NFPA 1670

Standard on

Operations and Training for Technical Search and Rescue Incidents

2004 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 Rescue and acted on by NFPA at its November Association Technical Meeting held November 15–19, 2003, in Reno, NV. It was issued by the Standards Council on January 16, 2004, with an effective date of February 5, 2004, and supersedes all previous editions.

This edition of NFPA 1670 was approved as an American National Standard on January 16, 2004.

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 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.

This second edition of NFPA 1670 represents a complete revision and incorporates the reorganization of the chapters to comply with the new NFPA *Manual of Style*. The title of the document has been 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 has also been added to each of the disciplines within the document.

The committee wishes to acknowledge 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 shall always be a part of this document.

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This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

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

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, Annex K lists the complete title and edition of the source documents for both mandatory and nonmandatory extracts. Editorial changes to extracted material consist of revising references to an appropriate division in this document or the inclusion of the document number with the division number when the reference is to the original document. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

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.

1.2* 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 Professional Competence of Responders to Hazardous Materials Incidents,* 2002 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program,* 2002 edition.

NFPA 1521, *Standard for Fire Department Safety Officer,* 2002 edition.

NFPA 1561, *Standard on Emergency Services Incident Management System,* 2002 edition.

2.3 Other Publications.

2.3.1 ANSI Publication.

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

ANSI/GCA G7.1, *Commodity Specification for Air.*

2.3.2 U.S. Government Publication.

U.S. Government Printing Office, Washington, DC 20402.

U.S. Department of Transportation, *First Responder Guidelines.*

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 included, common usage of the terms shall apply.

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. A document, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions shall be located in an appendix or annex, footnote, or fine-print note and are not to be considered a part of the requirements of a standard.

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

3.3.6 Ascent Device. An auxiliary equipment system component; a friction or mechanical device utilized to allow ascending a fixed line. [**1983:**1.3]

3.3.7 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.

3.3.8 Auxiliary Equipment. System components that are load-bearing accessories designed to be utilized with life safety rope and harness including, but not limited to, ascending devices, carabiners, descent control devices, rope grab devices, and snap-links. [**1983:**1.3]

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

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

3.3.11 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.

3.3.12 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.

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

3.3.14 Body Recovery. An operation involving the retrieval of the remains of a deceased victim, but in no case a living person.

3.3.15 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.

3.3.16 Collapse Zone. See 3.3.102, Rescue Area.

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

3.3.18 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:**3.3]

3.3.19* 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.

3.3.20 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.

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

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

3.3.23 Critical Angle. An angle of 120 degrees or less created between two rope rescue system components wide enough so as to create excessive force on the anchor points to which they are attached.

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

3.3.25 Descent Control Device. An auxiliary equipment system component; a friction or mechanical device utilized with rope to control descent. [**1983:**1.3]

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

3.3.27 Dive. An exposure to increased pressure whether underwater or in a hyperbaric chamber.

3.3.28 Dive Operation. A situation requiring divers to complete an assigned task.

3.3.29 Dive Team. An organization of public safety divers and members in training.

3.3.30 Diver. An individual using breathing apparatus that supplies compressed breathing gas at the ambient pressure.

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

3.3.32 Emergency Incident. Any situation to which the 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:**3.3]

3.3.33 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.

3.3.34 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.

3.3.35 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.

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

3.3.37 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.

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

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

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

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

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

3.3.43* Federal Response Plan. A U.S. government plan for the basic mechanisms and structures by which the federal government will mobilize resources and conduct activities to augment state and local disaster and emergency response efforts.

3.3.44* FEMA Task Force Search and Rescue Marking System. Distinct markings made with international orange spray paint near a collapsed structure's most accessible point of entry.

3.3.45* 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.

3.3.46* 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.

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

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

3.3.49 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.

3.3.50* 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.

3.3.51 Grade Pole. A wood or fiberglass pole, either cut to a certain length or provided with markings, used by workers when setting pipes on grade.

3.3.52 Hardware. Rigid mechanical auxiliary equipment that can include, but is not limited to, anchor plates, carabiners, and mechanical ascent and descent control devices.

3.3.53 Harness. See 3.3.69, Life Safety Harness.

3.3.54 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.

3.3.55 Hazardous Atmospheres. Any atmosphere that can expose personnel to the risk of death, incapacitation, injury, acute illness, or impairment of ability to self-rescue. [**1006:**3.3]

3.3.56 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.

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

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

3.3.59 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.

3.3.60 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.

3.3.61 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.

3.3.62 Incident Commander. The person who is responsible for all decisions relating to the management of the incident and is in charge of the incident site. [**472:**3.3]

3.3.63 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:**3.3]

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

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

3.3.66* Isolation System (or Isolation Devices). An arrangement of 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).

3.3.67* Knot. A fastening made by tying together lengths of rope or webbing in a prescribed way.

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

3.3.69 Life Safety Harness. A system component that is an arrangement of materials secured about the body and used to support a person during rescue.

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

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

3.3.72 Litter Attendant. A person who both accompanies and physically manages the litter.

3.3.73* Load. That which is being lowered or raised by rope in a high-angle system.

3.3.74* Lockout. A method for keeping equipment from being set in motion and endangering workers.

3.3.75 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).

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

3.3.77 Machinery. The moving parts of a particular machine.

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

3.3.79* 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.

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

3.3.81 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.

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

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

3.3.84 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.

3.3.85 Panel. See 3.3.147, Traditional Sheeting and Shoring.

3.3.86 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.

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

3.3.88 Personnel. Any individual participating within the incident scene.

3.3.89 Pier Hole. See 3.3.11, Bell-Bottom Pier Hole.

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

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

3.3.92* 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.

3.3.93 Public Safety Diver. An individual who performs public safety diving.

3.3.94 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.

3.3.95 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.

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

3.3.97 "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).

3.3.98 Recovery. Activities and programs designed to return the entity to an acceptable condition.

3.3.99 Redundant Air System. An independent secondary underwater breathing system (i.e., a pony bottle with first and second stage or a pony bottle supplying a bailout block).

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

3.3.101 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.

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

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

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

3.3.105 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.

3.3.106 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.

3.3.107 Resource Assessment. The component of the assessment phase that involves the determination for the need for additional resources. Resource assessment can be ongoing throughout the entire incident.

3.3.108 Resources. All personnel and equipment that are available, or potentially available, for assignment to incidents.

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

3.3.110 Risk. A measure of the probability and severity of adverse effects that result from an exposure to a hazard.

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

3.3.112* 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.

3.3.113 Rope. See 3.3.70, Life Safety Rope.

3.3.114 Rope-Based Mechanical Advantage System. A rope rescue system component incorporating the reeving of rope through moving pulleys (or similar devices) to create mechanical advantage.

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

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

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

3.3.118 Search Marking System. A separate and distinct marking system used to identify information related to the location of a victim(s).

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

3.3.120 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.

3.3.121* 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.

3.3.122 Shoring (or Shoring System). A structure such as a metal hydraulic, pneumatic/mechanical, or timber system that supports the sides of an excavation and is designed to prevent cave-ins.

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

3.3.124 Sides. See 3.3.41, Face(s).

3.3.125 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.

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

3.3.127 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.

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

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

3.3.130 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:**3.3]

3.3.131* 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.

3.3.132* 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 two feet of shoring exists below the bottom of the strongback.

3.3.133 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.

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

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

3.3.136* 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.

3.3.137 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.

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

3.3.139 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 3.3.74, Lockout.)*

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

3.3.141* Technical Rescue Incident. Complex rescue incidents requiring specially trained personnel and special equipment to complete the mission.

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

3.3.143 Termination. That portion of incident management in which personnel are involved in documenting safety procedures, site operations, hazards faced, and lessons learned from the incident. Termination is divided into three phases: debriefing the incident, post-incident analysis, and critiquing the incident.

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

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

3.3.146 Testing. The process by which the hazards that could confront entrants of a trench or excavation are identified and evaluated, including specifying tests that are to be performed in a trench or excavation.

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

3.3.148 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.

3.3.149 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 3.3.121, Shield (or Shield System).]*

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

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

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

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

3.3.154* Wilderness. An uncultivated, uninhabited, and natural area usually, but not necessarily, far from human civilization and trappings.

3.3.155 Wire Rope. Rope made of twisted strands of wire.

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 safely and effectively, based on hazard identification, risk assessment, training level of personnel, and availability of internal and external resources.

4.1.2 The AHJ shall establish written standard operating procedures consistent with one of the following operational levels:

(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, to identify hazards, use equipment, and apply advanced techniques specified in this standard necessary to coordinate, perform, and supervise technical search and rescue incidents.

4.1.3 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.

4.1.4 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.

4.1.5 Operational procedures shall not exceed the identified level of capability established in 4.1.2.

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

4.1.7 Training.

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

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

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

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

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

4.1.7.4* 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.

4.1.7.5* Documentation.

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

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

4.1.8 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 11 for the specific technical rescue incident.

4.1.9 Standard Operating Procedure.

4.1.9.1 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.

4.1.9.2 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.

4.1.10* The AHJ shall comply with all applicable local, state, and federal laws.

4.1.11* The AHJ shall train responsible personnel in procedures for invoking relevant components of the National Search and Rescue Plan, the Federal Response Plan, and other state and local response plans.

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. This list 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 is 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 personal protective equipment 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 atmospheric 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, *Standard on Fire Department Occupational Safety and Health Program*.

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, *Standard on Fire Department Occupational Safety and Health Program*:

(1) Section 5.4, Special Operations

(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 basic life support 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.

4.5.2.1 At technical search and rescue training exercises and in actual operations, the incident commander shall assign a safety officer with the specific knowledge and responsibility for the identification, evaluation, and, where possible, correction of hazardous conditions and unsafe practices.

4.5.2.2 The assigned safety officer shall meet the requirements specified in Chapter 6, Functions of the Incident Safety Officer, of NFPA 1521, *Standard for Fire Department Safety Officer*.

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, *Standard on Emergency Services Incident Management System*, with written standard operating procedures 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, *Standard on Emergency Services Incident Management System*.

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 4.1.2.

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, *Standard on Fire Department Occupational Safety and Health Program*.

4.5.5 Nuclear, Biological, and Chemical Response.

4.5.5.1* The authority having jurisdiction, 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 Structural Collapse

5.1 General Requirements.

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

5.2 Awareness Level.

5.2.1 Organizations operating at the awareness level for structural collapse incidents shall meet the requirements specified in Sections 5.2 and 7.2 (awareness level for confined space search and rescue).

5.2.2 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 five 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 the FEMA Task Force Search and Rescue Marking System, Building Marking System (structure/hazard evaluation), Victim Location Marking System, and Structure Marking System (structure identification within a geographic area)

(10) Removing readily accessible victims from structural collapse incidents

5.3 Operations Level.

5.3.1 Organizations operating at the operations level for structural collapse incidents shall meet the requirements specified in Sections 5.2 and 5.3 as well as those in the following sections:

(1) Section 6.3 (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)

(4) Section 9.2 (awareness level for water search and rescue)

(5) Section 11.3 (operations level for trench and excavation search and rescue)

5.3.2 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, and reinforced masonry construction).

5.3.3 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 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

5.4 Technician Level.

5.4.1 Organizations operating at the technician level for structural collapse incidents shall meet the requirements specified in this chapter and the following sections:

(1) Section 6.4 (technician level for rope rescue)

(2) Section 7.4 (technician level for confined space search and rescue)

(3) Section 8.4 (technician level for vehicle and machinery search and rescue)

(4) Section 11.4 (technician level for trench and excavation search and rescue)

5.4.2 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.

5.4.3 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

Chapter 6 Rope Rescue

6.1 General Requirements.

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

6.1.2* 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.

6.2 Awareness Level.

6.2.1 Organizations operating at the awareness level for rope rescue incidents shall meet the requirements specified in Section 6.2.

6.2.2 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 personal protective equipment assigned for use at a rope rescue incident

6.3 Operations Level.

6.3.1 Organizations operating at the low-angle operations level for rope rescue incidents shall meet the requirements specified in Section 6.2 and 6.3.4 (low-angle operations).

6.3.2 Organizations operating at the high-angle operations level for rope rescue incidents shall meet the requirements specified in Section 6.2, 6.3.4 (low-angle operations), and 6.3.5 (high-angle operations).

6.3.3 The AHJ shall choose to operate at either the low-angle operations level or the high-angle operations level commensurate with the needs of the organization.

6.3.4 Organizations operating at the low-angle operations level for rope rescue incidents shall develop and implement procedures commensurate with the identified needs of the organization for the following in the low-angle
environment:

(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, or hitches used by the organization

(6) Selecting anchor points and equipment to construct anchor systems

(7)* Constructing and using single-point anchor systems commensurate with the organization's needs

(8)* Constructing and using multiple-point, load-sharing anchor systems commensurate with the organization's needs

(9) Selecting, constructing, and using a belay system commensurate with the organization's needs

(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 rope

(12) Selecting and using methods necessary for personnel to escape from jammed or otherwise dysfunctional descent and ascent devices when descending and ascending a fixed rope

(13)* Selecting, constructing, and using a lowering system commensurate with the organization's needs

(14) Securing a patient in a litter

(15) Attaching a litter to a rope rescue system commensurate with the organization's needs

(16) Utilizing litter attendants commensurate with the organization's needs

(17) Selecting, constructing, and using rope-based mechanical advantage systems commensurate with the organization's needs

(18)* Selecting, constructing, and using raising systems commensurate with the organization's needs

6.3.5 Organizations operating at the high-angle operations level shall develop and implement procedures commensurate with the identified needs of the organization for the following in the high-angle environment:

(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, or hitches used by the organization

(6) Selecting anchor points and equipment to construct anchor systems

(7)* Constructing and using single-point anchor systems commensurate with the organization's needs

(8)* Constructing and using multiple-point, load-sharing anchor systems commensurate with the organization's needs

(9) Selecting, constructing, and using a belay system commensurate with the organization's needs

(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 rope

(12) Selecting and using methods necessary for personnel to escape from jammed or otherwise dysfunctional ascent and descent control devices when ascending and descending a fixed rope

(13)* Selecting, constructing, and using a lowering system commensurate with the organization's needs

(14) Securing a patient in a litter

(15) Attaching a litter to a rope rescue system commensurate with the organization's needs

(16) Utilizing litter attendants commensurate with the organization's needs

(17) Selecting, constructing, and using rope-based mechanical advantage systems commensurate with the organization's needs

(18)* Selecting, constructing, and using raising systems commensurate with the organization's needs

6.4 Technician Level.

6.4.1 Organizations operating at the technician level for rope rescue incidents shall meet all the requirements specified in this chapter.

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

(1) Evaluating existing and potential conditions at incidents where rope rescue operations will be performed

(2) Understanding of the basic physics involved in constructing rope rescue systems, including system safety factors, critical angles, and the causes and effects of force multipliers within rope rescue systems

(3) Negotiating obstacles while ascending and descending a fixed rope commensurate with the organization's needs

(4) Constructing and using multiple-point, load-distributing anchor systems commensurate with the organization's needs

(5) Passing knots through a rope rescue raising or lowering system commensurate with the organization's needs

(6) Constructing an elevated point to facilitate safe transition of rescuers or victims over difficult edges

(7) Selecting, constructing, and using a high-line rope system commensurate with the organization's needs

(8) Utilizing a high-line rope system to transport rescuers, equipment, and an occupied litter commensurate with the organization's needs

(9) Utilizing litter attendants within a high-line rope system

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 All confined space rescue services shall meet the requirements defined in 7.1.3.1 through 7.1.3.12.

7.1.3.1 Each member of the rescue service shall be provided with, and trained to use properly, the personal protective equipment and rescue equipment necessary for making rescues from confined spaces according to his or her designated level of competency.

7.1.3.2 Each member of the rescue service shall be trained to perform the assigned rescue duties corresponding to his or her designated level of competency.

7.1.3.3 Each member of the rescue service shall also receive the training required of authorized rescue entrants.

7.1.3.4 Each member of the rescue service shall practice making confined space rescues, in accordance with the requirements of 4.1.7 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.

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

7.1.3.6 Each member of the rescue service shall be certified to the level of first responder or equivalent according to U.S. Department of Transportation (DOT) *First Responder Guidelines.*

7.1.3.7 Each member of the rescue service shall successfully complete a course in cardiopulmonary resuscitation (CPR) taught through the American Heart Association (AHA) to the level of a “Health Care Provider,” through the American Red Cross (ARC) to the “CPR for the Professional Rescuer” level, or through the National Safety Council's equivalent course of study.

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

7.1.3.9 Each member of the rescue service shall be equipped, trained, and capable of functioning to perform confined space rescues within the area for which they are responsible at their designated level of competency.

7.1.3.10 The requirements of 7.1.3.9 shall be confirmed by an annual evaluation of the rescue service's capabilities to perform confined space rescues in terms of overall timeliness, training, and equipment and to perform safe and effective rescue in those types of spaces to which the team must respond.

7.1.3.11 Each member of the rescue service shall be aware of the hazards he or she could confront when called on to perform rescue within confined spaces for which the service is responsible.

7.1.3.12 If required to provide confined space rescue within U.S. federally regulated industrial facilities, the rescue service shall have 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.

7.1.4 A confined space rescue team shall be made up of a minimum of six individuals for organizations operating at the technician level, and a minimum of four individuals for organizations operating at the operations level.

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 6.2 (awareness level for rope rescue).

7.2.2 All members of the organization shall meet the requirements of Chapter 4 of NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*.

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 and 7.3, as well as in the following sections:

(1) Section 6.3 (operations level for rope rescue)

(2) Section 11.2 (awareness level for trench and excavation search and rescue)

7.3.2 The organization operating at this level shall be responsible for the development and training of a confined space rescue team of at least four individuals who are trained, equipped, and available to respond to confined space emergencies of a type and complexity that requires an operations level organization.

7.3.3 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 personnel from hazards within the confined space

(3)* Ensuring that 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 (LEL/LFL), and toxicity, in that order

(6)* Performing entry-type rescues into confined spaces meeting all of the following specific qualifying characteristics:

(a)* The internal configuration of the space is clear and unobstructed so retrieval systems can be utilized for rescuers without possibility of entanglement.

(b)* The victim can be easily seen from the outside of the space's primary access opening.

(c)* Rescuers can pass easily through the access/egress opening(s) with room to spare when PPE is worn in the manner recommended by the manufacturer.

(d)* The space can accommodate two or more rescuers in addition to the victim.

(e)* All hazards in and around the confined space have been identified, isolated, and controlled.

(7)* Using victim packaging devices that could be employed in confined space rescue

(8) Transferring victim information including location, surroundings, condition when found, present condition, and other pertinent information to emergency medical services personnel

(9)* Planning and implementing a confined space rescue operation

(10)* Selecting, constructing, and using a rope 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 8.4 (technician level for vehicle and machinery search and rescue).

7.4.2* The organization operating at this level shall be responsible for the development of a confined space rescue team of at least six individuals who are trained, equipped, and available to respond to confined space emergencies of a type and complexity that requires a technician level organization.

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)* Evaluating existing and potential conditions at confined space emergencies

(2)* Ensuring that rescue team members take part in a medical surveillance program

(3)* Planning response for entry-type confined space rescues in hazardous environments

(4)* Implementing the planned response

Chapter 8 Vehicle and Machinery Search and Rescue

8.1* General Requirements.

Organizations operating at vehicle and machinery 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 and machinery 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, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*.

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

(1) Recognizing the need for a vehicle and machinery search and rescue

(2)* Identifying the resources necessary to conduct operations

(3)* Initiating the emergency response system for vehicle and machinery search and rescue incidents

(4)* Initiating site control and scene management

(5)* Recognizing general hazards associated with vehicle and machinery search and rescue incidents

(6) Initiating traffic control

8.3 Operations Level.

8.3.1 Organizations operating at the operations level for vehicle and machinery 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, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*.

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 vehicle or machinery.

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

(1)* Sizing up existing and potential conditions at vehicle and 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 vehicles or machinery involved

(4) Identifying, containing, and stopping fuel release

(5) Protecting a victim during extrication or disentanglement

(6) The packaging of a victim prior to extrication or disentanglement

(7) Accessing victims trapped in a vehicle or machinery

(8)* Performing extrication and disentanglement operations involving packaging, treating, and removing victims trapped in vehicles or machinery through the use of hand and power tools

(9)* Mitigating and managing general and specific hazards (i.e., fires and explosions) associated with vehicle and machinery search and rescue incidents

(10) Procuring and utilizing the resources necessary to conduct vehicle and machinery search and rescue operations

(11) Maintaining control of traffic at the scene of vehicle and machinery search and rescue incidents

8.4 Technician Level.

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

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

(1) Evaluating existing and potential conditions at vehicle and machinery search and rescue incidents

(2)* Performing extrication and disentanglement operations involving packaging, treating, and removing victims injured or trapped in large, heavy vehicles or machinery

(3)* The advanced stabilization of unusual vehicle and machinery search and rescue situations

(4)* Using all specialized search and rescue equipment immediately available and in use by the organization

Chapter 9 Water Search and Rescue

9.1 General Requirements.

Organizations operating at water incidents shall meet the requirements specified in Chapter 4.

9.2 Awareness Level.

9.2.1 Organizations operating at the awareness level at water search and rescue incidents shall meet the requirements specified in Section 9.2.

9.2.2 Each member of an organization operating at the awareness level shall be a competent person as defined in 3.3.18.

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

(1) Recognizing the need for water search and rescue

(2)* Implementing the assessment phase

(3)* Identifying the resources necessary to conduct safe and effective water operations

(4)* Implementing the emergency response system for water incidents

(5)* Implementing site control and scene management

(6)* Recognizing general hazards associated with water incidents and the procedures necessary to mitigate these hazards within the general search and rescue area

(7) Determining rescue versus body recovery

9.3 Operations Level.

9.3.1 Organizations operating at the operations level at water search and rescue incidents shall meet the requirements specified in Section 9.2 and in 9.3.1 through 9.3.5.

9.3.2 For the purposes of this standard, there shall be four separate water-related disciplines for the operations level: dive, ice, surf, and swift water.

9.3.3* Organizations operating at the operations level of one or more specific disciplines shall meet the requirements defined in 9.3.6, 9.3.7, 9.3.8, or 9.3.9 for that discipline.

9.3.4* For personnel operating in the hazard zone, the minimum PPE provided shall include the following:

(1) Personal flotation device (PFD)

(2) Thermal protection

(3)* Helmet appropriate for water rescue

(4) Cutting device

(5) Whistle

(6) Contamination protection (as needed)

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

(1)* Sizing up existing and potential conditions at incidents where water search and rescue will be performed

(2)* Ensuring personal safety at water operations

(3)* Assessing water conditions in terms of hazards to the victim and rescuer

(4) Separating, isolating, securing, and interviewing witnesses

(5)* Determining the method of victim entrapment

(6)* Evaluating the progress of the planned response to ensure the objectives are being met safely, effectively, and efficiently

(7)* Conducting shore-based rescue operations

(8)* Using throw bags

(9)* Supplying assistance with rigging and mechanical advantage systems to technician-level personnel

(10) Deploying, operating, and recovering any watercraft used by the organization

(11)* Survival swimming and self-rescue

(12)* Identifying and managing heat and cold stress to the rescuer while utilizing PPE

(13) Using victim packaging devices that could be employed by the organization for water rescue

(14)* Transferring victim information including location, surroundings, condition when found, present condition, and other pertinent information to emergency medical services personnel

(15)* Boat-assisted and boat-based operations if boats are used by the organization

(16) Planning to meet operational objectives

(17)* Rapid extrication of accessible victims

(18) Surface water-based search operations

9.3.6 Dive. Organizations operating at the operations level at dive incidents shall develop and implement procedures for the following:

(1)* Recognizing the unique hazards associated with dive operations

(2)* Serving as surface support personnel

(3) Identifying water characteristics

(4)* Operating surface support equipment used in water operations

(5) Procuring the necessary equipment to perform dive operations

(6) Safe entry and recovery of divers from the water

(7)* Participating in safe dive operations in any climate the organization can encounter

9.3.7 Ice. Organizations operating at the operations level at ice rescue incidents shall develop and implement procedures for the following:

(1)* Recognizing the unique hazards associated with ice rescue operations

(2)* Identifying water and ice characteristics

(3)* Operating surface support equipment used in water or ice rescue operations

(4) Procuring the necessary equipment to perform ice rescue operations

(5)* Recognizing and dealing with a victim's hypothermia

(6) Safe entry of divers into the water through an ice hole, if ice diving is performed by the organization

9.3.8 Surf. Organizations operating at the operations level at surf search and rescue incidents shall develop and implement procedures for the following:

(1)* Recognizing the unique hazards associated with surf rescue operations

(2) Operating surface support equipment used in surf rescue operations

(3) Procuring the necessary equipment to perform surf rescue operations

(4)* Self-rescue and survival swimming in surf

9.3.9 Swift Water.

9.3.9.1 Organizations operating at the operations level at swift water search and rescue incidents shall meet the requirements specified in Section 6.3 (operations level for rope rescue).

9.3.9.2 Organizations operating at the operations level at swift water search and rescue incidents shall develop and implement procedures for the following:

(1)* Assessing moving water conditions, characteristics, and features in terms of hazards to the victim and rescuer

(2) Determining the method of victim entrapment

(3)* Using tag lines and tension diagonals (zip lines)

(4)* Self-rescue and survival swimming in swift water

9.4 Technician Level.

9.4.1 Organizations operating at the technician level at water search and rescue incidents shall meet the requirements specified in 9.3.1 through 9.3.5 and 9.4.1 through 9.4.6.

9.4.2 All members of the organization shall meet the requirements specified in Chapter 4 of NFPA 472, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*.

9.4.3 For the purposes of this standard, there shall be four separate water-related disciplines for the technician level: dive, ice, surf, and swift water.

9.4.3.1 Organizations operating at the technician level at dive search and rescue incidents shall meet the requirements specified in 9.3.6 and 9.4.6.

9.4.3.2 Organizations operating at the technician level at ice search and rescue incidents shall meet the requirements specified in 9.3.7 and 9.4.7.

9.4.3.3 Organizations operating at the technician level at surf search and rescue incidents shall meet the requirements specified in 9.3.8 and 9.4.8.

9.4.3.4 Organizations operating at the technician level at swift water search and rescue incidents shall meet the requirements specified in 9.3.9 and 9.4.9.

9.4.4 Personnel operating within an organization at the technician level shall possess a level of watermanship skill and comfort applicable to the required task.

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

(1) Evaluating existing and potential conditions at incidents where water search and rescue will be performed

(2) Planning a response within the capabilities of available resources

(3) Implementing a planned response consistent with the organization's capabilities

(4)* Conducting both boat-assisted and boat-based rescues

(5)* Conducting a “go” rescue

9.4.6 Dive.

9.4.6.1* Certification.

9.4.6.1.1* For all diving members of a technician level organization, the AHJ shall ensure provision of certification by a nationally recognized agency.

9.4.6.1.2 The curriculum for such certification shall be oriented toward the needs and operational requirements of public safety diving as defined herein.

9.4.6.2* For all diving members of a technician level organization, an annual fitness test, Watermanship/Skills Test, and Basic Scuba Skills Evaluation supplied by International Association of Dive Rescue Specialists (IADRS) shall be conducted to maintain public safety diver capability.

9.4.6.3 Organizations operating at the technician level at dive incidents shall develop and implement procedures for the following:

(1)* Skin and SCUBA diving, including the use of any associated equipment

(2) Applying an understanding of physics and physiology as it relates to the underwater environment

(3)* Using dive tables

(4) Dealing with the various underwater environments with which the rescue diver could come into contact

(5) Avoiding and dealing with underwater plants and animals

(6) Conducting and supervising dive operations

(7) Using accepted search techniques

(8)* Identification and management of dive-related maladies including psychological and physiological stress, air embolism, and decompression sickness

(9) Recognizing and managing the impact of near-drowning in cold water

(10)* Utilizing electronic communications within full-face mask equipment during operations

(11)* Utilizing redundant and alternate air sources during low- or out-of-air emergencies

(12)* Utilizing full-body encapsulation equipment, including dry suits, dry hoods, and dry gloves with full-face mask in contaminated water

(13)* Rescuing an entangled diver

(14)* Medical monitoring of divers

(15)* Recovering evidence including locating, securing, and packaging evidence, documenting and maintaining the chain of custody, and documenting the scene

9.4.7 Ice. Organizations operating at the technician level at ice rescue incidents shall develop and implement procedures for the following:

(1)* Self-rescue unique to ice rescue

(2) The reach, throw, row, and go rescue technique unique to ice rescue

(3) The use of watercraft, specialty craft, and specialty equipment unique to ice rescue

9.4.8 Surf. Organizations operating at the technician level at surf rescue incidents shall develop and implement procedures for the following:

(1) The reach, throw, row, and go rescue technique unique to surf rescue

(2) Using watercraft, specialty craft, and specialty equipment unique to surf rescue

9.4.9 Swift Water.

9.4.9.1 Organizations operating at the technician level at swift water rescue incidents shall meet the requirements specified in Section 6.4 (technician level for rope rescue).

9.4.9.2 Organizations operating at the technician level at swift water rescue incidents shall develop and implement procedures for applying rope rescue techniques in the swift water environment.

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.

10.2 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 incident shall implement procedures for the following:

(1) Recognizing the need for a wilderness search and rescue

(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 6.3 (operations level for rope rescue).

10.3.2 Organizations operating at the operations level in wilderness search and rescue shall be under the supervision of organizations at the technician level when operating in a wilderness environment.

10.3.2.1* The AHJ shall establish standard operating procedures that identify the specific environments in which operations-level organizations shall be permitted to operate.

10.3.2.2 Outside of the specific environments identified by the AHJ, personnel from technician-level organizations or special resources shall be utilized when operating in a wilderness environment.

10.3.3 Organizations operating at the operations level at wilderness search and rescue incidents shall develop and implement procedures for 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)* Personal survival, body management, and preparedness for the specific wilderness environments in which the rescuer could become involved

(5) 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

(6)* Selection, care, and use of personal medical and support equipment packed with due regard to how it will be carried

(7)* Traveling through various wilderness environments in which the rescuer could become involved while minimizing threats to safety

(8) Land navigation techniques using map and compass as well as any methods of navigation and position reporting utilized by the responding organizations with which the rescuer could become involved

(9) Procuring the necessary maps and navigational and topographical information

(10) Modifying actions and urgency as applicable to a rescue versus a recovery

(11) Acquiring information on current and forecast weather including temperature, precipitation, and winds

(12)* Participating in and supporting wilderness search operations intended to locate victims whose exact location is unknown

(13) Accessing and extricating individuals from all wilderness environments and terrain encountered in the response area

(14) Recognizing, identifying, and utilizing all rescue hardware and software used by the responding organizations with which the rescuer could become involved

(15) Working in and around any aircraft, watercraft, and special vehicles used for SAR operations while minimizing threats to rescuers

(16)* Recognizing the team's limitations regarding accessing and/or evacuating a victim

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 6.4 (technician level for rope rescue)

(2) Section 9.2 (awareness level for water search and rescue)

10.4.2 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.

10.4.3 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.

10.4.4 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

(2) Acquiring, utilizing, and coordinating search and rescue resources with which the rescuer could become involved

(3) Providing input to standard operating procedures for anticipated wilderness responses

(4)* Initiating and performing all aspects of search and rescue operations in the wilderness

(5)* Writing and utilizing an operational plan for search and rescue

Chapter 11 Trench and Excavation Search and Rescue

11.1 General Requirements.

Organizations operating at trench and excavation 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, *Standard for Professional Competence of Responders to Hazardous Materials Incidents*, and shall be a competent person as defined in 3.3.18.

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

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 6.3 (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 2.4 m (8 ft) 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 2.4 m (8 ft) 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)* Continuously, or at frequent intervals, monitoring 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