

NFPA®

1670

**Standard on
Operations and Training for
Technical Search and
Rescue Incidents**

2017



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NFPA® 1670

Standard on

Operations and Training for Technical Search and Rescue Incidents

2017 Edition

This edition of NFPA 1670, *Standard on Operations and Training for Technical Search and Rescue Incidents*, was prepared by the Technical Committee on Technical Search and Rescue. It was issued by the Standards Council on November 11, 2016, with an effective date of December 1, 2016, and supersedes all previous editions.

This edition of NFPA 1670 was approved as an American National Standard on December 1, 2016.

Origin and Development of NFPA 1670

The responsibility for NFPA 1470, *Standard on Search and Rescue Training for Structural Collapse Incidents*, 1994 edition, was transferred to the Technical Committee on Technical Rescue, which prepared a proposed new standard, NFPA 1670, *Standard on Operations and Training for Technical Rescue Incidents*. That document incorporated the scope of NFPA 1470, expanding it to include identifying and establishing levels of functional capability for safety and effectively conducting operations at technical rescue incidents.

The 2004 edition of NFPA 1670 represented a complete revision and incorporated reorganization of the chapters to comply with the new *Manual of Style for NFPA Technical Committee Documents*. The title of the document was changed to *Standard on Operations and Training for Technical Search and Rescue Incidents* as a result of a petition by the Technical Committee to the Standards Council to include “search” as part of the scope of the Committee. The search element was also added to each of the disciplines within the document.

The committee acknowledged the valuable contributions of George Howard to the origin and development of this document. Mr. Howard was working as a police officer for the New York and New Jersey Port Authority when he perished in the line of duty on September 11, 2001, at the World Trade Center at the age of 44. He was a 16-year veteran of the department and a founding member of its elite emergency services division and was awarded the New York Police Department’s Medal of Valor for rescuing children trapped in the World Trade Center during the 1993 bombing. Mr. Howard was a charter member of the NFPA Technical Rescue Technical Committee, on which he represented the Nassau County (NY) Fire Academy. His enlightened influence and hard work will always be a part of this document.

In the third edition of NFPA 1670, the Vehicle and Machinery Search and Rescue component was split into two separate chapters, and new chapters on Cave Search and Rescue, Mine and Tunnel Search and Rescue, and Helicopter Search and Rescue were added, resulting in renumbering of chapters within the document. Annex G was updated with material on the Search Assessment Marking System, and Annex H was revised with guidelines for initial response planning. Annex I was deleted, and the remaining annexes were renumbered.

For the 2014 edition, the committee added new chapters on Tower Rescue and Animal Technical Rescue. Chapter 16, Tower Rescue, was incorporated into the standard to address the significant hazards posed to technical rescuers associated with the removal of ill or injured persons from manmade tower structures. The adoption of the PETS Act in October 2006 authorized FEMA to provide rescue, care, shelter, and essential needs for individuals with household pets and service animals—and for the household pets and animals themselves—following a major disaster or emergency. That prompted the committee to incorporate a new Chapter 17, Animal Technical Rescue, and a new Annex K, Animal Technical Rescue, to address the significant hazards posed to technical rescuers associated with the rescue of injured or entrapped animals. Other notable changes to the 2014 edition included the reorganization of Chapter 3, Definitions; changes to confined space rescue team size requirements in Chapter 7, Confined Space Search and Rescue; new requirements

specific to floods in Chapter 9, Water Search and Rescue; and new requirements specific to elevators in Chapter 12, Machinery Search and Rescue.

The NFPA Technical Committee on Technical Search and Rescue recognized the contributions of our colleague, long-time staff liaison, and friend, Frank Florence (1943–2010). Frank passed away on July 27, 2010, after a relatively brief illness. He served with the Salt Lake City Fire Department for 31 years before retiring as Fire Chief. After retiring from SLCFD, Frank joined the NFPA in September of 1998 and served as the staff liaison for the Technical Search and Rescue Committee for twelve years. Frank was a strong advocate for the work of our committee and of the SAR community in general. His memory and contributions will continue to influence NFPA 1670, and the committee is forever grateful for his support and assistance.

For the 2017 edition, NFPA 1670 underwent a significant restructuring. Significant work was done to correlate the material found in both NFPA 1670 and NFPA 1006 through a joint task group. Correlation establishes a consensus for Awareness, Operations, and Technician for emergency responder levels between the documents, utilizing the same definitions in NFPA 1670 and NFPA 1006 and aligning chapters where possible. Chapters have been created for Floodwater and Watercraft to further reflect various water-type rescue challenges.

The NFPA Technical Committee on Technical Search and Rescue would like to recognize the contributions of our colleague and friend, Steve Hudson (1950-2013). Steve's insight and expertise were invaluable in the development of rope rescue system aspects throughout the standard, and his contributions will continue to be ever present. Steve's contributions and comradery will be missed.

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NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

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

Chapter 1 Administration

1.1 Scope.

1.1.1* This standard shall identify and establish levels of functional capability for conducting operations at technical search and rescue incidents while minimizing threats to rescuers.

1.1.2* The requirements of this standard shall apply to organizations that provide response to technical search and rescue incidents, including those not regulated by governmental mandates.

1.1.3* It is not the intent of this document to be applied to individuals and their associated skills and/or qualifications.

1.2* Purpose.

1.2.1 The purpose of this standard shall be to assist the authority having jurisdiction (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.

1.2.2 The functional capabilities of this standard shall be permitted to be achieved in a variety of ways.

1.3 Equivalency. Nothing in this standard shall be intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety in place of those prescribed by this standard, provided technical documentation is submitted to the authority having jurisdiction to demonstrate equivalency and the system, method, or device is approved for the intended purpose.

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 472, *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents*, 2013 edition.

NFPA 1006, *Standard for Technical Rescue Personnel Professional Qualifications*, 2017 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, 2013 edition.

NFPA 1561 *Standard on Emergency Services Incident Management System and Command Safety* 2014 edition.

2.3 Other Publications.

2.3.1 ANSI Publications. American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.

ANSI/CGA G7.1, *Commodity Specification for Air*, 2011.

2.3.2 U.S. Government Publications. U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

FEMA National Response Framework, 2nd edition, 2013.

FEMA *National Urban Search and Rescue (US&R) Response System*, 2006.

U.S. Coast Guard National Search and Rescue Committee, *U.S. National Search and Rescue Plan*, 2007.

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

National Cave Rescue Commission of the National Speleological Society — Cave Orientation Course.

2.4 References for Extracts in Mandatory Sections.

NFPA 1006, *Standard for Technical Rescue Personnel Professional Qualifications*, 2017 edition.

NFPA 1021, *Standard for Fire Officer Professional Qualifications*, 2014 edition.

NFPA 1521, *Standard for Fire Department Safety Officer Professional Qualifications*, 2015 edition.

NFPA 1561, *Standard on Emergency Services Incident Management System and Command Safety*, 2014 edition.

NFPA 1983, *Standard on Life Safety Rope and Equipment for Emergency Services*, 2017 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 Shall. Indicates a mandatory requirement.

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

3.2.5 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 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.

3.3.3 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.

3.3.4 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.

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

3.3.6 Ascending Device. A type of rope grab; auxiliary equipment; a friction or mechanical device utilized to allow ascending a fixed line. [1983, 2017]

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

3.3.8 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.

3.3.9 Auxiliary Equipment. Equipment items that are load-bearing and designed to be utilized with life safety rope and harness. [1983, 2017]

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

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

3.3.12 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.

3.3.13 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.

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

3.3.15* 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.

3.3.16 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.

3.3.17* Cave. A natural underground void formed by geologic process. [1006, 2017]

3.3.18 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.

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

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

3.3.21 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, 2017]

3.3.22* 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.

3.3.23 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.

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

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

3.3.26 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.

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

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

3.3.29 Descent Control Device. An auxiliary equipment item; a friction or mechanical device utilized with rope to control descent. [1983, 2017]

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

3.3.31 Dive. Exposure of an individual to a hyperbaric environment

3.3.32 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.

3.3.33 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.

3.3.34 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.

3.3.35 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.

3.3.36 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.

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

3.3.37.1* 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.

3.3.37.2* 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.

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

3.3.39 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, 2014]

3.3.40 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.

3.3.41 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.

3.3.42 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.

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

3.3.44 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.

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

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

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

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

3.3.49 Failure. The breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

3.3.50* 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.

3.3.51* 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.

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

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

3.3.54 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.

3.3.55* 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.

3.3.56 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.

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

3.3.58 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.

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

3.3.60 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.

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

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

3.3.63 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.

3.3.64 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.

3.3.65 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.

3.3.66 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, 2014]

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

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

3.3.69* 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).

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

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

3.3.72 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.

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

3.3.74 Life Safety Harness. An equipment item; an arrangement of materials secured about the body to support a person. [1983, 2017]

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

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

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

3.3.78* Lockout. A method for keeping equipment from being set in motion and endangering workers. (See also 3.3.147, Tagout.)

3.3.79 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).

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

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

3.3.82 Machinery. The moving parts of a particular machine.

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

3.3.84* 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.

3.3.85* 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.

3.3.86 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.

3.3.87* Multiple-Point Anchor System. System configuration providing load distribution over more than one anchor point, either proportionally or disproportionately. (*See also 3.3.4, Anchor System.*)

3.3.88* 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.

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

3.3.90 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.

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

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

3.3.93 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.

3.3.94 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.

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

3.3.96 Personnel. Any individual participating within the incident scene.

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

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

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

3.3.100* 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.

3.3.101 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.

3.3.102 Pulley. A device with a free-turning, grooved metal wheel (sheave) used to reduce rope friction. Side plates are available for a carabiner to be attached.

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

3.3.104 "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).

3.3.105* 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.

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

3.3.107* 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.

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

3.3.109 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.

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

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

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

3.3.113 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.

3.3.114 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.

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

3.3.116 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.

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

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

3.3.119* 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.

3.3.120 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. [1983, 2017]

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

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

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

3.3.124 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.

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

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

3.3.127 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.

3.3.128* 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.

3.3.129 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.

3.3.130 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.

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

3.3.132 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).

3.3.133 Software. A flexible fabric component of rope rescue equipment that can include, but is not limited to, anchor straps, pick-off straps, and rigging slings.

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

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

3.3.136 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, 2015]

3.3.137* 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.

3.3.138* 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.

3.3.139 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.

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

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

3.3.142* 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.

3.3.143 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.

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

3.3.145 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 3.3.80, Lockout.*)

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

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

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

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

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

3.3.151* 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

3.3.152 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.

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

3.3.154 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 3.3.130, Shield (or Shield System).*]

3.3.155* 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.

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

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

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

3.3.159* 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

4.1 General.

4.1.1* The authority having jurisdiction (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.

4.1.2 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 4.2.1*).

4.1.3* 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.

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

4.1.3.2 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.

4.1.4 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.

4.1.5* It is not the intent of this document to have an organization 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. 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.

4.1.6 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.

4.1.7 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.

4.1.8 Operational procedures shall not exceed the identified level of capability established in 4.1.4.

4.1.9* At a minimum, medical care at the basic life support (BLS) level shall be provided by the organization at technical search and rescue incidents.

4.1.10 Training.

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

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

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

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

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

4.1.10.4* 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.

4.1.10.5* Documentation.

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

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

4.1.11 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.

4.1.12 Standard Operating Procedure.

4.1.12.1 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.

4.1.12.2 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.

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

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

4.2 Hazard Identification and Risk Assessment.

4.2.1* 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.

4.2.2 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.

4.2.3* 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.

4.2.4* 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.

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

4.2.6 The hazard identification and risk assessment shall be documented

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

4.2.8 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.

4.3 Incident Response Planning.

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

4.3.1.1 The plan shall be a formal, written document.

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

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

4.3.3 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.

4.3.4 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.

4.4 Equipment.

4.4.1 Operational Equipment.

4.4.1.1* 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.

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

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

4.4.2 Personal Protective Equipment (PPE).

4.4.2.1* 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.

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

4.4.2.3 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.

4.4.2.4 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.

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

4.4.2.4.2 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.

4.4.2.4.3 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.

4.4.2.4.4 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.

4.5 Safety.

4.5.1 General.

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

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

4.5.1.3 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

4.5.1.4* 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.

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

4.5.2 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.

4.5.3 Incident Management System.

4.5.3.1* The AHJ shall provide for and utilize training on the implementation of an incident management system that meets the requirements of NFPA 1561 with written SOPs applying to all members involved in emergency operations. All members involved in emergency operations shall be familiar with the system.

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

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

4.5.3.4 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.

4.5.3.5 At all technical search and rescue incidents, the organization shall provide supervisors who possess skills and knowledge commensurate with the operational level identified in 4.1.4.

4.5.4* 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 10 of NFPA 1500.

4.5.5 Nuclear, Biological, and Chemical Response.

4.5.5.1* 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.

4.5.5.2 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

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) Recognizing the need for a rope rescue
- (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 utilizing PPE assigned for use at a rope rescue incident

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 rescues involving movement of persons from one stable location to another, including, but not limited to, the following:

- (1) Sizing up existing and potential conditions at incidents where rope rescue operations will be performed
- (2) Assuring safety in rope rescue operations
- (3) Establishing the need for, selecting, and placing edge protection
- (4) Selecting, using, and maintaining rope rescue equipment and rope rescue systems
- (5) Configuring all knots, bends, and hitches used by the organization

- (6) Selecting anchor points and equipment to construct anchor systems
- (7) Constructing and using single-point anchor systems
- (8)* Constructing and using multiple-point anchor systems with regard to the potential increase in force that can be associated with their use
- (9)* Selecting, constructing, and using a belay system
- (10) Selecting and using methods necessary to negotiate an edge or other obstacle that includes protecting all personnel working nearby from accidental fall
- (11) Ascending and descending a fixed line
- (12)* Self-rescue
- (13)* Selecting, constructing, and using a lowering system in both the low- and high-angle environments
- (14) Securing a patient in a litter
- (15) Attaching a litter to a rope rescue system and managing its movement
- (16)* Selecting, constructing, and using rope-based mechanical advantage haul systems in both the low- and high-angle environments
- (17)* Negotiating a loaded litter over an edge during a raising and lowering operation

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

Chapter 6 Structural Collapse Search and Rescue

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 (awareness level for confined space search and rescue).

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

- (1) Recognizing the need for 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 the 14 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 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

6.3 Operations Level

6.3.1 Organizations operating at the operations level for structural collapse incidents shall meet the requirements specified in Sections 6.2 and 6.3 as well as those in the following sections:

- (1) Section 5.3 (operations level for rope rescue)
- (2) Section 7.3 (operations level for confined space search and rescue)
- (3) Section 11.3 (operations level for trench and excavation search and rescue)
- (4) Section 8.3 (operations level for vehicle search and rescue)
- (5) Section 16.2 (awareness level for surface water search and rescue)
- (6) Section 12.3 (operations level for machinery search and rescue)

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 this chapter and the following sections:

- (1) Section 5.4 (technician level for rope rescue)
- (2) Section 7.4 (technician level for confined space search and rescue)
- (3) Section 11.4 (technician level for trench and excavation search and rescue)
- (4) Section 8.4 (technician level for vehicle search and rescue)
- (5) Section 12.4 (technician level for machinery search and rescue)

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

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 7.2 and 5.2 (awareness level for rope rescue).

7.2.2 The organization shall have an appropriate number of personnel meeting the requirements of Chapter 4 of NFPA 472 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) Recognizing the need for confined space search and rescue
- (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

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 7.2, 7.3, and 5.3 (operations level for rope rescue).

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 making confined space rescues once every 12 months, in accordance with the requirements of 4.1.10 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. 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.

7.3.6 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 this chapter and Section 12.2 (awareness level for machinery search and rescue).

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 emergen-

cies 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

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 472 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) Recognizing the need for a vehicle search and rescue
- (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
- (5)* Recognizing general hazards associated with vehicle search and rescue incidents
- (6) Initiating traffic control

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 5 of NFPA 472 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

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)* Stabilizing in advance of technician-level vehicle search and rescue situations
- (4)* Using all specialized search and rescue equipment immediately available and in use by the organization
- (5) Using specialized outside resources, including heavy equipment

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 as defined in NFPA 1006.

Chapter 9 Animal Technical Rescue

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 3.3.21.

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) Recognizing the need for an animal rescue, including differentiating between operations and technician-level response
- (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 utilizing 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

9.3 Operations Level.

9.3.1 Organizations performing animal rescue at the operations level shall meet all requirements of Sections 5.3 (operations level for rope rescue), 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 (operations level for rope rescue), 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 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 a ladder to access animals from a location below or above grade
- (13) Using auxiliary equipment to facilitate the safe placement of rescue devices on the animal
- (14) Constructing and operating a portable high-point anchor system
- (15) 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 (technician level for rope rescue), 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 (technician level for rope rescue), 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 designed and tested harness device designed for animals and extended use in the high-angle environment to include helicopter rescue
- (2) Performing a high-angle rope rescue of an animal suspended from, or stranded on, a structure or landscape feature
- (3) Using rope rescue systems to move an animal along a horizontal path above an obstacle or projection
- (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 an animal litter or sling system using tender(s) to negotiate obstacles or manipulate or position the animal
- (6) Moving an animal packaged in an animal litter or sling system up and over an edge during a raising or vertical lift operation with a rope system
- (7) Mitigating all dynamic loads associated with animal behaviors in a rope rescue system
- (8) Performing helicopter rescue with a specifically designed extended lift harness

Chapter 10 Wilderness Search and Rescue

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

10.1.1* The AHJ, as part of its hazard identification and risk assessment (*see 4.2.2*), 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) Recognizing the need for a wilderness search and rescue-type response
- (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 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

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 10.2 and 10.3, as well as those in Section 5.3 (operations level for rope rescue).

10.3.2* The AHJ shall establish standard operating procedures (SOPs) that identify the specific environments in which operations-level organizations shall be 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 this chapter and the following sections:

- (1) Section 5.4 (technician level for rope rescue)
- (2) Section 16.2 (awareness level for surface water search and rescue)
- (3) Section 15.2 (awareness level for helicopter search and rescue)

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 (e.g., search, cave, alpine). 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.

10.4.5 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

10.4.6 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

10.4.7* 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

10.4.8 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

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 11.2 and 7.2 (awareness level for confined space search and rescue)

11.2.2 Each member of the organization shall meet the requirements specified in Chapter 4 of NFPA 472 and shall be a competent person as defined in 3.3.21.

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

- (1) Recognizing the need for a trench and excavation rescue
- (2)* Identifying the resources necessary to conduct safe and effective trench and excavation emergency operations
- (3)* Initiating the emergency response system for trenches and excavations
- (4)* Initiating site control and scene management
- (5)* Recognizing general hazards associated with trench and excavation emergency incidents and the procedures necessary to mitigate these hazards within the general rescue area
- (6)* Recognizing typical trench and excavation collapse patterns, the reasons trenches and excavations collapse, and the potential for secondary collapse
- (7)* Initiating a rapid, nonentry extrication of noninjured or minimally injured victim(s)
- (8)* Recognizing the unique hazards associated with the weight of soil and its associated entrapping characteristics
- (9) Making the rescue area safe, including the identification, construction, application, limitations, and installation of ground pads around the affected collapse or rescue area

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, as well as the following sections:

- (1) Section 5.3 (operations level for rope rescue)
- (2) Section 7.3 (operations level for confined space search and rescue)
- (3) Section 8.3 (operations level for vehicle and machinery search and rescue)

11.3.2* 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.

11.3.3 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) Initiating entry into a trench or excavation rescue area
- (3)* Recognizing unstable areas associated with trench and excavation emergencies and adjacent structures
- (4)* Identifying probable victim locations and survivability
- (5)* Making the rescue area safe, including the identification, construction, application, limitations, and removal of traditional sheeting and shoring using tabulated data and approved engineering practices
- (6)* Initiating a one-call utility location service
- (7)* Identifying soil types using accepted visual or manual tests
- (8) Ventilating the trench or excavation space
- (9) Identifying and recognizing a bell-bottom pier hole excavation and its associated unique hazards
- (10) Placing ground pads and protecting the "lip" of a trench or excavation
- (11)* Providing entry and egress paths for entry personnel
- (12)* Conducting a pre-entry briefing
- (13)* Initiating record keeping and documentation during entry operations
- (14) Selecting, utilizing, and applying shield systems
- (15)* Selecting, utilizing, and applying sloping and benching systems
- (16) Identifying the duties of panel teams, entry teams, and shoring teams
- (17) Assessing the mechanism of entrapment and the method of victim removal
- (18)* Performing extrication

11.4 Technician Level.

11.4.1 Organizations operating at the technician level at trench and excavation emergencies shall meet the requirements specified in this chapter and the following sections:

- (1) Section 7.4 (technician level for confined space search and rescue)
- (2) Section 8.4 (technician level for vehicle and machinery search and rescue)

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)* Identifying, constructing, and removing manufactured protective systems consistent with the application and limitations of such systems using tabulated data and approved engineering practices
- (3)* 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
- (4) Identifying the construction, application, limitations, and removal of supplemental sheeting and shoring systems designed to create approved protective systems
- (5) Adjusting the protective systems based on digging operations and environmental conditions
- (6)* Rigging and placement of isolation systems

Chapter 12 Machinery Search and Rescue

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 472 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) Recognizing the need for a machinery search and rescue
- (2)* Identifying the resources necessary to conduct operations
- (3)* Initiating the emergency response system for machinery search and rescue incidents
- (4)* Initiating site control and scene management
- (5)* Recognizing general hazards associated with machinery search and rescue incidents

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 5 of NFPA 472 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 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 (e.g., lockout/tagout) 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
- (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
- (10) Procuring and utilizing the resources 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

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

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

12.4 Technician Level.

12.4.1 Organizations operating at the technician level for machinery emergencies shall meet the requirements specified in this chapter.

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

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