

NFPA®

120

Standard for
Fire Prevention and
Control in Coal Mines

2020



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NFPA® 120

Standard for

Fire Prevention and Control in Coal Mines

2020 Edition

This edition of NFPA 120, *Standard for Fire Prevention and Control in Coal Mines*, was prepared by the Technical Committee on Mining Facilities. It was issued by the Standards Council on November 4, 2019, with an effective date of November 24, 2019, and supersedes all previous editions.

This edition of NFPA 120 was approved as an American National Standard on November 24, 2019.

Origin and Development of NFPA 120

In 1977, with the formation of the Mining Committee, this standard, NFPA 120, formerly NFPA 653, was reassigned to the Committee on Mining Facilities. The change in numerical identity of the standard was in keeping with the numbering sequence assigned to the Mining Committee for other documents now under development. NFPA 120 represents a complete revision of former NFPA 653 and also includes changes in style in accordance with the *NFPA Manual of Style*.

The 1971 edition of NFPA 653, *Coal Preparation Plants*, was the same as the 1959 edition and was adopted at the NFPA 1971 Annual Meeting. The 1959 edition of NFPA 653 was prepared by the NFPA Committee on Dust Explosion Hazards and was adopted at the 1958 Annual Meeting with an amendment adopted in 1959.

The 1994 edition of NFPA 120 included a variety of technical and editorial updates. Previous editions not already mentioned include versions issued in 1984 and 1988.

The 1999 edition addressed the need for emergency lighting, expanded the types of portable fire extinguishers used, and expanded and clarified the types of fire suppression equipment used. The water supply requirements also were clarified.

The 2004 edition applied the *NFPA Manual of Style* to the document. It also incorporated all the appropriate sections of NFPA 121 and NFPA 123, which was done in an effort to consolidate common requirements.

The Coal Mining Task Group for the 2004 edition consisted of the following members: Matt Bujewski, Chair, Marsh Inc.; Tim Gierer, Alltype Fire Protection; Dennis Brohmer, Ansul Inc.; Jay Senn, Peabody Energy Group; Charlie Russell, Arch Coal Inc.; Brent Sullivan, Coteau Properties; Carol Boring, Mine Safety and Health Administration; Alex Smith, NIOSH; Mario Orozco, Zurich Services Corp.; Mike Wegleitner, Falkirk Mining Co. (alternate for Brent Sullivan); and Bill Wilson, U.S. Department of Labor (alternate for Carol Boring).

For the 2010 edition, the technical committee revised the fire prevention and fire protection provisions for coal mines by requiring the use of means to manage the spontaneous combustion potential of the coal being mined, including adding an inspection plan for carbon monoxide detection systems. The fire prevention practices for coal mines were improved by referencing the inspection and maintenance practices of fire suppression systems in the corresponding NFPA fire suppression standard. The committee provided improved fire protection for transformers by referencing *NFPA 70®*, *National Electrical Code®*, and adding NFPA 850, *Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations*, as an annex reference. Similarly, the standard was revised to make it consistent with fire protection industry practices and the updated provisions in NFPA 122, *Standard for Fire Prevention and Control in Metal/Nonmetal Mining and Metal Mineral Processing Facilities*.

For the 2014 edition, the technical committee rewrote the sprinkler requirements in a more coherent manner and provided additional guidance for underground sprinkler systems. The committee established a common definition and a protection scheme for self-propelled, mobile, and portable equipment.



In the 2020 edition, the technical committee has added new fire safety material to Chapter 6 related to the use of spiral concentrators in coal processing facilities. Direction has been provided to the stakeholder regarding best practices during welding and cutting operations within the vicinity of spiral concentrators, including associated Annex A material for further guidance.

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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 safeguarding life and property against fire, explosion, and related hazards associated with underground and surface coal and metal and nonmetal mining facilities and equipment.

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NFPA 120

Standard for

Fire Prevention and Control in Coal Mines

2020 Edition

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

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

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

Chapter 1 Administration

1.1 Scope.

1.1.1* This standard shall cover minimum requirements for reducing loss of life and property from fire and explosion in the following:

- (1) Underground bituminous coal mines
- (2) Coal preparation plants designed to prepare coal for shipment
- (3) Surface building and facilities associated with coal mining and preparation
- (4) Surface coal and lignite mines

1.1.2 This standard shall not apply to the following:

- (1) Flammable and combustible liquids produced in underground coal mines
- (2) Other equipment and processes, such as coal pulverizers, used to condition coal for firing in boilers at power-generating plants or gasification plants or for utilization in certain special processes

1.2 Purpose. This standard shall be intended for the use and guidance of those charged with designing, constructing, purchasing, testing, installing, examining, approving, operating, or maintaining fire prevention, fire protection, or fire-fighting equipment in underground bituminous coal mines, coal preparation plants, and surface mining equipment and processes.

1.3* Application.

1.3.1 This standard shall be based on the current state of the art, and application to existing installations shall not be mandatory. Nevertheless, operating mines are urged to adopt those features of this standard that are considered applicable and reasonable for existing installations.

1.3.2 At times it will be necessary for those responsible for the storage of flammable and combustible liquids and the use of diesel-powered equipment within underground bituminous coal mines to consult an experienced fire protection specialist, and it shall be permitted.

1.3.3 Only those skilled in fire protection shall be considered competent to design and supervise the installation of mine fire protection systems.

1.3.4 Coal preparation plants shall be designed by experienced persons familiar with fire and explosion hazards in coal-processing plants.

1.3.5 At times it will be necessary for those charged with purchasing, testing, approving, and maintaining fire protection equipment for self-propelled and surface mining equipment to consult an experienced fire protection specialist.

1.4 Retroactivity. The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

1.4.1 Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

1.4.2 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this standard deemed appropriate.

1.4.3 The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

1.4.4 Operators are urged to avail themselves of any information that will prevent dust dispersions, eliminate sources of ignition, or otherwise reduce fire and explosion hazards by improving conditions in their plants.

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

1.5.1 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.5.2 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

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 10, *Standard for Portable Fire Extinguishers*, 2018 edition.

NFPA 11, *Standard for Low-, Medium-, and High-Expansion Foam*, 2016 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2019 edition.

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, 2019 edition.

NFPA 17, *Standard for Dry Chemical Extinguishing Systems*, 2017 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2019 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2020 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 2018 edition.

NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, 2019 edition.

NFPA 55, *Compressed Gases and Cryogenic Fluids Code*, 2020 edition.

NFPA 58, *Liquefied Petroleum Gas Code*, 2020 edition.

NFPA 68, *Standard on Explosion Protection by Deflagration Venting*, 2018 edition.

NFPA 69, *Standard on Explosion Prevention Systems*, 2019 edition.

NFPA 70®, *National Electrical Code®*, 2020 edition.

NFPA 72®, *National Fire Alarm and Signaling Code®*, 2019 edition.

NFPA 85, *Boiler and Combustion Systems Hazards Code*, 2019 edition.

NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids*, 2020 edition.

NFPA 101®, *Life Safety Code®*, 2018 edition.

NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, 2017 edition.

NFPA 780, *Standard for the Installation of Lightning Protection Systems*, 2020 edition.

NFPA 1142, *Standard on Water Supplies for Suburban and Rural Fire Fighting*, 2017 edition.

NFPA 1961, *Standard on Fire Hose*, 2020 edition.

NFPA 1962, *Standard for the Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances*, 2018 edition.

NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*, 2018 edition.

2.3 Other Publications.

2.3.1 API Publications. American Petroleum Institute, 200 Massachusetts Avenue NW, Suite 1100, Washington, DC 20001.

API STD 2000, *Standard for Venting Atmospheric and Low-Pressure Storage Tanks*, 2014 edition.

2.3.2 ASME Publications. American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

Boiler and Pressure Vessel Code, 2017.

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

ASTM D5/D5M, *Standard Test Method for Penetration of Bituminous Materials*, 2013.

ASTM D323, *Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)*, 2015a.

ASTM D4359, *Standard Test Method for Determining Whether a Material is a Liquid or a Solid*, 1990, reapproved 2012.

2.3.4 NETA Publications. InterNational Electrical Testing Association, 3050 Old Centre Avenue, Suite 101, Portage, MI 49024.

ANSI/NETA MTS, *Standard for Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems*, 2015.

2.3.5 U.S. Bureau of Mines Publications. National Technical Information Service (NTIS), 5301 Shawnee Road, Alexandria, VA 22312.

Schedule 2G, March 1968.

▲ 2.3.6 USDA Forest Service Publications. U.S. Department of Agriculture Forest Service, 1400 Independence Avenue, SW, Washington, DC 20250-1111.

Specification 5100-186(d), *Fire Hose, Cotton-Synthetic, Lined, Woven Jacket, 1-inch and 1½-inch Hose*, 2006.

2.3.7 Other Publications.

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

2.4 References for Extracts in Mandatory Sections.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2019 edition.

NFPA 17, *Standard for Dry Chemical Extinguishing Systems*, 2017 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 2018 edition.

NFPA 52, *Vehicular Gaseous Fuel Systems Code*, 2019 edition.

NFPA 80, *Standard for Fire Doors and Other Opening Protectives*, 2019 edition.

NFPA 99, *Health Care Facilities Code*, 2018 edition.

NFPA 122, *Standard for Fire Prevention and Control in Metal/Nonmetal Mining and Metal Mineral Processing Facilities*, 2020 edition.

NFPA 5000®, *Building Construction and Safety Code®*, 2018 edition.

Chapter 3 Definitions

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

Dictionary, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

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

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

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

3.2.5 Shall. Indicates a mandatory requirement.

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

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

3.3 General Definitions.

3.3.1 Adequate Ventilation. Air volume and velocity that is sufficient to dilute, render harmless, and carry away flammable or explosive concentrations of dusts and vapors.

3.3.2 Atmospheric Tank. A storage tank that has been designed to operate at pressures from 760 mm Hg through 812 mm Hg (atmospheric through 1.0 psig) measured at the top of the tank.

3.3.3 Boiling Point. The temperature at which the vapor pressure of a liquid equals the surrounding atmospheric pressure. [30, 2018]

3.3.4 Closed Container. A container as herein defined, so sealed by means of a lid or other device that neither liquid nor vapor will escape from it at ordinary temperatures. [30, 2018]

3.3.5 Coal Preparation. The separation, crushing, screening, washing, drying, storage, and loadout of coal to make ready for market.

3.3.6 Combustible. Capable of undergoing combustion.

3.3.7 Combustible Liquid. Any liquid that has a closed-cup flash point at or above 37.8°C (100°F), as determined by the test procedures and apparatus set forth in Section 4.4 of NFPA 30. Combustible liquids are classified according to Section 4.3 of NFPA 30. [30, 2018]

3.3.8 Combustible Liquid Storage Area — Fixed. An area used for storage of Class II and Class III combustible liquids that is infrequently moved, and where the aggregate quantity present shall not exceed 18,925 L (5000 gal). Handling of liquids incidental to transfer can take place within a storage area.

3.3.9 Combustible Liquid Storage Area — Mobile. Self-propelled or mobile equipment fitted with suitable containers or tanks and other related fixtures used for the storage, transport, and dispensing of Class II and Class III combustible liquids. The aggregate quantity of combustible liquid carried on such equipment does not exceed 3785 L (1000 gal).

3.3.10 Combustible Liquid Storage Area — Portable. An area used for storage of Class II and Class III combustible liquids that is periodically moved, and where the aggregate quantity present does not exceed 3785 L (1000 gal). Handling of liquids incidental to transfer can take place within a storage area.

3.3.11 Combustion. A chemical process of oxidation that occurs at a rate fast enough to produce heat and usually light in the form of either a glow or flame. [5000, 2018]

3.3.12 Container. Any vessel of 450 L (119 gal) or less capacity used for transporting or storing liquids. [30, 2018]

3.3.13 Diesel-Powered Equipment. Any device powered by a diesel engine. [122, 2020]

3.3.14 Dry Pipe Sprinkler System. A sprinkler system employing automatic sprinklers that are attached to a piping system containing air or nitrogen under pressure, the release of which (as from the opening of a sprinkler) permits the water pressure to open a valve known as a dry pipe valve, and the water then flows into the piping system and out the opened sprinklers. [13, 2019]

3.3.15 Emergency Egress. An egress from a compartment or work station in emergencies when the normal egress is unusable.

3.3.16 Equipment Operator. The authorized person who starts, controls, or stops mining equipment.

3.3.17 Fire Detector. An automatic device designed to detect the presence of fire and initiate action. [122, 2020]

3.3.18 Fire-Resistant Construction. Masonry walls or equivalent having at least a 1-hour fire rating, including compressible materials having an equivalent fire resistance capability.

3.3.19 Fire-Resistant Enclosure. An enclosure that is constructed of fire-resistant construction.

3.3.20 Fire Risk Assessment. The evaluation of the relative danger of the start and spread of fire; the generation of smoke, gases, or toxic fumes; and the possibility of explosion or other

occurrence endangering the lives and safety of personnel or causing significant damage to property. [122, 2020]

3.3.21 Fixed Fire-Suppression System. An engineered or pre-engineered total flooding or local application system consisting of a fixed supply of extinguishing agent permanently connected for fixed agent distribution to fixed nozzles that are arranged to discharge an extinguishing agent into an enclosure (total flooding), directly onto a hazard (local application), or a combination of both; or an automatic sprinkler system. [122, 2020]

3.3.21.1 Engineered Systems. Engineered systems are those systems requiring individual calculation and design to determine the flow rates, nozzle pressures, pipe size, area, or volume protected by each nozzle, quantity of suppression agent, number and types of nozzles and their placement in a specific system.

3.3.21.2 Pre-Engineered Systems. Those systems having predetermined flow rates, nozzle pressures, and quantities of extinguishing agent and having specific pipe size, maximum and minimum pipe lengths, flexible-hose specifications, number of fittings, and number and types of nozzles. [17, 2017]

▲ **3.3.22 Flammable Liquid.** Any liquid that has a closed-cup flash point below 37.8°C (100°F), as determined by the test procedures and apparatus set forth in Section 4.4 of NFPA 30, and a Reid vapor pressure that does not exceed an absolute pressure of 276 kPa (40 psi) at 37.8°C (100°F), as determined by ASTM D323, *Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)*. Flammable liquids are classified according to Section 4.3 of NFPA 30. [30, 2018]

3.3.23 Flammable Liquid Storage Area. Area used for storage of Class I liquids.

3.3.24 Flash Point. The minimum temperature of a liquid at which sufficient vapor is given off to form an ignitable mixture with the air, near the surface of the liquid or within the vessel used, as determined by the appropriate test procedure and apparatus specified in Section 4.4 of NFPA 30. [30, 2018]

3.3.25 Hand Hose Line System. A hose and nozzle assembly connected by fixed piping or connected directly to a supply of extinguishing agent. [122, 2020]

3.3.26 Hydrant. A valved hose connection.

3.3.27 Important Structures. A structure that is considered not expendable in an exposure fire.

3.3.28 Inby. A mining term that means in the direction of the face of the mine or further into the mine.

3.3.29 Intrinsically Safe. As applied to equipment and wiring, equipment and wiring that are incapable of releasing sufficient electrical energy under normal or abnormal conditions to cause ignition of a specific hazardous atmospheric mixture. [99, 2018]

3.3.30 Liquid. Any material that (1) has a fluidity greater than that of 300 penetration asphalt when tested in accordance with ASTM D5/D5M, *Standard Test Method for Penetration of Bituminous Materials*, or (2) is a viscous substance for which a specific melting point cannot be determined but that is determined to be a liquid in accordance ASTM D4359, *Standard Test Method for Determining Whether a Material is a Liquid or a Solid*. [30, 2018]

3.3.31 Low Pressure Tank. A storage tank designed to withstand an internal pressure above 3.5 kPa (0.5 psig) but not more than 102.4 kPa (15 psig).

3.3.32 Mine Operator. Any owner, lessee, or other person who operates, controls, or supervises a mine. [122, 2020]

3.3.33* Mobile Equipment. Wheeled, skid-mounted, track-mounted, or rail-mounted equipment capable of moving or being moved.

3.3.34* Noncombustible Material. A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat.

3.3.35 Normal Operation. The regular performance of those functions for which a machine or accessory is designed.

3.3.36 Operating Area. An area where mining of coal is taking place or area where construction is underway.

3.3.37 Outby. A mining term that means in the direction away from the face of the mine or toward the outside of the mine; opposite of inby.

3.3.38 Permissible Equipment. A completely assembled machine or accessory for which formal approval has been issued, allowing operation in a potentially explosive methane and air-mixture environment.

3.3.39 Pipeline System. An arrangement of piping, valves, connections, and allied equipment installed in a mine for the purpose of transporting, transferring, or dispensing flammable or combustible liquids. [122, 2020]

3.3.40 Portable Extinguisher. An extinguisher of the hand-held or wheeled type that is capable of being carried or moved about, or a transportable system consisting of a hose reel or rack, hose, and discharge nozzle assembly connected to a supply of suppressant.

3.3.41 Portable Tank. Any vessel having a liquid capacity over 230 L (60 gal) intended for storing liquids and not intended for fixed installation. [30, 2018]

▲ **3.3.42 Pressure Vessel.** A container or other component designed in accordance with the ASME *Boiler and Pressure Vessel Code*. [52, 2019]

3.3.43 Rock Dust. Crushed limestone applied on surfaces in mines to make coal dust incombustible in the event of a gas explosion.

▲ **3.3.44 Safety Can.** A listed container of not more than 20 L (5.3 gal) capacity having a screen or strainer in each fill and pour opening and having a spring-closing lid and spout cover designed to safely relieve internal pressure when exposed to fire. [30, 2018]

3.3.45 Self-Closing Doors. Doors that, when opened and released, return to the closed position. [80, 2019]

3.3.46 Self-Propelled Equipment. Any unit that contains a motive power train as an integral part of the unit.

3.3.47 Suitable. That which is appropriate and has the qualities or qualifications to meet a given purpose, occasion, condition, function, or circumstance. [122, 2020]

3.3.48 Tank. A closed vessel having a liquid capacity in excess of 227 L (60 gal). [122, 2020]

3.3.49 Task Trained. Instructed in the safety and health aspects and safe work procedures of the task prior to performing such tasks.

3.3.50 Unattended. Any machine or device that is not regularly operated by a miner or not in direct line of sight of a miner that is assigned within 152.4 m (500 ft) of the equipment during each production shift.

Chapter 4 Underground Mining Operations

4.1 General. This chapter shall cover minimum requirements for reducing loss of life and property from fire in underground coal mines.

4.2* Fire Prevention. Precautions shall be taken to prevent the ignition of flammable vapors and combustible materials.

4.2.1 Smoking materials, matches, and lighters shall not be allowed underground.

4.2.2 Rock Dusting. Rock dust shall be provided on the ribs, ceiling, and floor of the mine from the mine entry to the working face in all areas of the mine that are active (not sealed).

4.2.2.1 Rock dust shall be maintained at a concentration of 80 percent.

4.2.3 Cutting and Welding. Cutting and welding and compressed gas usage shall be in accordance with Section 7.1.

4.2.4 Housekeeping.

4.2.4.1 Maintenance and operating practices shall prevent the accidental release of flammable or combustible liquids.

4.2.4.2 A cleanup plan shall be established, implemented, and monitored to prevent the accumulation of loose coal and other combustible materials.

4.2.4.3 Where flammable or combustible liquids are used or handled, means shall be provided to dispose of leakage or spills.

4.2.4.4 Waste receptacles shall be provided for combustible refuse.

4.2.4.5 Routes designated for access to fire protection equipment shall be kept clear of obstructions.

4.2.5 Underground Maintenance Shops.

4.2.5.1* Underground maintenance shops that are intended for use longer than 6 months shall be enclosed structures of fire-resistant construction, including floor, roof, roof supports, doors, and door frames, or shall be protected with an automatic sprinkler fire suppression system in accordance with 4.3.3.3.

4.2.5.2 The shop area shall be ventilated directly to a return airway.

4.2.6* Belt Conveyors. Belt conveyors installed in underground coal mines shall, as a minimum, meet all the requirements of Section 9.4 of this standard.

4.2.7 Hydraulic Fluids.

4.2.7.1 Fire-resistant hydraulic fluid shall be approved by the authority having jurisdiction.

4.2.7.2 Unattended hydraulic equipment shall employ fire-resistant hydraulic fluid and be protected by an automatic fire suppression system.

4.2.7.3 Where fire-resistant fluids are required, samples of in-use fire-resistant fluids of the invert emulsion type shall be collected quarterly.

4.2.7.3.1 Samples of the in-use fire-resistant fluids shall be tested individually to determine if the water content will make the fluid fire resistant.

4.2.7.3.2 When a sample of the in-use fire-resistant fluids indicates that the water content is insufficient for the fluid to be fire resistant, the fluid shall be replaced or water shall be added to restore the fire resistance of the fluid.

4.2.7.3.3 When water is added to the hydraulic system of any machine, a sample shall be taken and analyzed within 24 hours.

4.2.8 Flammable Liquids Storage and Use. The storage and use of flammable liquids underground shall conform to Section 7.5.

4.2.9 Combustible Liquids Storage and Use. The storage and use of combustible liquids underground shall conform to Section 7.6.

4.2.10 Methane Control. Methane within the coal mine shall be reduced to not more than 1 percent on the intake air and 2 percent on the return air.

4.2.10.1 Methane monitors shall be provided on equipment used to cut coal from the face.

4.2.10.1.1 The methane monitors shall alarm at 1 percent concentration and be interlocked to shut down the machine at a 2 percent concentration of methane.

4.2.11* Spontaneous Combustion.

4.2.11.1 Mine operators shall determine the spontaneous combustion potential of the coal being mined.

4.2.11.2* Mines with a high spontaneous combustion potential shall take means to minimize the spontaneous combustion risk.

N 4.2.12 Liquid-Filled Transformers.

N 4.2.12.1* Transformers with mineral oil or other combustible coolants shall not be installed underground.

N 4.2.12.2 An oil analysis, including dissolved gas, shall be conducted on combustible oil-filled transformers that are located on the surface based on the manufacturer's recommendations or on ANSI/NETA MTS, *Standard for Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems*, whichever is more stringent.

N 4.2.13* Thermographic Scanning. Thermographic scanning shall be performed on surface switchgear and motor starters supplying the underground electrical system on an annual basis.

4.3* Fire Protection.

4.3.1 Water Supply for Mine Fire Protection.

4.3.1.1 General Requirements.

4.3.1.1.1* Water distribution lines shall extend from the surface to each operating area.

4.3.1.1.2 Water distribution lines from a suitable underground supply of water shall be permitted to replace the surface distribution lines if sufficient quantity is available and power for the pump(s) will not be affected or interrupted during a fire.

4.3.1.1.3 The operator shall choose the entry in which the water line is located, and it shall be protected by the choice of location.

4.3.1.1.4 Water flow and ventilation airflow shall be in the same direction unless provision is made to ensure the availability of fire-fighting water on the upwind side of a fire in the entry containing the water line.

4.3.1.1.5 Where applicable, water lines shall be protected against freezing.

4.3.1.1.6 Water lines that are 50 mm (2 in.) or larger in diameter shall be joined with flanges, mechanical grooved fittings, threaded fittings, or other fittings.

4.3.1.1.7 At least every third joint shall be capable of allowing limited motion and emergency rearrangement.

4.3.1.1.8 Pipe and fittings shall be of metal construction and designed to withstand the anticipated water pressure.

4.3.1.1.9* Water lines shall be equipped with shutoff valves at intervals not exceeding 1524 m (5000 ft).

4.3.1.1.10 A shutoff valve shall be provided in each branch line at the point where it is coupled to the main water line.

4.3.1.1.10.1 Shutoff valves for fire protection shall be sealed, locked, or supervised in the open position.

4.3.1.2 Water Demand.

4.3.1.2.1* All coal mine water systems shall be capable of simultaneously supplying three hose streams, each with a flow rate of at least 190 L/min (50 gpm), and a nozzle pressure of at least a gauge pressure of 345 kPa (50 psi) for a total of 570 L/min (150 gpm), applied through the maximum expected lay of hose.

4.3.1.2.2* The mine water system shall be capable of supplying the required hose stream water demand continuously for 24 hours or the sprinkler water demand continuously for 2 hours, whichever is the greater supply.

4.3.1.3 Hydrants.

4.3.1.3.1* The mine operator shall choose the entry in which hydrants are to be located, except for belt conveyor entries where hydrants shall be located in the same entry as the belt, locate personnel doors, and provide fire hose that reaches parallel entries where risk of fires exists.

4.3.1.3.2* Hydrants that supply water to a fire hose shall be provided on the water line at intervals not exceeding 91.4 m (300 ft) for belt conveyors and 152.4 m (500 ft) for haulage tracks.

4.3.1.3.3 Hydrants shall be located in the belt entry and accessible.

4.3.1.3.3.1 If staggered crosscuts are used, hydrant locations and crosscuts with personnel doors shall be located to provide a route for laying a fire hose to parallel entries.

4.3.1.3.3.2 At least one hydrant shall be located upwind of the area protected by an automatic sprinkler system.

4.3.1.4 Maintenance. The water supply system shall be maintained operable.

4.3.2* Protective Signaling Fire Detection Systems.

4.3.2.1 General Requirements.

4.3.2.1.1* The design and installation of all fire detection systems shall be approved for the intended use.

4.3.2.1.2 Fire detectors and related signaling system components used to initiate an audible or visual alarm, automatic activation of a fire suppression system, or equipment shutdown shall be listed or approved for the intended use.

4.3.2.1.3* Signaling system input, alarm, and releasing circuits shall be supervised.

4.3.2.1.3.1 The presence of a fault, alarm, or release shall initiate a signal in the protected area and remotely in a constantly attended location.

4.3.2.1.3.2 The signal specified in 4.3.2.1.3.1 shall indicate which condition has occurred.

4.3.2.1.3.3 A trouble signal shall not be required when the main power supply is intentionally shut off during periods of mine inactivity.

4.3.2.1.4* All components of protective signaling systems used in the last open crosscut or in return air shall be classified as permissible or intrinsically safe.

4.3.2.2 Selection and Application.

4.3.2.2.1* Carbon monoxide (CO) detectors or the equivalent shall be installed along all belt conveyors and at all unattended automatic belt heads (where mine cars are loaded automatically).

4.3.2.2.2* Compartment sizes and contours, airflow patterns, obstructions, and other characteristics of the protected area shall determine the placement, type, sensitivity, and, where applicable, number of detectors.

4.3.2.2.3 The fire alarm shall identify a fire within each belt flight (segment).

4.3.2.2.4 Fire detection systems shall be installed so as to minimize the possibility of damage from roof falls and from the moving belt and its load.

4.3.2.2.5 The voltage of automatic fire alarm systems shall not exceed 120 volts.

4.3.2.2.6 The system shall be designed to provide an alarm up to 4 hours after the source of power to the belt is shut off.

4.3.2.2.7 An audible and visual alarm shall be provided either at the location of the belt or at a constantly attended location that has a telephone or equivalent communication with those miners who might be endangered.

4.3.2.2.8 The alarm system shall be equipped with a “trouble” signal to indicate open circuits, shorts, ground faults, or any other defects.

4.3.2.2.9 The alarm system shall include a manual reset feature.

N 4.3.2.2.10* Electrical equipment buildings and rooms on the surface that are critical to underground operations shall be provided with a smoke detection system.

N 4.3.2.2.10.1 The smoke detection system shall report to a constantly attended location.

N 4.3.2.2.10.2 Fire alarm systems shall be installed in accordance with *NFPA 72*.

4.3.2.3 Inspection, Maintenance, and Testing.

4.3.2.3.1 Fire detection systems and associated equipment shall be tested after installation according to the manufacturer’s or designer’s instruction manual.

4.3.2.3.2 The detection system shall be inspected visually weekly.

4.3.2.3.3 Carbon monoxide detection systems shall be visually inspected daily, functionally tested weekly, and calibrated monthly, not to exceed 31 days between calibrations.

N 4.3.2.3.4 Fire detection systems installed in surface structures shall be inspected in accordance with *NFPA 72*.

4.3.3 Fire Protection Systems.

4.3.3.1 General Requirements.

4.3.3.1.1 Mining equipment requiring a fixed fire protection system shall be protected by a system with the capacity to suppress the largest anticipated fires in the protected areas and shall meet the following criteria:

- (1) They shall be listed or approved for the purpose.
- (2) They shall be located or guarded so as to be protected against physical damage.
- (3)* They shall be actuated either automatically, manually, or both.
- (4)* They shall be provided with an agent distribution hose or pipe secured and protected against damage, including abrasion and corrosion, and shall be flame resistant.
- (5) They shall be provided with discharge nozzle blowoff caps or other devices or materials to prevent the entrance of moisture, dirt, or other material into the piping. The discharge nozzle protective device shall blow off, blow out, or open upon agent discharge.
- (6)* Water-based systems shall not be required to have nozzle blowoff caps as long as the nozzles are kept free of blockage at all times.
- (7) The fire protection system shall be installed so that system actuation causes shutdown of the protected equipment.
- (8) Discharge nozzles or sprinklers shall not be covered with any material that will reduce the effectiveness of the system.

4.3.3.1.2 Automatically actuated systems other than water-based sprinkler systems shall have a manual actuator capable of being activated from the **operator’s** compartment or other accessible location.

4.3.3.1.3 Unless otherwise noted in this standard, fire protection systems shall be installed and operate in accordance with the applicable NFPA standard.

4.3.3.1.3.1 Pre-engineered systems shall be designed, installed, and tested in accordance with the fire suppression system manufacturer’s listed installation and maintenance manual.

4.3.3.1.4* Where the nature of a coal mine does not allow the NFPA standards to be followed, systems that provide equivalent protection shall be approved by the authority having jurisdiction.

Δ 4.3.3.2 Applications.

Δ 4.3.3.2.1* Equipment and Facilities.

Δ 4.3.3.2.1.1 Equipment and facilities shall be protected in accordance with the following requirements:

- (1)* Drive areas of belt conveyors shall be protected in accordance with 9.4.6.
- (2) Flammable and combustible liquid storage areas shall be protected **in** either of the following **fashions**:
 - (a) Automatic water-based fixed fire protection systems installed for the protection of Class I or Class II liquid storage areas shall be of the Class B foam-water type.
 - (b) Fixed diesel or other Class II combustible liquid storage areas shall be protected with a dry chemical system or a system that provides equivalent protection according to the authority having jurisdiction.
- (3) Unattended hydraulic equipment shall use fire-resistant hydraulic fluid.
- (4) Unattended electrical equipment such as enclosed electric motors, controls, transformers, rectifiers, battery chargers, and other equipment that does not have a hydraulic system shall be protected by an approved automatic fire protection system.

N (A) Unattended electrical equipment located on noncombustible material and spaced at least 0.61 m (2 ft) from coal or other combustible material shall not be required to be protected with an automatic fire suppression system.

N (B) Unattended electrical equipment located on noncombustible material and separated from coal or other combustible material by a fire-resistive layer or wall shall not be required to be protected with an automatic fire suppression system.

N 4.3.3.2.1.2 Sprinkler systems used to protect the equipment and facilities listed in 4.3.3.2.1.1 shall satisfy the requirements of 4.3.3.3 through 4.3.3.5.4.

N 4.3.3.2.1.3 Dry or wet chemical systems used to protect the equipment and facilities listed in 4.3.3.2.1.1 shall satisfy the requirements for self-propelled equipment in 4.3.3.6.1.

4.3.3.2.2* Air Compressors. Air compressors with motors that exceed 5 horsepower shall be protected by an approved automatic fire protection system interlocked to shut down the power to the compressor and by one of the following:

- (1) A person in constant attendance, within the line of sight of the compressor, and equipped with a portable fire extinguisher
- (2) Containment within an enclosure that is constructed of noncombustible materials, ventilated to prevent overheat-

ing of the compressor, and designed to provide containment of any possible fire involving the compressor

4.3.3.3 Sprinkler System Requirements.

4.3.3.3.1* Water Supply. The water supply shall have enough pressure and flow to provide sprinkler coverage as the sprinkler design is intended.

4.3.3.3.1.1 An approved strainer with a flush-out connection and a manual shutoff valve shall be provided at the point of the sprinkler system connection to the main water line.

4.3.3.3.1.2 An indicating, full-flow, slow-opening water control valve shall be located at the tap of the water line supplying the sprinkler system.

4.3.3.3.1.3 When the sprinkler system is put into operation, the slow-opening valve specified in 4.3.3.3.1.2 shall be sealed or locked in the open position, or be provided with a supervisory alarm.

4.3.3.3.1.4 A pressure gauge shall be provided at the point of connection.

4.3.3.3.1.5 The water line from the water main to the sprinkler system shall be metallic.

4.3.3.3.1.6 The water line from the water main to the sprinkler system of a belt drive shall be flexible metal or reinforced nonmetal if excessive vibration could reduce the reliability of the sprinkler system.

4.3.3.3.1.7 Fittings and piping shall have a rated pressure higher than the anticipated maximum pressure on the system.

4.3.3.3.2 General Installation Requirements.

4.3.3.3.2.1* Piping in sprinkler systems shall comply with NFPA 13.

4.3.3.3.2.2 Nonmetallic pipe shall not be used downstream of the sprinkler control valve unless investigated and approved for this purpose.

4.3.3.3.2.3 Hangers supporting sprinkler piping shall be metallic.

4.3.3.3.2.4 At least one hanger shall be attached to each length of pipe.

4.3.3.3.2.5* Sprinklers shall be standard orifice pendent, upright, or sidewall-type automatic sprinklers.

4.3.3.3.2.6* For sprinkler systems installed to protect the equipment and facilities indicated in 4.3.3.2.1.1(2) through 4.3.3.2.1.1(4), 4.3.3.2.1.1(A), and 4.3.3.2.1.1(B), sprinklers shall be spaced no more than 3.66 m (12 ft) apart, and the protection of any one sprinkler shall not exceed 9.3 m² (100 ft²).

4.3.3.3.2.7* Sprinklers shall be located so that the discharge will not be obstructed.

4.3.3.3.2.8 Sprinkler deflectors shall be located at a distance below the roof of not less than 25.4 mm (1 in.) nor greater than 508 mm (20 in.).

4.3.3.3.2.9 Roof cavities containing combustible material such as wood or coal in the area to be protected shall be protected by installation of upright sprinklers within the cavity at the top

of riser pipes so that the deflectors are within 508 mm (20 in.) of the roof.

4.3.3.3.2.10 Wet-pipe sprinkler systems shall not be used where chance of freezing exists.

4.3.3.3.2.11 Provisions shall be made to drain all parts of the system.

4.3.3.3.2.12 Drain connections shall be sized as shown in Table 4.3.3.3.2.12.

4.3.3.3.2.13 Trapped piping sections shall be equipped with auxiliary drains or otherwise arranged to facilitate draining.

4.3.3.3.3 General Alarm Requirements for Sprinkler Systems.

4.3.3.3.3.1 A waterflow switch or alarm valve capable of detecting the flow through one opened sprinkler shall be installed in the piping feeding the sprinklers.

(A) An inspector's test connection shall be provided at the end of the most remote line of the sprinkler system.

(B) The inspector's test connection shall simulate the operation of a single sprinkler for sprinkler systems other than belt drive systems.

(C) In addition to 4.3.3.3.3.1(B), the inspector's test connection for belt drive systems shall simulate a minimum of eight sprinklers activating at the same time.

4.3.3.3.3.2 The alarm device shall be connected to an alarm system that will alarm at a constantly attended location. The alarm device shall provide a local audible and visual alarm.

4.3.3.3.3.3 The alarm system shall identify the sprinkler system involved.

4.3.3.3.3.4 In dry-pipe automatic sprinkler systems, the alarm system shall be actuated by a pressure switch associated with the trim on the dry-pipe device.

4.3.3.3.3.5 A paddle-type water flow switch shall be installed in wet systems only.

4.3.3.3.4 Antifreeze System. Where danger of freezing exists, sprinkler systems filled with antifreeze solution shall be permitted and shall meet the requirements of 7.6.2 and 7.6.3 of NFPA 13.

4.3.3.3.5* Dry-Pipe System. Where danger of freezing exists, a dry-pipe sprinkler system shall be permitted and shall meet the requirements of 4.3.3.3.5.1 through 4.3.3.3.5.7.

4.3.3.3.5.1 The dry-pipe valve and its accessories shall be installed in a separate area and shall be protected against freezing and mechanical injury.

4.3.3.3.5.2 If the separate area described in 4.3.3.3.5.1 is ventilated with return air, all electrical components shall be permissible or intrinsically safe.

Table 4.3.3.3.2.12 Sizes of Drain Connections

Riser or Main Size	Size of Drain Connection
Up to 2 in.	¾ in. or larger
2½ in. to 3½ in.	1¼ in. or larger
4 in. and larger	2 in. only

For SI units, 1 in. = 25.4 mm.

4.3.3.3.5.3 Water pressure shall be regulated not to exceed the maximum pressure specified by the manufacturer of the dry-pipe valve.

4.3.3.3.5.4 The dry-pipe valve shall be installed in accordance with the manufacturer's instructions.

4.3.3.3.5.5 Mechanical grooved couplings, including gaskets used on dry-pipe systems, shall be listed for dry-pipe service.

4.3.3.3.5.6 Operation of the dry-pipe system and supervision of the system, including pressure of the air supply, shall be signaled to an attended location. Signaling to an attended location shall be permitted to utilize alarm systems serving fire detection equipment.

4.3.3.3.5.7 The system air supply shall be provided from a reliable source such as a dedicated compressor and shall be equipped with an air maintenance device.

4.3.3.3.5.8 Sprinklers shall be installed in the upright position on a dry-pipe system or be listed dry type or horizontal sidewall sprinklers installed according to the listing for dry-pipe systems.

4.3.3.3.6 Protection of Specific Hazards.

4.3.3.3.6.1* Automatic water-based fixed fire protection systems installed for the protection of Class I or Class II liquid storage areas shall be of the foam-water type.

4.3.3.3.6.2* Where the requirements of 9.4.6 dealing with underground belt drives are satisfied by installing automatic sprinkler systems, such systems shall comply with the requirements of 4.3.3.3.1.2 and 4.3.3.3.1.3.

4.3.3.4 Automatic Sprinkler System Acceptance Testing.

4.3.3.4.1 Flushing of Water-Line Connections.

4.3.3.4.1.1 Water-line connections and lead-in connections shall be flushed at the maximum flow rate available before connection is made to the sprinkler piping in order to remove foreign material.

4.3.3.4.1.2 Flushing shall be continued until the water is clear.

4.3.3.4.2 Flow Testing of Sprinkler Systems.

Δ 4.3.3.4.2.1 Wet-pipe closed automatic sprinkler systems shall be flow-tested by operating flow through at least one sprinkler for non-belt drive areas and at least eight **sprinklers** for belt drive areas.

4.3.3.4.2.2 If the system contains fewer than eight sprinklers, all sprinklers or an inspector's test simulating all sprinklers shall be flow-tested as specified in 4.3.3.4.2.1.

4.3.3.4.2.3 With a water flow and pressure that is present under normal mine operating conditions, if the residual pressure measured downstream of the opened sprinklers is 70 kPa (10 psi) or greater for belt drive systems and 140 kPa (20 psi) for all other systems, the system shall be considered acceptable.

4.3.3.4.2.4 Closed sprinkler systems installed to protect areas where the water discharge could damage the area or its contents shall not be required to be tested by operating flow through opened sprinklers.

4.3.3.4.2.5 Where the condition(s) in 4.3.3.4.2.4 exist, the alternative test of operating flow through a 51 mm (2 in.) valve test connection shall be permitted to be used.

4.3.3.4.2.6 Portable sprinkler systems that are dismantled and reinstalled in new areas shall be flow-tested following the initial installation.

4.3.3.4.3 Tests of Dry-Pipe Sprinkler Systems.

4.3.3.4.3.1 Where there is no risk of freezing, new dry-pipe systems shall be flow-tested and hydrostatically tested in accordance with NFPA 13.

4.3.3.4.3.2 A dry-pipe valve shall be tested according to the manufacturer's recommendations.

4.3.3.4.3.3* Where there is risk of freezing in dry-pipe systems, an air pressure of 276 kPa (40 psi) shall be pumped up and allowed to stand 24 hours, and all leaks that allow a loss of pressure over 10.3 kPa (1½ psi) during the 24 hours shall be stopped.

4.3.3.5 Inspection, Maintenance, and Testing.

4.3.3.5.1 All fire suppression systems shall be tested after installation in accordance with the appropriate NFPA standard.

4.3.3.5.2 If an applicable NFPA standard does not exist, then a fire suppression system shall be tested in accordance with the manufacturer's or designer's instruction manual.

4.3.3.5.3 Testing shall not require the discharge of suppressant unless there is no other satisfactory manner in which the reliability and integrity of the system can be verified.

4.3.3.5.4* All persons who inspect, test, operate, or maintain fire suppression systems shall be trained.

4.3.3.5.5 Sprinkler System Maintenance.

4.3.3.5.5.1 All sprinkler systems shall be maintained in accordance with the manufacturer's requirements or in accordance with NFPA 25.

4.3.3.5.5.2* As a minimum, all closed-head sprinkler systems, except antifreeze systems, shall be flushed annually by operating flow through the end of the line drain(s) for the system to remove any silt buildup.

(A) If pendent sprinklers are used on wet-type sprinkler systems, the end sprinkler on each line shall be removed and examined annually to check for silt buildup.

(B) If silt buildup is found, all sprinklers on the line shall be removed, the line flushed, and new sprinklers installed.

4.3.3.5.5.3* As a minimum, deluge sprinklers and deluge water-spray systems shall be flow-tested on a monthly basis.

4.3.3.5.5.4 The strainer shall be flushed on a weekly basis, at a minimum.

4.3.3.5.6 Antifreeze Systems.

(A) Each year at the onset of freezing weather, a small amount of antifreeze shall be drawn from the drain valve and the test valve(s) and tested with a hydrometer to ensure that the solution is suitable for the lowest temperature expected.

(B) If the test described in 4.3.3.5.6(A) shows that the solution is not suitable, the solution shall be replaced.

4.3.3.6 Fire Suppression for Self-Propelled Equipment.

4.3.3.6.1* Fire suppression systems consisting of an agent container and a network of agent distribution hose or pipe with

discharge nozzles attached shall be used to protect self-propelled equipment and shall comply with the following:

- (1) The system shall suppress any potential fire on the equipment it is intended to protect.
- (2) The fire suppression system shall be approved for the purpose, and the components shall be located or guarded to protect against damage.
- (3) Fire suppression systems shall be actuated automatically, manually, or both.
- (4) Automatically actuated systems designed to incorporate manual actuation shall be equipped with one or more such devices accessible for actuation and shall be maintained in operable condition.
- (5) Discharge nozzles shall be provided with blow-off caps or other devices to prevent the entrance of moisture or other environmental materials into the piping.
- (6) The protective device shall blow off, blow out, or open upon agent discharge.
- (7) The electrical components of systems installed on equipment that might be operated in the last open crosscut or in return air shall be permissible.
- (8) A standby source of power shall be provided if electrical power is the only means of actuation.
- (9) All fire suppression equipment and systems shall be tested after installation in accordance with the manufacturer's or designer's recommendations.
- (10) Testing shall not require the discharge of agent unless there is no other feasible way to evaluate the system.
- (11)* An owner's or operations manual shall be provided for all fire suppression systems.
- (12)* Fire suppression systems shall be inspected and maintained in accordance with the appropriate NFPA standard.

4.3.3.6.2* Fire suppression systems shall be provided for protection of attended, electrically powered, self-propelled equipment such as cutting machines, continuous miners, shearers, roof and coal drills, loaders, shuttle cars, scoops, and locomotives that use hydraulic fluid, unless fire-resistant hydraulic fluid is used.

4.3.3.6.3 Cutting machines, continuous miners, shearers, and other machines that supply water through a hose for dust control during mining shall be permitted to use this water source for fire protection, provided a diversion valve is at or outby the operator's station to permit quick and convenient diversion of water to the fire suppression nozzles.

4.3.4 Manual Fire Fighting.

4.3.4.1 Portable Fire Extinguishers.

4.3.4.1.1 General Requirements.

4.3.4.1.1.1* Portable fire extinguishers used in underground coal mines shall be listed, multipurpose (ABC) dry chemical types having a minimum nominal capacity of 4.6 kg (10 lb) of extinguishing agent, and shall meet the requirements of NFPA 10.

4.3.4.1.1.2 Portable extinguishers shall be kept in their designated places.

4.3.4.1.1.3 Extinguishers shall be located where they will be accessible in the event of fire.

4.3.4.1.1.4 In areas where visual obstruction cannot be completely avoided, visible markings shall be provided to indicate the location.

4.3.4.1.1.5 Extinguishers subject to dislodgment shall be installed in brackets specifically designed for this problem.

4.3.4.1.1.6 Extinguishers shall be protected from physical damage.

4.3.4.1.1.7 Damaged extinguishers shall be repaired, replaced, or removed from service.

4.3.4.1.1.8 At least one hand-portable fire extinguisher having a nominal capacity of 9.1 kg (20 lb) with a minimum rating of 10-A:60-B:C shall be located outside of, but not more than 3.0 m (10 ft) from, the opening into each flammable and combustible storage area and maintenance shop.

4.3.4.1.1.9 The installation of manual or automatic fire suppression systems shall not waive the requirement of 4.3.4.1.1.8.

4.3.4.1.1.10 Where portable fire extinguishers are provided within flammable and combustible storage areas, travel distance to a portable extinguisher shall not exceed 12.2 m (40 ft).

4.3.4.1.2 Selection and Application.

4.3.4.1.2.1 Multipurpose (ABC) dry chemical extinguishers shall be provided for protection of the following:

- (1) Ventilation doors on trolley wire-supplied track haulage ways
- (2) Pumps and pump rooms
- (3) Conveyor belt drives
- (4) Belt head loading equipment
- (5) Air compressors
- (6) Electrical equipment such as transformers, load centers, rectifiers, circuit breakers, generators, and starters
- (7) Rotary dump areas
- (8) Battery-charging areas
- (9) Intervals of 23 m (75 ft) along a longwall face unless washdown hose is present
- (10) Flammable and combustible liquid storage areas
- (11) Mobile equipment used for the storage, transport, and dispensing of combustible liquids
- (12) Electric- or diesel-powered mobile equipment
- (13) Self-propelled equipment

4.3.4.1.2.2 The installation of an automatic or manually operated fire suppression system shall not eliminate the requirement for a portable fire extinguisher.

4.3.4.1.2.3* At least one multipurpose (ABC) dry chemical extinguisher having a nominal capacity of 13.6 kg (30 lb) or greater of agent or two multipurpose (ABC) dry chemical extinguishers having a nominal capacity of 9.1 kg (20 lb) or greater of agent each shall be provided in each working section of a mine, including the headgate of a longwall face.

4.3.4.1.3 Inspection and Maintenance.

4.3.4.1.3.1 Portable fire extinguishers shall be inspected, maintained, and recharged as specified in Chapter 7 of NFPA 10 and shall include the requirements of 4.3.4.1.3.2 through 4.3.4.1.3.9.

4.3.4.1.3.2* Visual Inspection.

(A) Portable fire extinguishers shall be inspected visually at least monthly.

(B) The visual inspection shall confirm the following:

- (1) The extinguisher is in its designated place.
- (2) The tamper seals are intact.
- (3) The extinguisher gauge is in the operable range (if extinguisher is stored pressure type).
- (4) There is no obvious physical damage or condition to prevent operation.

4.3.4.1.3.3 Extinguishers shall be subjected to a thorough maintenance examination at least once every 12 months.

4.3.4.1.3.4 Maintenance procedures shall include a thorough examination of the extinguisher, including mechanical parts, extinguishing agent, and the means of expulsion.

4.3.4.1.3.5 Any detected troubles or impairments shall be corrected or replaced immediately by competent personnel.

4.3.4.1.3.6 Each extinguisher shall have a durable tag or label securely attached on which the date of the maintenance services shall be recorded.

4.3.4.1.3.7 All extinguishers shall be recharged after any discharge.

4.3.4.1.3.8 All extinguishers shall be recharged as deemed necessary through inspection and maintenance.

4.3.4.1.3.9 Portable extinguishers shall be hydrostatically tested at intervals not exceeding those specified in **Chapter 8 of NFPA 10**.

4.3.4.2 Hand Hose Line Systems.**4.3.4.2.1 Selection and Application.**

4.3.4.2.1.1* Fire hose for use in underground coal mines shall be a minimum of 38 mm (1½ in.) in diameter, single or multi-jacket, and of a type suitable for coal mine use.

4.3.4.2.1.2 The hose shall meet the minimum applicable standards of NFPA 1961.

4.3.4.2.1.3 Hose lines employing natural fibers shall not be used in underground coal mines.

4.3.4.2.1.4* Fire hose, including couplings, shall be rated for the maximum line pressure that can exist on the mine water system, or there shall be provision for limiting the line pressure to the working pressure of the hose.

4.3.4.2.1.5 Nozzle flow pressure shall be adjusted to provide hose control.

4.3.4.2.1.6* Couplings for fire hose used in underground coal mines shall have straight, iron pipe threads or National Standard Thread.

4.3.4.2.1.7 Where hose or hose-connected equipment is brought in from outside the mine, compatible adapters shall be available.

4.3.4.2.1.8 Hose nozzles shall be capable of delivering a straight stream and a spray discharge.

4.3.4.2.1.9* Fire hose shall be stored in caches, and caches shall contain hose to reach all areas covered by the hydrants that the cache will serve.

4.3.4.2.1.10 Each cache shall contain at least one hose nozzle and one hose wrench.

4.3.4.2.1.11* Caches of fire hose shall be provided at strategic underground locations as follows:

- (1) At each intersection with an active submain
- (2) At the mouth of each panel
- (3) At and on the intake side of each conveyor belt drive
- (4) At the entrance to each shop and storage area as defined in 4.2.5, 4.2.8, and 4.2.9
- (5) In each operating area
- (6) At intervals not to exceed 1524 m (5000 ft) along the main haul route or travelway

4.3.4.2.1.12 Hand hose line systems, if used, shall be installed in accordance with NFPA 14 and shall be a minimum of either 38 mm (1½ in.) lined or 25.4 mm (1 in.) hard rubber.

4.3.4.2.1.13 Hand hose lines that are designated for fire fighting and that have the capability to be used in Class I or Class II liquid storage areas shall be equipped to discharge a foam-water solution and shall be in accordance with the applicable sections of NFPA 11.

4.3.4.2.2* Maintenance. Caches of fire hose shall be checked at least every 6 months to ensure that the inventory of hose, nozzles, wrenches, and adapters is complete, and the following requirements shall apply:

- (1) At least one length of hose from each cache shall be pressure-tested annually in accordance with NFPA 1962.
- (2) The tested hose shall be tagged and dated so that a different length of hose is tested each year.
- (3) If any length of hose fails the pressure test, all lengths of hose in the cache shall be tested.
- (4) Hose lines that fail the test shall be replaced.

4.3.4.3 Portable Foam-Generating Devices.**4.3.4.3.1 General Requirements.**

4.3.4.3.1.1 Portable foam generators, fire hose, foam concentrate, and emergency fire-fighting materials in accordance with 4.3.4.5 shall be accessible within 60 minutes of fire notification.

4.3.4.3.1.2 Portable foam-generating devices and associated equipment shall be listed or approved for that purpose.

4.3.4.3.2 High-Expansion Foam.

4.3.4.3.2.1 Where high-expansion foam is used, provision shall be made to supply uncontaminated air for foam making.

4.3.4.3.2.2 The foam system shall be tested with the water supply to determine the quality of the foam-making capabilities.

4.3.4.3.3 Maintenance.

4.3.4.3.3.1 At least annually, a thorough maintenance examination of the foam-generating devices and associated equipment, including foam concentrate, shall be made by the mine operator.

4.3.4.3.3.2 Operation of foam-generating equipment during training sessions conducted at least annually shall satisfy the maintenance examination requirement.

4.3.4.4 Rock Dust.

4.3.4.4.1 At least 109 kg (240 lb) of bagged, dry rock dust shall be stored upwind and kept available for fire fighting at or near the following areas:

- (1) Maintenance and shop areas
- (2) Combustible liquid storage area
- (3) Working section
- (4) Belt drive area
- (5) Belt-head loading area
- (6) Ventilation doors on trolley wire-supplied track haulage-ways

4.3.4.4.2 Where it is impractical to store for fire extinguishment purposes, rock dust shall be permitted to be replaced with an additional portable extinguisher having a nominal capacity of 4.5 kg (10 lb) of multipurpose (ABC) dry chemical extinguishing agent.

4.3.4.5 Emergency Materials.

4.3.4.5.1 Emergency materials for fighting mine fires shall be near the shaft bottom or other entrance to the mine.

4.3.4.5.2 If the shaft bottom or other entrance to the mine is more than 3.2 km (2 mi) from a working section, additional caches of emergency materials shall be located within 3.2 km (2 mi) of the working section.

4.3.4.5.3 Emergency materials shall include fire hose and necessary adapters, multiple hydrants, wrenches and nozzles, brattice boards and cloth, wood posts, cap pieces, wood wedges, spad guns and spads, or other specialized equipment for installing line brattice, nails, bags of sealant or cement, saws, hammers, axes, shovels, and picks.

4.3.4.5.4 Caches of emergency materials shall be checked at least every 6 months to ensure that the inventory of materials is complete.

4.3.4.6* Training.

4.3.4.6.1 All miners shall be instructed annually in fire prevention and fire-fighting techniques.

4.3.4.6.2 All employees shall be instructed in emergency evacuation procedures.

4.3.4.6.3 All persons who inspect, test, operate, or maintain fire suppression systems shall be trained in the functions they are to perform.

Chapter 5 Surface Mining Operations

5.1 General. This chapter shall cover surface bituminous and subbituminous coal and lignite mining operations.

5.2* Fire Prevention. Risk reduction practices shall follow the principles of minimizing ignition sources and reducing exposure of combustible materials to ignition sources.

5.2.1 Housekeeping.

5.2.1.1 Spills, leaks, excess lubricants, and combustible materials such as oil-soaked wastes, rubbish, and accumulations of environmental debris shall not be allowed to accumulate in quantities that could create a fire hazard.

5.2.1.2 Approved metal receptacles shall be provided where oil-soaked wastes or rubbish are not immediately removed to a safe place for disposal.

5.2.1.3 The storage and handling of flammable or combustible liquids on or within equipment shall be in accordance with NFPA 30.

5.2.1.4 Access to fire protection equipment on mining equipment shall be kept clear of obstructions.

5.2.2 Inspection and Maintenance of Equipment. Hydraulic, coolant, lubrication and fuel lines, and electrical wiring shall be inspected and maintained in accordance with the manufacturers' recommendations.

5.2.3 Flammable and Combustible Liquid Storage on Equipment and in Buildings. Flammable and combustible liquid storage and usage shall be in accordance with Sections 7.3 and 7.4.

5.2.4 Compressed Gas Storage and Usage. Compressed gas storage and usage shall be in accordance with Section 7.1.

5.3 Fire Protection.

5.3.1 Fire protection for the purposes of this standard shall be defined in the broad sense to include fire detection and fire suppression.

5.3.2* Fire suppression system types shall include dry chemical, wet chemical, gaseous, water mist, foam, and sprinkler.

5.3.3 Fire suppression systems and fire alarm systems shall be installed in accordance with applicable NFPA standards.

5.3.3.1 Fire suppression systems shall be tested and maintained in accordance with the appropriate NFPA standard.

5.3.3.2 Water Supplies. Fire suppression water supply shall be of sufficient quantity to extinguish the largest anticipated fire. This shall be accomplished with water trucks in pit areas or fire hydrants in coal processing areas.

5.3.4 Fire Extinguishers for Equipment.

5.3.4.1* A 9.1 kg (20 lb) ABC-type fire extinguisher shall be provided at intervals not to exceed 15.2 m (50 ft) travel distance, including the lower frame areas of draglines.

5.3.4.2 The fire-extinguishing agent applied by hand-portable extinguishers to hazards involving energized electrical equipment shall be nonconductive.

5.3.4.3 Portable extinguishers shall be maintained in accordance with NFPA 10 and kept in their designated places at all times.

5.3.4.4 Extinguishers shall be located on each vehicle and shall be accessible.

5.3.4.5 In areas where obstruction to visual observation cannot be completely avoided, visible markings shall be provided to indicate the location of the fire extinguishers.

5.3.4.6 Extinguishers installed under conditions where they can be subject to physical damage shall be guarded to protect against damage.

5.3.4.7 The installation of an automatic or manually operated fire suppression system shall not eliminate the portable fire extinguisher requirement.