness level at cave search and rescue incidents shall meet the requirements specified in Section 13.2.

13.2.2 Members of organizations at the awareness level shall be permitted to assist in support functions on a cave search and rescue operation but shall not be deployed into the cave.

13.2.3 Organizations operating at the awareness level at any cave incident shall implement procedures for the following:

- (1) Initiating size-up to ascertain the need for a cave search and rescue, the number of subjects, and their reported locations
- (2)* Recognizing the limitations of conventional emergency response skills and equipment in various cave environments
- (3)* Initiating the emergency response system for cave search and rescue
- (4) Initiating site control and scene management
- (5)* Recognizing the general hazards associated with cave search and rescue incidents
- (6)* Establishing control of all cave entrances
- (7)* Initiating the collection and recording of information necessary to assist operational personnel in a cave search and rescue
- (8)* Identifying and isolating any reporting parties and witnesses
- (9) Supporting an organization at the operations or technician level while functioning within an IMS

13.3 Operations Level.

13.3.1 Organizations operating at the operations level at cave search and rescue incidents shall meet the requirements specified in Sections 5.3, 13.2, and 13.3.

13.3.2 Organizations operating at the operations level in cave search and rescue shall be under the supervision of organizations at the technician level when operating in a cave environment where technician-level skills are required.

13.3.2.1* Organizations operating at the operations level at cave search and rescue incidents shall be trained and equipped to operate in situations where all of the following conditions are true:

- (1) Where the general location of the subject is known
- (2) Where movement through the passage is not more difficult than walking or crawling or moving over uneven surfaces
- (3) Where water obstacles, if present, are no more than 2 ft (0.61 m) deep
- (4) Where cave passage is easily negotiable without undue exposure
- (5) Where cave passage is open and can be negotiated without squeezing through tight or constricted spaces
- (6) Where travel or transport does not involve fragile cave environments
- (7) Where the incident spans an operational period of no more than 8 hours
- (8) Where routes are obvious, and specialized map skills are not required
- (9) Where travel might involve low-angle travel or patient evacuation on slopes where rope can be used for safety but not for suspension

13.3.2.2 Outside of the specific environments identified above and/or by the AHJ, personnel from technician-level cave search and rescue organizations or special cave search and rescue resources shall be utilized when operating in a cave environment.

13.3.3 Organizations operating at the operations level at cave search and rescue incidents shall develop and implement procedures for the following:

- (1)* Sizing up existing and potential conditions at incidents where cave search and rescue will be performed
- (2)* Requesting and interfacing with cave search and rescue resources
- (3)* Recognizing the types of cave passages and the vertical and horizontal extent of those passages as well as restrictions and water hazards involved in cave search and rescue incidents
- (4)* Providing the specialized medical care and protocols that are unique to the cave environment
- (5) Recognizing the need for, and procedures and equipment for the provision of, environmental protection through clothing systems applicable to the specific cave environments in which the organization could become involved
- (6)* Selecting, caring for, and using personal, medical, and support equipment and packing it with due regard to how it will be carried and for protection from the cave environment
- (7)* Traveling expeditiously through various cave environments in which the organization could become involved, while minimizing threats to safety

- (8) Using appropriate cave navigation techniques, including map and compass, trail markers, balls of string, as well as any methods of navigation and position reporting
- (9) Ensuring that personnel are capable of safely and effectively operating for an 8-hour period without support
- (10) Procuring the necessary cave maps and navigational and topographical information
- (11) Modifying actions and urgency as applicable to a rescue versus a recovery
- (12) Acquiring information on current and forecast weather, including temperature, precipitation, and winds
- (13)* Mitigating dangers from weather outside the cave on the rescue operation within the cave
- (14)* Participating in and supporting cave search operations intended to locate victims whose exact location is unknown
- (15) Accessing, packaging, and evacuating individuals from all cave environments and terrain where operations-level capabilities are appropriate
- (16) Recognizing, identifying, and utilizing all rescue hardware and software used by the responding organizations with which the organization could become involved
- (17)* Recognizing the team's limitations regarding accessing and/or evacuating a victim
- (18) Establishing procedures for conducting an interview of a reporting party and for documenting and transmitting pertinent information
- (19) Establishing procedures for recognizing and preserving evidence and a point last seen (PLS) or a last known point (LKP)
- (20) Locating a subject in the operational environment based on reporting party information when the general location of the subject is known
- (21)* Deploying and operating in-cave wired and wireless communications systems that allow direct communication from in-cave rescue operations personnel to incident command
- (22) Establishing an accountability system for all persons and equipment entering or leaving any and all of the cave's entrances
- (23) Recognizing and understanding the unique characteristics of search segmentation using a two-dimensional map for a three-dimensional cave
- (24) Understanding when the incident requires a technician-level response or when other specialized resources are required

13.4 Technician Level.

13.4.1 Organizations operating at the technician level at cave search and rescue incidents shall meet the requirements specified in Sections 5.4, 10.3, 13.2, 13.3, 13.4, and 16.2

13.4.2 Organizations operating at the technician level at cave search and rescue incidents shall be capable of operating in environments in which special cave search and rescue training and equipment are required or where the capabilities of operations-level equipment and training are exceeded.

13.4.3 Technician-level response capability shall be required where any of the following are true:

- (1) Where cave passage involves difficult scrambling or climbing
- (2) Where water obstacles deeper than 2 ft (0.61 m) are present

- (3) Where search and/or rescue involves technical cave passage that is difficult to negotiate without special skills or that might be exposed or dangerous
- (4) Where cave passage is tight and might require squeezing through constricted spaces
- (5) Where travel or transport might involve fragile cave environments
- (6) Where the incident might span more than one operational period of 8 hours
- (7) Where specialized route-finding skills are required, or the use of cave maps is required
- (8) Where travel or patient evacuation requires negotiating steep to vertical slopes where rope is essential for security or suspension

13.4.4 Organizations operating at the technician level shall be capable of performing and supervising all aspects of cave search and rescue operations with which the organization could become involved.

13.4.5* The ability of the organization to respond at the technician level in one type of cave search and rescue operation shall not imply the ability to respond at the technician level in all types of cave search and rescue operations.

13.4.6 Organizations operating at the technician level at cave search and rescue incidents shall develop and implement procedures for the following:

- (1) Evaluating existing and potential conditions at incidents where cave search and rescue will be performed
- (2) Acquiring, utilizing, and coordinating search and rescue resources with which the organization could become involved
- (3) Providing input to standard operating procedures for anticipated cave responses
- (4)* Initiating and performing all aspects of search and rescue operations in the cave
- (5)* Writing and utilizing an operational plan for cave search and rescue

Chapter 14 Mine and Tunnel Search and Rescue (NFPA 1670)

14.1 General Requirements.

14.1.1 Organizations operating at mine and tunnel incidents shall meet the requirements specified in Chapter 4.

14.1.2* The requirements of this chapter shall apply to agencies that provide varying degrees of response to tunnels or other underground excavations previously classified as mines or tunnels.

14.1.2.1 The requirements of this chapter shall not apply to operating mines.

14.1.2.2* The requirements of Chapter 7 shall not apply to the basic underground structures and excavations addressed in this chapter but shall be relevant to equipment or spaces found inside the structure or excavation.

14.1.3* All mine and tunnel rescue services shall meet the requirements in 14.1.3.1 through 14.1.4.

14.1.3.1 Each member of the search and rescue organization shall be provided with, and be trained to properly use, the personal protective and rescue equipment necessary for

making rescues from mines and tunnels according to his or her assignment and designated level of competency.

14.1.3.2* Each member of the search and rescue organization shall be equipped, trained, and capable of performing the assigned search and rescue duties corresponding to the member's assignment and designated level of competency.

14.1.3.3 Emergency services that are the designated primary provider of rescue services for operational mines and tunnels under construction shall comply with applicable regulations.

14.1.3.4* As part of a team, each member shall practice making mine or tunnel rescues consistent with their designated level of competency, in accordance with the requirements of 4.2.11, by means of simulated rescue operations in which dummies, mannequins, or persons are removed from actual mines and tunnels or from environments that simulate mines and tunnels.

14.1.3.5* The search and rescue organization shall be capable of responding in a timely manner to rescue summons.

14.1.3.6 The search and rescue organization shall have access to all identified mines and tunnels from which it is required to provide search and rescue services, in order to develop search and rescue plans and practice search and rescue operations according to its designated level of competency.

14.1.4* A mine and tunnel search and rescue team shall be made up of a minimum of five individuals.

14.2 Awareness Level.

14.2.1 Organizations operating at the awareness level for mine and tunnel search and rescue incidents shall meet the requirements specified in Sections 5.2, 7.2, 11.2, and 14.2.

14.2.2 All members of the organization shall meet the requirements of Chapter 4 of NFPA 470 commensurate with the organization's needs.

14.2.3 Organizations operating at the awareness level for mine and tunnel search and rescue incidents shall implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs at a mine and tunnel search and rescue
- (2) Initiating contact and establishing communications with victims where possible
- (3)* Recognizing and identifying the hazards associated with nonentry mine and tunnel emergencies
- (4)* Recognizing mines and tunnels
- (5)* Implementing the emergency response system for mine and tunnel emergencies
- (6)* Implementing site control and scene management
- (7) Supporting an organization at the operations or technician level while functioning within an IMS

14.3 Operations Level.

14.3.1 Organizations operating at the operations level for mine and tunnel search and rescue incidents shall meet the requirements specified in Sections 14.2 and 14.3.

14.3.2 The organization operating at this level shall be responsible for the development and training of a mine and tunnel rescue team of at least five individuals who are trained, equipped, and available to respond to mine and tunnel emergencies

of a type and complexity that requires an operations-level organization.

14.3.3 Organizations operating at the operations level shall develop and implement procedures for the following:

- (1)* Sizing up existing and potential conditions at mine and tunnel emergencies
- (2)* Ensuring that personnel are capable of managing the physical and psychological challenges that affect rescuers entering mines and tunnels
- (3)* Identifying the duties of team members and the rescue team leader
- (4)* Monitoring continuously, or at frequent intervals, the atmosphere in all parts of the space to be entered for oxygen content, flammability (LEL/LFL), and toxicity, in that order
- (5)* Providing an approved means of emergency egress respiratory protection with no less than a 30-minute-rated service life that is immediately available to each member of the organization entering a tunnel under construction or related excavation where no immediate atmospheric hazard has been identified
- (6)* Performing entry-type rescues into mines and tunnels meeting all of the following specific qualifying characteristics:
 - (a) Where the space has been previously surveyed by all team members who might need to enter the space as part of the rescue operation
 - (b) Where a written pre-entry plan for the space is in place and is on site that clearly defines the conditions under which the team can enter that specific space
 - (c) Where a written rescue plan is in place and on site that specifically defines the types of incidents that might occur in the space and the expected actions of the rescue team for each incident
 - (d) Where all members who could be expected to enter the tunnel as part of the rescue plan will have physically practiced the elements of the rescue plan in the actual space or a representative space
 - (e) Where the known or suspected hazards for the specific incident are exclusive of any risks attributed to the tunnel environment itself such as fire, hazardous atmosphere, or potential collapse
 - (f) Where there are no known or anticipated conditions that would require deviation from the criteria established in the entry and pre-rescue plan
 - (g) Where conditions on the worksite or in the tunnel have not changed beyond the scope of those identified in the most recent entry and pre-rescue plan
 - (h) Where the internal configuration of the space is clear and unobstructed and rescue can be effected without possibility of entanglement
 - (i)* Where rescuers can pass easily through the access/egress opening(s) with room to spare when PPE is worn in the manner recommended by the manufacturer
 - (j)* Where the space can accommodate two or more rescuers in addition to the victim
 - (k)* Where a previously developed hazard control plan is in place and all identified hazards have been controlled in accordance with the plan
- (l) Where specific criteria for suspending or terminating an entry or rescue operation are clearly identified to all members
- (m) Where contingencies for emergencies during the entry or rescue operation are provided for, such as areas of refuge or intervention methods
- (7)* Using victim packaging devices that could be employed in mine and tunnel rescue
- (8) Transferring victim information, including location, surroundings, condition when found, present condition, and other pertinent information to emergency medical services personnel
- (9) Planning and implementing a mine and tunnel rescue operation
- (10)* Selecting, constructing, and using a rope-lowering and -raising system in the high-angle environment
- (11) Controlling all identified entry points to the mine/tunnel to prevent unauthorized entry and accounting for all rescuers who might enter the space

14.3.4 Individuals in the organization expected to perform functions at the operations level shall meet the competencies prescribed at the operations level in Chapter 15 of NFPA 1006.

14.4 Technician Level.

14.4.1 Organizations operating at the technician level for mine and tunnel search and rescue emergencies shall meet the requirements of Sections 5.3, 6.3, 7.4, 11.3, 12.3, 14.2, 14.3, and 14.4.

14.4.2 Organizations operating at the technician level shall select and identify for use, positive pressure SCBA with a rated duration that will permit an entry team to complete a rescue mission in spaces of a size or configuration that might be encountered and still provide an adequate reserve to the wearer.

14.4.3* The organization operating at this level shall be responsible for the development of a mine and tunnel rescue team of at least five individuals who are trained, equipped, and available to respond to mine and tunnel emergencies of a type and complexity that requires a technician-level organization.

14.4.3.1* The entry team shall be provided resources designated to aid in their survival and egress should an unanticipated event pose a risk of death or serious injury.

14.4.3.2 Methods selected for providing for the survival of the entry team shall be consistent with the size of the space, travel distances, expected conditions, and the mission and include establishing areas of refuge, increasing the size of the entry team, and staging intervention resources in a manner so they can be accessed by the team if needed.

14.4.3.3* The need for egress-only respiratory protection identified in 14.3.3(5) shall be considered satisfied for members of an entry team who have selected and donned atmosphere-supplying respirators identified by the AHJ for use in the mine or tunnel environment as part of an entry plan to enter a space with a recognized atmospheric hazard, provided the conditions of 14.4.3.7 and 14.4.3.8 have been met.

14.4.3.3.1 There shall be at least one respirator unit per member in the tunnel.

14.4.3.4 Each entry team shall, as a minimum, have the ability to continuously monitor the air for oxygen, carbon monoxide, hydrogen sulfide, and combustible gases as well as any other atmospheric contaminants that are known or suspected.

14.4.3.5* All team members shall be aware of prescribed action levels for specific contaminants or atmospheric conditions.

14.4.3.6* The entry team shall have at least one method of verbal communication with the surface.

14.4.3.7 Entry teams that enter a mine or tunnel with a known atmospheric hazard shall have a clearly defined “turnaround” benchmark to ensure adequate egress to an area of refuge or safety.

14.4.3.8* Each entry team that enters a mine or tunnel with a known or suspected atmospheric hazard shall have at least one additional redundant source of breathable air per team, independent of each wearer’s SCBA, to be used in the event of an SCBA failure or “out of air” emergency.

14.4.3.8.1 The redundant air source shall be self-contained and of a capacity to ensure egress of the wearer based on the travel distances.

14.4.3.8.2 The redundant air system shall be independent of any device brought in for use by the victim.

14.4.4 Organizations operating at the technician level for mine and tunnel search and rescue emergencies shall develop and implement procedures for the following:

- (1) Performing entry and rescue operations into tunnels for which a pre-entry or pre-rescue plan has not been developed or spaces where those plans are not consistent with conditions at the site
- (2) Performing entry and rescue operations in tunnels or spaces where the hazards present could include those that are inherent to the environment such as fire, collapse, and atmospheric hazards
- (3) Providing all members who are designated as part of the technician-level team with training in accordance with technician rescuer for mine and tunnel rescue described in NFPA 1006
- (4) Providing members of the entry team access to specialized tools and training required to lift loads, move patients, cut steel, break concrete, or other tasks identified as associated with performing rescue operations in a mine or tunnel
- (5) Providing members of the entry team with access to and training in respiratory protection such as CCBA or SCBA commensurate with the size and configuration of the spaces and travel distances associated with mines and tunnels
- (6)* Evaluating existing and potential conditions at mine and rescue emergencies
- (7)* Ensuring that rescue team members take part in a medical surveillance program
- (8)* Planning response for entry-type mine and tunnel rescues in hazardous environments
- (9)* Implementing the planned response

Chapter 15 Helicopter Search and Rescue (NFPA 1670)

15.1 General Requirements.

15.1.1 Organizations operating at helicopter search and rescue incidents shall meet the requirements specified in Chapter 4.

15.1.2* The AHJ shall evaluate the need for helicopter search and rescue within its response area and shall provide a search and rescue capability commensurate with the identified needs.

15.2 Awareness Level.

15.2.1 Organizations operating at the awareness level for helicopter search and rescue shall meet the requirements specified in Section 15.2.

15.2.2 Organizations operating at the awareness level for helicopter search and rescue shall develop and implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs for a helicopter search and rescue
- (2) Identifying the resources necessary to conduct helicopter search and rescue
- (3) Identifying a landing zone or helispot in accordance with the AHJ
- (4) Initiating the emergency response system for helicopter search and rescue
- (5) Initiating site control and scene management
- (6) Ensuring safety in and around landing zones and helicopters in support of helicopter search and rescue
- (7)* Recognizing general hazards associated with helicopters and procedures necessary to mitigate these hazards within the operational area
- (8)* Identifying PPE required by awareness-level personnel assigned to work in the vicinity of helicopters
- (9) Identifying the general uses of helicopters with which the organization could become involved
- (10) Establishing communications with the helicopter crew or their agency according to procedures established by the AHJ
- (11)* Prior to flying as a passenger on a search and rescue helicopter, ensuring that a preflight safety briefing has been received from the pilot or his designate
- (12) Communicating outside the helicopter in accordance with the AHJ
- (13) Supporting an organization at the operations or technician level while functioning within an IMS

15.3 Operations Level.

15.3.1 Organizations operating at the operations level for helicopter search and rescue incidents shall meet the requirements specified in Section 15.2.

15.3.2 Organizations operating at the operations level for helicopter search and rescue incidents shall develop and implement procedures commensurate with the identified needs of the organization for the following:

- (1) Ensuring safety in and around the helicopter
- (2)* Identifying the minimum required crew complement and functions needed for helicopter search and rescue operations
- (3) Identifying and selecting the kind and type of helicopter required to perform a specific mission

- (4) Maintaining proficiency in procedures involved with in-flight emergencies
- (5)* Maintaining proficiency in post-crash egress and survival training appropriate to the environment likely to be encountered
- (6) Communicating inside the helicopter in accordance with the AHJ
- (7) Performing search observation techniques in accordance with the AHJ
- (8) Managing a landing zone or helispot in accordance with the AHJ
- (9) Developing an alternate helicopter operational plan in case the primary plan cannot be accomplished

15.4 Technician Level.

15.4.1 Organizations operating at the technician level for helicopter search and rescue shall meet the requirements specified in Sections 5.3, 15.2, 15.3, and 15.4.

15.4.2 Organizations operating at the technician level for helicopter search and rescue shall develop and implement procedures for the following:

- (1) Evaluating existing and potential conditions at incidents where helicopter search and rescue operations will be performed
- (2) Facilitating operational communications
- (3) Performing helicopter search operations, including the provision of trained search observer(s) in a helicopter in accordance with the needs of the AHJ
- (4) Performing helicopter rescue operations in accordance with the needs of the AHJ
- (5) Identifying, selecting, and utilizing PPE in any environment in which the organization might become involved
- (6)* Applying an understanding of the effects of flight on the human body
- (7)* Identifying and managing a temporary landing zone or a helispot
- (8) Recognizing the factors affecting weight and balance calculations on the aircraft used by the search and rescue organization.
- (9) Performing emergency procedures in the aircraft used by the organization
- (10) Selecting, constructing, and utilizing both single-point and multiple-point load-sharing anchor systems, both inside and outside the helicopter(s) used by the organization
- (11) Reporting information that has the potential to affect helicopter safety operations
- (12) Inspecting and using search and rescue equipment in, on, or attached to the helicopter used by the organization

Chapter 16 Surface Water Search and Rescue (NFPA 1670)

16.1 General Requirements. Organizations operating at surface water search and rescue incidents shall meet the requirements specified in Chapter 4.

16.2 Awareness Level.

16.2.1 Organizations operating at the awareness level at surface water search and rescue incidents shall meet the requirements specified in Section 16.2.

16.2.2 Each member of an organization operating at the awareness level shall be a competent person as defined in 3.3.34.

16.2.3 Organizations operating at the awareness level at surface water search and rescue incidents shall implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs at a surface water search and rescue
- (2)* Implementing the assessment phase
- (3)* Identifying the resources necessary to conduct safe and effective water operations
- (4)* Implementing the emergency response system for surface water rescue incidents
- (5)* Implementing site control and scene management
- (6)* Recognizing general hazards associated with surface water search and rescue incidents and the procedures necessary to mitigate these hazards within the general search and rescue area
- (7)* Determining rescue versus recovery
- (8) Supporting an organization at the operations or technician level while functioning within an IMS

16.3 Operations Level.

16.3.1 Organizations operating at the operations level at surface water search and rescue incidents shall meet the requirements specified in Sections 16.2 and 16.3.

16.3.2* Any member of the organization who could be expected to perform functions as a crewmember on a watercraft shall be provided training to meet the job performance requirements for operations-level watercraft operations as defined in NFPA 1006 for the types of watercraft used by the agency under conditions representative of those typically encountered in the work environment.

16.3.3* Any member of the organization who could be expected to perform functions as the operator of a watercraft shall be provided training to meet the job performance requirements for technician-level watercraft operations as defined in NFPA 1006 for the types of watercraft used by the agency under conditions representative of those typically encountered in the work environment.

16.3.4 Organizations operating at the operations level at surface water search and rescue incidents shall develop and implement procedures for performing a risk benefit analysis that shall include the following:

- (1)* A survival profile of the potential victim
- (2)* A risk profile for the proposed rescue operation

16.3.5* Personnel operating in the hazard zone who are not expected to enter the water as part of the rescue plan shall be provided the following minimum PPE:

- (1)* PFD or other PPE approved by the AHJ as designed to provide inherent or on-demand positive buoyancy to the user for the expected tasks and conditions encountered in the specific rescue environment
- (2) Whistle or other audible signaling device
- (3)* Visible signaling device

16.3.6 Organizations operating at the operations level at surface water search and rescue incidents shall develop and implement procedures for performing nonentry rescue, including the following:

- (1)* Initial and ongoing size-up of existing and potential conditions at incidents where surface water search and rescue training and operations will be performed
- (2)* Ensuring personal safety at water operations
- (3)* Assessing water conditions in terms of hazards to the victim and the rescuer
- (4) Separating, isolating, securing, and interviewing witnesses
- (5) Evaluating or assessing the potential rescue problems
- (6)* Evaluating the progress of the planned response to ensure the objectives are being met
- (7)* Conducting shore-based rescue operations
- (8)* Using throw bags and related retrieval tools
- (9)* Providing assistance to organizations operating at the technician level
- (10)* Intervention and self-rescue methods for rescuers who accidentally become immersed
- (11)* Identifying and managing heat and cold stress to the rescuer
- (12) Using packaging devices identified by the AHJ to be employed for removal of water-bound patients
- (13) Transferring victim information, including location, surroundings, condition when found, present condition, and other pertinent information, to emergency medical services personnel
- (14)* Using watercraft-assisted and watercraft-based operations if watercraft are used by the organization
- (15) Planning to meet operational objectives
- (16)* Performing rapid extrication of accessible victims
- (17) Performing search operations for missing subjects, which do not require the rescuer to enter the water but that identify areas of highest probability and track progress of the search
- (18)* Managing incidents that involve waterbound vehicles, vessels, structures, or other circumstances that pose additional challenges to the rescue operation
- (19) Providing a method for accounting for the location of all responders at the scene and ensuring their welfare

16.4 Technician Level.

16.4.1 Organizations operating at the technician level for surface water search and rescue shall meet the requirements in Sections 16.2, 16.3, and 16.4.

16.4.2 Organizations operating at the technician level at surface water search and rescue incidents shall develop and implement the following procedures, which allow for deploying a rescuer or rescuer(s) into the water to conduct a search and rescue task:

- (1) Performing a risk benefit analysis based on the victim's projected survival profile and the potential risks the operation poses to the responder
- (2) Using a checklist or other method to ensure all required elements of the rescue plan are in place prior to deploying a rescuer into the water
- (3)* Providing an intervention plan with specific methods for rescue or removal of rescuers who become injured or fatigued while in the water
- (4)* Conducting a search for a missing victim(s) or victims so that the areas of highest probability are identified and

progress of the search can be monitored and documented

- (5) Methods for managing incidents that involve waterbound vehicles and vessels or other circumstances that pose multiple concurrent challenges to the rescue operation
- (6) Providing a method to maintain communication or contact with a rescuer(s) in the water so that the rescuer's location is known and assistance can be summoned immediately

Chapter 17 Swiftwater Search and Rescue (NFPA 1670)

17.1 General Requirements. Organizations operating at swiftwater search and rescue incidents shall meet the requirements specified in Chapter 4.

17.2 Awareness Level.

17.2.1 Organizations operating at the awareness level at swiftwater search and rescue incidents shall meet the requirements specified in Section 17.2.

17.2.2 Each member of an organization operating at the awareness level shall be a competent person as defined in 3.3.34.

17.2.3 Organizations operating at the awareness level at swiftwater search and rescue incidents shall implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs at a swiftwater search and rescue
- (2)* Implementing the assessment phase
- (3)* Identifying the resources necessary to conduct swiftwater search and rescue operations
- (4)* Implementing the emergency response system for swiftwater search and rescue incidents
- (5)* Implementing site control and scene management
- (6)* Recognizing general hazards associated with swiftwater search and rescue incidents and the procedures necessary to mitigate these hazards within the general search and rescue area
- (7) Determining rescue versus recovery
- (8) Supporting an organization at the operations or technician level while functioning within an IMS

17.3 Operations Level.

17.3.1 Organizations operating at the operations level at swiftwater search and rescue incidents shall meet the requirements specified in Sections 16.3 and 17.3.

17.3.2 Organizations operating at the operations level for swiftwater rescue shall make provisions for the access and removal of victims in and around vehicles under conditions representative of the swiftwater environment.

17.3.3 For personnel operating in the hazard zone at a swiftwater search and rescue incident, the minimum PPE provided shall include the following:

- (1) Personal flotation device (PFD) intended for use in the swiftwater environment
- (2) Thermal protection
- (3)* Helmet appropriate for swiftwater rescue
- (4) Cutting device that is easily accessible and that will at a minimum cut the ropes and webbing used by the AHJ
- (5) Whistle or audible signaling device

17.4 Technician Level.

17.4.1 Organizations operating at the technician level for swiftwater search and rescue shall meet the requirements in Sections 17.2, 17.3, and 17.4.

17.4.2 Organizations operating at the technician level at swiftwater search and rescue incidents shall develop and implement procedures for applying rope rescue techniques in the swiftwater environment.

17.4.3 Organizations operating at the technician level at swiftwater search and rescue incidents shall have the following capabilities:

- (1) Constructing and operating rope rescue system anchors and mechanical advantage systems as specified by the AHJ
- (2) Constructing a tension diagonal rope system over water
- (3) Constructing a highline system over water
- (4) Constructing and operating rope systems that position and move a tethered boat controlled by ropes

17.4.4 Organizations operating human-powered watercraft in a swiftwater search and rescue environment shall develop and implement procedures for the use of human-powered watercraft in the swiftwater search and rescue environment.

17.4.5 Organizations operating motorized watercraft in a swiftwater search and rescue environment shall develop and implement procedures for the use of motorized watercraft in the swiftwater search and rescue environment.

Chapter 18 Dive Search and Rescue (NFPA 1670)

18.1 General Requirements. Organizations operating at dive search and rescue incidents shall meet the requirements specified in Chapter 4.

18.2 Awareness Level.

18.2.1 Organizations operating at the awareness level at dive search and rescue incidents shall meet the requirements specified in Section 18.2.

18.2.2 Each member of an organization operating at the awareness level shall be a competent person as defined in 3.3.34.

18.2.3 Organizations operating at the awareness level at dive search and rescue incidents shall implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs at a dive search and rescue
- (2) Initiating size-up to the extent authorized by the AHJ to determine the number of victims and their reported location
- (3)* Implementing the assessment phase
- (4)* Identifying the resources necessary to conduct dive rescue operations
- (5)* Implementing the emergency response system for dive rescue incidents
- (6)* Implementing site control and scene management
- (7)* Recognizing general hazards associated with dive search and rescue incidents and the procedures necessary to mitigate these hazards within the general search and rescue area
- (8)* Determining rescue versus recovery

- (9) Supporting an organization at the operations or technician level while functioning within an IMS

18.3 Operations Level.

18.3.1 Organizations operating at the operations level at dive search and rescue incidents shall meet the requirements specified in Sections 18.2 and 18.3.

18.3.2 Organizations operating at the operations level for dive rescue shall be capable of applying the requirements of Section 8.3 under conditions representative of the dive rescue environment.

18.3.3 For personnel operating in the hazard zone at a dive rescue incident, the minimum PPE provided shall include the following:

- (1)* Personal flotation device (PFD) or other PPE approved by the AHJ as designed to provide inherent or on-demand positive buoyancy to the user for the expected tasks and conditions encountered in the specific rescue environment
- (2) Thermal protection
- (3) Whistle or audible signaling device
- (4) Cutting tool

18.3.4 Organizations operating at the operations level for dive rescue shall develop and implement procedures for fulfilling the function of a dive tender at a dive rescue incident, including the following:

- (1)* Recognizing the unique hazards associated with dive operations
- (2)* Serving as surface support personnel, including obtaining and assembling the diver's gear, assisting with donning, and performing all pre-entry checks
- (3) Identifying water characteristics
- (4)* Operating surface support equipment used in water operations
- (5) Procuring the necessary equipment to perform dive operations
- (6) Employing techniques for water access, entry, and egress for divers
- (7)* Participating in dive operations at any time of day or in any climate the organization encounters
- (8) Recognizing conditions or situations where a diver might need assistance
- (9) Implementing standardized contingency procedures for dive-related emergencies, including a diver in distress, a missing or injured diver, and related medical emergencies
- (10) Providing the necessary medical equipment at the designated egress point to manage medical emergencies commonly associated with compressed gas diving
- (11) Tracking and documenting status of divers, including bottom time, location, repetitive dive status, and, when possible, depth
- (12) Using standardized methods to communicate with divers while they are on the surface and while submerged
- (13) Tracking and documenting the progress of subsurface search operations

18.4 Technician Level.

18.4.1 Organizations operating at the technician level for dive search and rescue shall meet the requirements in Sections 18.2, 18.3, and 18.4.

18.4.2 Organizations operating at the technician level for dive rescue shall apply the requirements of Section 16.4 in a manner consistent with the anticipated conditions of the rescue environment.

18.4.3* The AHJ shall ensure that all members of the organization who are recognized as divers obtain and maintain current dive certification from an agency or organization recognized as providing a curriculum focused on public safety diving.

18.4.4* For all diving members of a technician-level organization, an annual fitness test and a watermanship/skills test and basic scuba skills evaluation supplied by the International Association of Dive Rescue Specialists (IADRS) shall be conducted to maintain public safety diver capability.

18.4.5 Prior to engaging in subsurface operations, any organization operating at the technician level at dive rescue incidents shall make provisions for the following functions whenever divers are in the water, and these functions shall be exclusive of other duties such as supervision, surface support, and standby resources:

- (1)* Designating an on-site dive supervisor who has the authority to manage all aspects of the dive operation and has been trained to meet all nondiving job performance requirements of technician-level dive rescue as defined in NFPA 1006
- (2) Designating a dive tender who is responsible for assisting divers with assembly and donning of equipment, communicating with divers, tracking their location, and managing subsurface search operations and who has been trained to meet all the job performance requirements of operations-level dive rescue as defined in NFPA 1006
- (3)* Designating a safety diver who is equipped and positioned to immediately submerge and lend assistance to a diver in distress or to engage in a search for a missing diver
- (4)* Implementing at the direction of the AHJ the mobilization of contingencies specifically intended to sustain or resume the subsurface mission in the event the dive plan requires multiple subsurface divers, or is suspended because of the need to deploy the safety diver or the primary or safety diver cannot fulfill their role

18.4.6 The agency shall ensure that the following equipment is present at the dive site and readily available prior to engaging in subsurface activities:

- (1) Medical oxygen and related delivery equipment
- (2) Backboard or other device suitable for the movement of a nonambulatory diver
- (3) Means of summoning aid without leaving the dive site
- (4) A dive flag or float in areas subject to vessel traffic readily visible to vessels approaching the dive location
- (5) Copy of the agency's dive emergency response plan
- (6) Audible signaling device
- (7) Means of immediately recording required information relating to each diver's status and dive profile in a manner that is readily communicated or transferred to other members of the team or medical professionals

18.4.7 Organizations operating at the technician level at dive incidents shall develop and implement procedures for performing public safety scuba diving, including the following:

- (1)* Managing a diver's breathing gas supply and bottom time so that on reaching the surface the diver has a

minimum reserve pressure that reflects one third of the entire rated capacity of the total primary breathing gas available to the diver and in no case allowing the established minimum reserve pressure for the primary source of breathing gas to be less than 500 psi.

- (2) Applying an understanding of physics and physiology as they relate to the diver, diver-related emergencies, and the underwater environment
- (3)* Applying dive tables or other methods designated by the AHJ that use a diver's bottom time and depth to determine his/her level of hyperbaric exposure, including the use of letter group designators, any potential decompression obligation, and the ability to perform repetitive dives
- (4) Identifying and evaluating underwater environments and conditions to which the public safety diver could be exposed
- (5) Identifying and managing the hazards posed by underwater plants and animals
- (6) Conducting and supervising dive operations, including planning a dive based on projected depths, bottom times, and available air supply for a particular mission
- (7)* Identifying, selecting, and implementing standardized techniques to perform and track the progress of a search that is consistent with the mission of the agency and anticipated conditions that might be encountered in their response area
- (8)* Using recognized tools, such as a field neurological exam, to identify divers who are experiencing dive-related maladies, including psychological and physiological stress, air embolism, and decompression sickness
- (9) Recognizing and managing the impact of near-drowning in cold water
- (10)* Identifying, selecting, and implementing standardized methods of communicating between a submerged diver and the surface so that the diver can immediately summon help, be recalled to the surface, directed in a search pattern, and warned of imminent hazards
- (11)* Using redundant and alternative air sources and techniques during low-air or out-of-air emergencies
- (12)* Using full-body encapsulation equipment, including dry suits, dry hoods, and dry gloves, with a full-face mask as required by the AHJ, to protect divers from cold or potentially contaminated water
- (13)* Rescuing an entangled diver
- (14)* Performing pre- and post-entry medical monitoring of divers
- (15)* Recovering evidence, including locating, securing, and packaging evidence, documenting and maintaining the chain of custody, and documenting the scene
- (16)* Implementing standardized contingency procedures from the agency's dive emergency response plan for rescue operations in the event of primary diver injury, entrapment, loss of communication, and/or disconnect
- (17) Using positive connection systems such as chest harnesses and tending lines with quick-release connectors when the use of such systems does not compromise the safety of the diver
- (18)* Using standardized written checklists to verify the condition, proper configuration, and operation of a diver's equipment before he/she enters the water
- (19) Providing access to and removal of victims in and around vehicles under conditions representative of the dive environment

18.4.8* All diving members of the organization shall have a medical exam conducted by a physician with specific training in hyperbaric exposure and dive-related injuries before engaging in dive operations and annually thereafter.

18.4.9 Organizations operating human-powered watercraft in a dive rescue environment shall develop and implement procedures for the use of human-powered watercraft in the dive rescue environment.

18.4.10 Organizations operating motorized watercraft in a dive rescue environment shall develop and implement procedures for the use of motorized watercraft in the dive rescue environment.

18.4.11* The AHJ shall ensure that all diving members of the organization complete a subsurface task utilizing tools and tactics identified by the AHJ as consistent with the mission of the team under conditions representative of the rescue environment no less than 4 times per 12-month period.

Chapter 19 Ice Search and Rescue (NFPA 1670)

19.1 General Requirements. Organizations operating at ice search and rescue incidents shall meet the requirements specified in Chapter 4.

19.2 Awareness Level.

19.2.1 Organizations operating at the awareness level at ice search and rescue incidents shall meet the requirements specified in Section 19.2.

19.2.2 Each member of an organization operating at the awareness level shall be a competent person as defined in 3.3.34.

19.2.3 Organizations operating at the awareness level at ice search and rescue incidents shall implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs at an ice search and rescue
- (2)* Implementing the assessment phase
- (3)* Identifying the resources necessary to conduct ice rescue operations
- (4)* Implementing the emergency response system for ice rescue incidents
- (5)* Implementing site control and scene management
- (6)* Recognizing general hazards associated with ice search and rescue incidents and the procedures necessary to mitigate these hazards within the general search and rescue area
- (7) Determining rescue versus recovery
- (8) Supporting an organization at the operations or technician level while functioning within an IMS

19.3 Operations Level.

19.3.1 Organizations operating at the operations level at ice search and rescue incidents shall meet the requirements specified in Sections 19.2 and 19.3.

19.3.2 For personnel operating in the hazard zone at an ice search and rescue incident, the minimum PPE provided shall include the following:

- (1) Personal flotation device (PFD) or other PPE designed with inherent buoyancy intended for use in the ice rescue environment
- (2) Thermal protection
- (3) Whistle or audible signaling device
- (4) Ice awls/picks

19.3.3 Organizations operating at the operations level for ice search and rescue incidents shall develop and implement procedures for evaluating ice strength and conditions.

19.4 Technician Level.

19.4.1 Organizations operating at the technician level for ice search and rescue incidents shall meet the requirements in Sections 19.2, 19.3, and 19.4.

19.4.2 Organizations operating at the technician level for an ice rescue shall make provisions for the access and removal of victims in and around vehicles under conditions representative of the ice environment.

19.4.3 Organizations operating at the technician level at ice search and rescue incidents shall develop and implement procedures for applying specialized tools and rescue techniques for the ice rescue environment.

19.4.4 Organizations operating human-powered watercraft in an ice search and rescue environment shall develop and implement procedures for the use of human-powered watercraft in the ice search and rescue environment.

19.4.5 Organizations operating motorized watercraft in an ice search and rescue environment shall develop and implement procedures for the use of motorized watercraft in the ice search and rescue environment.

Chapter 20 Surf Search and Rescue (NFPA 1670)

20.1 General Requirements. (Reserved)

20.2 Awareness Level. Organizations operating at surf search and rescue incidents shall meet the requirements specified in Chapter 4.

20.2.1 Organizations operating at the awareness level at surf search and rescue incidents shall meet the requirements specified in Section 20.2.

20.2.2 Each member of an organization operating at the awareness level shall be a competent person as defined in 3.3.34.

20.2.3 Organizations operating at the awareness level at surf search and rescue incidents shall implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs for a surf search and rescue and conducting nonentry victim location and observation techniques
- (2)* Conducting a dynamic size-up and hazard/risk assessment
- (3)* Identifying the resources necessary to conduct surf search and rescue operations based on conditions observed
- (4)* Implementing the emergency response system for surf search and rescue incidents
- (5)* Implementing site control and scene management, including a personnel accountability system

- (6)* Recognizing general hazards associated with surf search and rescue incidents and the procedures necessary to mitigate these hazards within the general search and rescue area
- (7)* Determining rescue versus recovery
- (8) Supporting an organization at the operations or technician level while functioning within an IMS

20.3 Operations Level.

20.3.1 Organizations operating at the operations level at surf search and rescue incidents shall meet the requirements specified in Sections 20.2 and 20.3.

20.3.2 Organizations operating at the operations level for surf search and rescue shall develop and implement procedures for evaluating surf size, strength, and conditions.

20.4 Technician Level.

20.4.1 Organizations operating at the technician level for surf search and rescue shall meet the requirements in Sections 20.2, 20.3, and 20.4.

20.4.2 Organizations operating at the technician level at surf search and rescue incidents shall develop and implement procedures for applying specialized tools and rescue techniques for the surf search and rescue environment.

20.4.3 Organizations operating human-powered watercraft in a surf search and rescue environment shall develop and implement procedures for the use of human-powered watercraft in the surf search and rescue environment.

20.4.4 Organizations operating motorized watercraft in a surf search and rescue environment shall develop and implement procedures for the use of motorized watercraft in the surf search and rescue environment.

Chapter 21 Watercraft Search and Rescue (NFPA 1670)

21.1 General Requirements.

21.1.1 Organizations operating watercraft at search and rescue incidents shall meet the requirements specified in Chapter 4.

21.1.2* This chapter outlines the requirements for use of both human-powered and motorized watercraft to perform search and rescue operations.

21.1.3* The AHJ shall ensure that the requirements of this section are met in a manner consistent with the water and weather conditions typically associated with the agency's projected mission.

21.1.4 No part of this section shall be used to abridge or circumvent certifications or licenses legally required to operate specific watercraft in a particular region, city, or state.

21.2 Awareness Level.

21.2.1 Organizations operating at the awareness level at watercraft search and rescue incidents shall meet the requirements specified in Section 21.2.

21.2.2 Each member of an organization operating at the awareness level shall be a competent person as defined in 3.3.34.

21.2.3 Organizations operating at the awareness level at watercraft search and rescue incidents shall implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs at a watercraft search and rescue operation
- (2) Implementing the assessment phase
- (3) Identifying the resources necessary to conduct watercraft search and rescue operations, including launching and recovery sites
- (4) Implementing the emergency response system for mobilizing search and rescue watercraft
- (5) Implementing site control and scene management
- (6) Recognizing general hazards associated with watercraft search and rescue operations and the procedures necessary to mitigate these hazards within the general search and rescue area
- (7) Determining rescue versus recovery, if possible
- (8) Supporting an organization at the operations or technician level while functioning within an IMS

21.3 Operations Level.

21.3.1 Organizations operating at the operations level at watercraft search and rescue incidents shall meet the requirements specified in Sections 21.2 and 21.3.

21.3.2* Any member of the organization who could be expected to perform functions as a crewmember on a watercraft shall be provided training to meet the job performance requirements for operations-level watercraft operations as defined in NFPA 1006 for the types of watercraft used by the agency under conditions representative of those typically encountered in the work environment.

21.3.3* Personnel operating in or on watercraft who might be exposed to accidental immersion shall wear the following minimum PPE:

- (1) Personal flotation device (PFD)
- (2) Whistle or other audible signaling device
- (3)* Visible signaling device

21.3.4* Organizations operating at the operations level at watercraft search and rescue incidents shall develop and implement procedures for using watercraft in search and rescue operations, including the following:

- (1) Identifying the types of watercraft available to the agency and their capabilities, limitations, and any special considerations associated with each type of craft
- (2) Identifying the roles of crewmembers for each type of watercraft available to the agency
- (3) Providing for the safety of each crewmember and passenger on the watercraft, including methods for accountability and briefing passengers on emergency procedures
- (4) Performing an ongoing size-up of existing and potential conditions where watercraft search and rescue operations and training will be performed
- (5) Assessing water conditions in terms of hazards to the victim and the rescuer and the capability of the watercraft
- (6)* Communicating with other agencies or resources that might be part of a watercraft-based search and rescue operation
- (7)* Conducting operations to take a vessel under tow with motorized watercraft, if used by the AHJ

- (8)* Conducting watercraft-based operations for deploying and recovering rescuers from the water
- (9)* Conducting watercraft-based operations for rescuing and recovering both unconscious and conscious water-bound subjects
- (10) Deploying and recovering any watercraft used by the organization
- (11)* Deploying crew overboard (COB) measures, including a U.S. Coast Guard–approved Type IV throwable PFD, water rescue throw bags, heaving lines, or similar devices, for passengers or crew who fall overboard
- (12) Performing watercraft-based search operations that identify areas of highest probability and areas previously searched
- (13) Managing incidents that involve operating around water-bound vehicles, other vessels, submerged hazards, or other circumstances that pose additional challenges to the rescue operation
- (14) Identifying navigational aids, such as lights, symbols, or sounds that are used to identify other watercraft, navigational channels, waterway features, or hazards
- (15) Identifying and utilizing audible and visual distress signals
- (16) Identifying emergency conditions on the watercraft, such as fire or flooding, and implementing required actions

21.4 Technician Level.

21.4.1 Organizations operating at the technician level at watercraft search and rescue incidents shall meet the requirements specified in Sections 21.2, 21.3, and 21.4.

21.4.2* Organizations operating at the technician level at watercraft search and rescue incidents shall develop and implement procedures for operating watercraft in search and rescue operations, including the following:

- (1)* Operating a motorized watercraft with a vessel under tow, if used by the AHJ
- (2)* Operating a watercraft while deploying and recovering rescuers to and from the water
- (3)* Operating a watercraft for recovering both unconscious and conscious waterbound subjects
- (4) Using watercraft-specific navigational systems, tools, and techniques so that the position of the craft can be accurately determined and a desired destination reached
- (5)* Operating a vessel or watercraft in response to a crew overboard (COB) event, which includes a U.S. Coast Guard–approved Type IV throwable PFD, water rescue throw bags, heaving lines, or similar devices
- (6) Operating and navigating watercraft in a search operation that identifies areas of highest probability and documents areas previously searched
- (7) Operating watercraft in environments that include water-bound vehicles, vessels, submerged objects, or other hazards that pose additional challenges to the rescue operation
- (8) Incorporating the use of navigational aids, such as lights, symbols, or sounds, that are used to identify other watercraft, features, or hazards to reach the intended destination and avoid collisions and groundings

Chapter 22 Flood Search and Rescue (NFPA 1670)

22.1 General Requirements. The AHJ operating at flood search and rescue incidents shall meet the requirements specified in Chapter 4 and Chapter 8.

22.1.1 The AHJ shall evaluate the need for a missing person search in flood incidents that might occur within its response area.

22.1.2 The AHJ shall provide a search capability commensurate with the identified needs.

22.2 Awareness Level.

22.2.1 Members of organizations at the awareness level shall be permitted to assist in support functions on a flood search and rescue operation but shall not be deployed into the floodwater-affected areas.

22.2.2 Organizations operating at the awareness level at any flood search and rescue incident shall have the following capabilities:

- (1) Initiating size-up to ascertain immediate response needs at a flood search and rescue incident
- (2)* Initiating the emergency response system for flood search and rescue
- (3)* Initiating incident management systems suitable to the scale and nature of the flood
- (4)* Recognizing the hazards associated with flood search and rescue incidents
- (5)* Recognizing the types of floods and the impact to the organization
- (6)* Recognizing the different phases of a flood and the impact to the organization
- (7) Recognizing the limitations of emergency response skills and equipment in the flood environments
- (8) Initiating the collection and recording of information necessary to assist operational personnel in a flood search and rescue incident
- (9)* Understanding the social, economic, and political issues associated with flood incidents
- (10)* Recognizing and implementing a search marking system suitable for the flood environment
- (11) Supporting an organization at the operations or technician level while functioning within an IMS

22.3 Operations Level.

22.3.1 Organizations operating at the operations level at flood search and rescue incidents shall meet the requirements specified in Sections 22.2 and 22.3.

22.3.2 For personnel operating in the hazard zone at a flood search and rescue, the minimum PPE provided shall include the following:

- (1) Personal flotation device (PFD) intended for use in the flood environment
- (2) Thermal protection
- (3) Cutting device that is easily accessible and that will at a minimum cut the ropes and webbing used by the AHJ
- (4) Whistle or audible signaling device
- (5) PPE consistent with expected contaminated water

22.3.3* Organizations operating at the operations level shall be capable of operating at flood incidents that are limited to requiring a response based on surface water search and rescue operations capabilities on and around flood-affected areas.

22.3.4 Organizations at the operations level shall be permitted to support organizations operating at the technician level but shall not deploy into higher risk, difficult, or complex flood environments.

22.3.5 Organizations operating at the operations level at flood search and rescue incidents shall develop and implement procedures for the following:

- (1) Identifying flood characteristics specific to the cause of the flooding and the geographic area flooded
- (2) Operating surface support equipment used in flood search and rescue operations
- (3)* Identifying and operating watercraft appropriate for use in the flood environment
- (4)* Navigating through the flood-affected area
- (5) Identifying potential sources of floodwater contamination
- (6) Implementing decontamination procedures for personnel, casualties, and equipment

22.4 Technician Level.

22.4.1 Organizations operating at the technician level for flood search and rescue incidents shall meet the requirements in Sections 22.2, 22.3, and 22.4.

22.4.2 Organizations operating at the technician level for flood rescue shall make provisions for the access and removal of victims in and around vehicles under conditions representative of the flood environment.

22.4.3 Organizations operating at the technician level at flood search and rescue incidents shall be capable of operating in, on, and around higher risk, difficult, or complex flood environments and shall have the following capabilities:

- (1) Recognizing higher risk, difficult, or complex flood environments, and implementing systems to maximize the safety of responders
- (2) Conducting search operations in areas affected by flood waters, including building and structure entries, as required to support the task
- (3) Performing extrication and rescue operations involving packaging, treating, and removing victims trapped by floodwaters
- (4) Transporting victims to a location where they can be removed from the flood-affected area

22.4.4 Organizations operating at the technician level for flood rescue shall make provisions for the access and removal of victims in and around swiftwater, when those conditions are present.

22.4.5 Organizations operating human-powered watercraft in a flood search and rescue environment shall develop and implement procedures for the use of human-powered watercraft in the flood search and rescue environment.

22.4.6 Organizations operating motorized watercraft in a flood search and rescue environment shall develop and implement procedures for the use of motorized watercraft in the flood search and rescue environment.

Chapter 23 Tower Search and Rescue (NFPA 1670)

23.1 Prerequisites.

23.1.1 Organizations operating at tower rescue incidents shall, as a prerequisite, meet the requirements specified in Chapter 4.

23.1.2* The requirements of this chapter shall apply to organizations that provide varying degrees of response to emergencies involving guyed, self-supporting, monopoles and nonstandard tower structures.

23.1.3 The AHJ, as part of its hazard identification and risk assessment (*see Section 4.3*), shall identify all locations and situations in the jurisdiction that meet the definition of *towers* and shall make reasonable effort to perform pre-incident rescue action plans with the tower owner, manager, operator, or other AHJ for potential tower emergencies.

23.2 General Requirements.

23.2.1* The rescue organization shall be capable of responding in a timely manner to rescue summons.

23.2.2* The AHJ shall ensure that all members of the tower rescue organization are equipped, trained, and capable of functioning to perform tower rescues within the area for which they are responsible at their designated level of competency.

23.2.2.1 The AHJ shall ensure that all members of the tower rescue organization who ascends a tower in the course of training or rescue is protected from a potential fall with equipment and methods that provide protection that is at least equivalent to the protection that would be expected or required for a worker on the same tower.

23.2.2.2 The AHJ shall ensure that each member of the tower rescue organization is provided with, and trained to use properly, the PPE and rescue equipment necessary for performing rescue from towers according to the designated level of competency.

23.2.2.3 The AHJ shall ensure that a responder to any tower incident that also involves wilderness, water, confined space, machinery, or other disciplines addressed in Chapters 4 through 23, also meets the applicable requirements in Chapters 4 through 23 in those areas.

23.2.3* The AHJ shall ensure that each member of the tower rescue organization is aware of the hazards that could be confronted when called upon to perform rescue in or on towers within the response area of the AHJ, including (but not limited to) radio frequency RF.

23.2.3.1* The AHJ shall ensure that each member of the tower rescue organization who might be called upon to climb the tower is trained in accordance with the outlined requirements described in 23.4.4 for operations-level organizations or 23.5.4 for technician-level organizations.

23.2.3.2 The AHJ shall ensure that each member of the tower rescue organization is trained to identify, avoid, and protect against the following tower-specific hazards:

- (1) Those associated with electrical energy, including alternating current (ac), direct current (dc), or fields generated by these currents
- (2) Those associated with other types of electromagnetic radiation

23.2.3.3 The AHJ shall ensure that any member of the rescue organization who works in a position where he/she could be exposed to RF radiation (such as on a telecommunications tower) is equipped with and carries on his/her person an RF monitor and shall receive training on lockout/tagout procedures for telecommunications and broadcast towers.

23.2.4 The AHJ shall ensure that each member of the tower rescue organization designated to perform tower rescue shall practice performing tower rescues at a frequency of not less than once every 12 months, by means of simulated rescue operations in which dummies, mannequins, or persons are removed from actual towers or representative structures resembling the type(s), configuration(s), and accessibility of towers to which the tower rescue organization could be required to respond.

23.2.5* The AHJ shall establish a preplan for working with the utility providers in its area, and during any incident involving transmission towers shall consult with utility companies to identify and mitigate electrical hazards before attempting rescue on these or related structures.

23.2.6 The AHJ shall ensure that each member of the tower rescue organization is familiar with the medical conditions likely to exist in a tower rescue emergency (including but not limited to suspension intolerance, electrical burns, and RF exposure) and knows how to treat them during the operation.

23.3 Awareness Level.

23.3.1 Organizations operating at the awareness level for tower rescue incidents shall meet the requirements specified in Section 23.3.

23.3.1.1 Members of organizations at the awareness level shall be permitted to assist in support functions on a tower rescue operation (such as ground support) but shall not be deployed onto the tower.

23.3.1.2* Organizations at the awareness level shall be responsible for removal or retrieval of the subject only in cases where climbing the tower is not required and fall hazards are eliminated.

23.3.2 Organizations operating at the awareness level for tower rescue incidents shall implement procedures for the following:

- (1) Initiating size-up to ascertain immediate response needs for tower rescue
- (2) Initiating contact and establishing communications with a subject(s) where possible
- (3) Initiating the emergency response system for tower rescue
- (4) Recognizing different types and purposes of towers with consideration to the information covered in 23.2.3
- (5) Performing a retrieval without ascending the structure or tower
- (6) Initiating site control and scene management
- (7)* Recognizing and identifying the hazards associated with tower emergencies
- (8) Recognizing the limitations of conventional emergency response skills and equipment in various tower environments
- (9) Initiating the collection and recording of information necessary to assist operational personnel in a tower rescue

- (10) Identifying and securing any reporting parties and witnesses
- (11) Establishing familiarity with lockout/tagout procedures
- (12) Supporting an organization at the operations or technician level while functioning within an IMS

23.4 Operations Level.

23.4.1 Organizations operating at the operations level for tower rescue incidents shall meet the requirements specified in Sections 5.2, 5.3, 23.2, 23.3, and 23.4.

23.4.2 Operations-level organizations are restricted to tower rescue response where all of the following conditions are true:

- (1) Where a climbing ladder, integrated tower safety system, or both, are present, and rescuers can access the subject using available PPE and tower climbing techniques consistent with the requirements set forth within this chapter
- (2) Where the tower is not structurally compromised
- (3) Where the climb path is not obstructed
- (4) Where a rescue preplan exists for that particular tower site and advance preparation/planning has been performed with the tower owner/operator
- (5) Where the subject can be reached and evacuation performed in accordance with the preplan in such a manner so as to avoid additional hazards, entanglement, or restrictions to the rescue effort
- (6) Where the tower can accommodate two or more rescuers in addition to the victim
- (7) Where all hazards in and around the tower have been identified, isolated, and controlled
- (8) Where the operation is feasible using the equipment or systems with which the organization has been trained
- (9) Where the height of the tower does not exceed 300 ft (91.44 m)

23.4.3* Organizations operating at the operations level shall ensure personnel are trained and capable of conducting an operations-level response and are available to respond to a tower incident.

23.4.3.1 Organizations operating at the operations level shall develop and implement procedures for the following:

- (1)* Sizing up existing and potential conditions at tower incident sites
- (2)* Protecting personnel from hazards on and around the tower environment
- (3) Ensuring that personnel are capable of managing the physical and psychological challenges that affect rescuers accessing and climbing towers
- (4)* Performing ongoing assessment of conditions affecting the tower rescue operation
- (5)* Requesting and interfacing with specialized resources applicable to tower safety
- (6) Placing a team of two rescuers on a tower where existing ladder or step bolts and climb protection are present, using accepted tower safety methods and procedures consistent with the requirements of 23.4.4
- (7) Performing the following basic rescue techniques with two rescuers on the tower:
 - (a) Releasing a subject from fall protection
 - (b) Lowering a subject vertically down an unobstructed path

- (c) Performing a rescue of a subject where methods require up to a 15-degree deviation from plumb and can be performed with a tag line
- (8) Performing selection, care, and use of personal tower climbing equipment
- (9) Procuring the necessary tower-site information, including owner and lessor information, site plan, and specific hazard information
- (10) Modifying actions and urgency as applicable to a rescue versus a recovery
- (11) Acquiring information on current and forecast weather, including temperature, precipitation, lightning potential, and winds
- (12) Recognizing, identifying, and using typical fall protection and safety hardware and software used by tower climbers
- (13)* Recognizing the team's limitations regarding accessing a subject, evacuating a subject, or both
- (14) Recognizing and using engineered anchor points for the rescue operation
- (15) Developing of and adhering to contingency plans for when weather or other factors make operations-level response ineffective or dangerous to rescuers

23.4.4 The AHJ shall ensure that each member of the operations-level tower rescue organization who might be responsible for ascending a tower for rescue shall, at a minimum, meet the requirements of operations-level tower rescue in NFPA 1006.

23.4.5 Capabilities shall include, but not be limited to, the ability to demonstrate competency in the principles and use of the following:

- (1) Job hazard analysis used on tower sites
- (2) 100 percent fall protection
- (3) Tower anchorages
- (4)* Use of energy-absorbing lanyards
- (5)* Use of work-positioning lanyards
- (6)* Self-retracting lifelines (SRLs)
- (7)* Vertical lifelines for fall arrest
- (8)* Ladder climbing safety systems (cable and rail)
- (9)* Use of a pre-climb checklist
- (10)* Tower ladder/peg climbing techniques
- (11) Transferring between the ladder and the tower structure
- (12)* Selection and use of appropriate rescue equipment and techniques for a given tower rescue situation

23.5 Technician Level.

23.5.1* Organizations operating at the technician level shall be capable of performing and supervising all aspects of any tower rescue operation with which the organization could become involved.

23.5.1.1 Organizations operating at the technician level for tower rescue emergencies shall meet all of the requirements of Sections 5.2, 5.3, 5.4, 23.3, 23.4, and 23.5.

23.5.2 Technician-level tower rescue capabilities are required for tower rescues where any one or more of the following conditions exist:

- (1) Where a climbing ladder or climbing pegs are not present
- (2) Where an integrated tower safety system is not present
- (3) Where the tower is structurally compromised

- (4) Where the site is affected by hazards other than those directly related to the tower or fall protection
- (5) Where the climb path is obstructed
- (6) Where a rescue preplan does not exist, has been compromised, is infeasible, and/or is not sufficient to resolve the problem at hand
- (7) Where the tower cannot accommodate more than one rescuer in addition to the victim
- (8) Where the use of standard subject packaging devices, systems, and/or procedures is infeasible
- (9) Where the capabilities of operations-level skills are exceeded
- (10) Where the height of the tower exceeds 300 ft (91.44 m)

23.5.3* Organizations operating at the technician level for tower rescue emergencies shall be capable of developing and implementing procedures for the following:

- (1) Evaluating hazards and establishing a climb plan for an unfamiliar tower
- (2) Isolating and controlling electrical hazards on an unfamiliar tower
- (3) Identifying and controlling EMF/RF hazards on an unfamiliar tower
- (4)* Accessing and rescuing from a tower using non-standard anchorages
- (5) Planning and implementing response for tower rescues on unfamiliar towers where ascent of the tower is required
- (6)* Placing at least one rescuer on the tower without the benefit of a ladder, step bolts, or integrated fall protection while maintaining 100 percent fall protection at all times
- (7) Performing basic rescue techniques, including at least the following, with only one rescuer on the tower:
 - (a) Releasing a subject from common types of fall protection, including a vertical lifeline (cable), vertical lifeline (rope), fall arrest lanyard, and SRL
 - (b) Lowering a subject vertically down an obstructed path
 - (c)* Performing a rescue where the subject must be moved horizontally as well as vertically

23.5.4 Every member of the technician-level tower rescue organization who might be responsible for ascending a tower for rescue shall, at a minimum, meet the requirements of technician-level tower rescue in NFPA 1006.

23.5.5 In addition to meeting the requirements of technician-level tower rescue in NFPA 1006, every member of the technician-level tower rescue organization who might be responsible for ascending a tower shall have demonstrated competency in the following:

- (1)* Overseeing others who are using tower rescue equipment and techniques
- (2)* Constructing or installing horizontal lifelines
- (3)* Tower structure climbing techniques
- (4) Transferring between different parts of the structures and between the structure and the rescue system
- (5)* Selecting and using rescue equipment and techniques for a tower rescue situation that has not been preplanned