

NFPA®

820

**Standard for
Fire Protection in
Wastewater Treatment
and Collection Facilities**

2020



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NFPA® 820

Standard for

Fire Protection in Wastewater Treatment and Collection Facilities

2020 Edition

This edition of NFPA 820, *Standard for Fire Protection in Wastewater Treatment and Collection Facilities*, was prepared by the Technical Committee on Wastewater Treatment Plants. It was issued by the Standards Council on April 28, 2019, with an effective date of May 18, 2019, and supersedes all previous editions.

This edition of NFPA 820 was approved as an American National Standard on May 18, 2019.

Origin and Development of NFPA 820

The Committee on Wastewater Treatment Plants was organized in 1983 to have primary responsibility for documents on safeguarding against the fire and explosion hazards specific to wastewater treatment plants and associated collection systems. This document includes the hazard classification of specific areas and processes. The need to develop NFPA 820 was based on fire or explosion incidents that, while infrequent, are relatively severe when they do occur. Initial work on the document was begun early in 1985 and resulted in the first edition being issued in 1990. Extensive changes were made between the first edition and the 1992 edition, with the most notable revision being the document title, which was changed from *Recommended Practice for Fire Protection in Wastewater Treatment Plants* to *Recommended Practice for Fire Protection in Wastewater Treatment and Collection Facilities*. In addition, the document scope was revised to include storm sewer systems and their appurtenances.

In 1995 the document was changed from a recommended practice to a standard, which contains mandatory requirements. This was done because NFPA 820 was widely referenced by various jurisdictions.

The 1999 edition of NFPA 820 was changed to include some editorial corrections and to make the document more enforceable. The definitions were also modified to conform to NFPA's *Manual of Style*.

For the 2003 edition, the entire document was reformatted to conform to the *Manual of Style for NFPA Technical Committee Documents*. Definitions were revised to conform to the *NFPA Glossary of Terms*.

The 2008 edition included guidance on waste gas burners and enclosed aeration basins. Definitions were coordinated with the *NFPA Glossary of Terms*.

The 2012 edition incorporated editorial changes to Table 5.2, Table 6.2(a), and Table 6.2(b). A new definition was added for waste gas burners, along with mitigation steps to Section 10.11 on fire and explosion prevention control procedures. Ventilation requirements and supporting language were revised to provide clarity and to tie in with an effort to better coordinate with associated industry documents.

For the 2016 edition, all tables were reformatted for better readability and reviewed and revised to provide clearer guidance on when the requirements apply. Combustible gas detector requirements were modified in several locations in the tables. Construction requirements throughout the document were revised to indicate that building codes cover general building construction; components of the wastewater facility are covered by the requirements provided in the chapter tables. The 2016 edition required alarm signaling for combustible gas detectors and ventilation because those systems are critical in preventing fires and explosions. The document was also revised to better indicate conditions under which dual ventilation can be used.

The 2020 edition has been updated to cover the protection of pressure sewers. All caution text throughout the document has been moved to the annex. New sections have been added to

emphasize the importance of monitoring for flammable atmospheres prior to the performance of work that could introduce a source of ignition. The definition for *physical separation* has been updated to clarify that personnel entry into physically separated spaces is by individual, exterior access ports with no physical connection. In addition, the 2020 edition now permits the use of an airlock as an alternative means of providing a physical separation.

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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 criteria for safeguarding against the fire and explosion hazards specific to wastewater treatment plants and associated collection systems, including the hazard classification of specific areas and processes.

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NFPA 820

Standard for

Fire Protection in Wastewater Treatment and Collection Facilities

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 E.

Chapter 1 Administration

1.1 Scope.

1.1.1* General. This standard shall establish minimum requirements for protection against fire and explosion hazards in wastewater treatment plants and associated collection systems, including the hazard classification of specific locations and processes.

1.1.2 This standard shall apply to the following:

- (1) Collection sewers
- (2) Trunk sewers
- (3) Intercepting sewers
- (4) Combined sewers
- (5) Storm sewers
- (6) Pumping stations
- (7)* Wastewater treatment plants
- (8) Sludge-handling facilities

- (9) Chemical-handling facilities
- (10) Treatment facilities
- (11) Ancillary structures (see 3.3.58.1)

1.1.3 This standard shall not apply to the following:

- (1) On-site treatment systems (see 3.3.42)
- (2) Building drain systems and appurtenances (see 3.3.6)
- (3) Industrial sewer systems and appurtenances (see 3.3.52.5)
- (4) Personnel safety from toxic and hazardous materials or products of combustion
- (5) Separate nonprocess-related structures (see 3.3.58.2)

1.2 Purpose.

1.2.1 The purpose of this standard shall be to provide a degree of fire and explosion protection for life, property, continuity of mission, and protection of the environment.

1.2.2 The purpose of this standard shall be to reduce or eliminate the effects of fire or explosion by maintaining structural integrity, controlling flame spread and smoke generation, preventing the release of toxic products of combustion, and maintaining serviceability and operation of the facility.

1.3 Application.

1.3.1 Installations and Modifications. The requirements of this standard shall apply to new installations or changes in use of a space, electrical hazard classification, or process capacity.

1.3.1.1 Replacement-in-kind of components or devices are not considered modifications.

Δ 1.3.1.2 The requirements of this standard shall be used in a risk assessment to identify the areas identified in 1.1.2 that are vulnerable to fire or other loss.

1.3.2 Toxicity and Biological Hazards.

1.3.2.1 This standard shall apply to the fire and explosion hazards of various substances associated with wastewater treatment and conveyance.

1.3.2.2* This standard shall not apply to toxicity and biological hazards.

1.3.3 Ventilation Practices. Ventilation rates required by this standard are deemed only to minimize fire and explosion hazards. (See 1.3.2.2 and 9.1.1.2.)

1.3.4* Materials Selection. When conditions or applications warrant the selection of combustible, limited-combustible, or low flame spread index materials, the fire risk assessment shall include evaluation of flame spread, smoke generation, and the impact that a fire or explosion will have on the structural integrity of the facility. (See Section 10.3.)

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.

1.5 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.

Δ 1.5.2 The system, method, or device shall be approved for the intended purpose.

1.6 Units and Formulas. Metric units of measurement used within this standard are in accordance with the modernized metric system known as the International System of Units (SI).

1.6.1 Values of measurement are followed by an approximate equivalent value in U.S. customary units.

1.6.2 For metric conversion practices, see IEEE/ASTM SI 10, *Use of the International System of Units (SI): the Modern Metric System*.

1.7 Document Organization. This document shall be divided into 10 chapters.

1.7.1 Chapters 1, 3, 7, 8, 9, and 10 shall apply generally.

1.7.2 Chapters 4, 5, and 6 shall apply to specific processes and functions.

1.8* National Electrical Code® Criteria.

1.8.1 NFPA 820 is based on the criteria established by Article 500 of *NFPA 70* but shall not supersede or conflict with the requirements therein.

1.8.2 Once a location is classified, it shall comply with the requirements of *NFPA 70*.

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 1, *Fire Code*, 2018 edition.

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

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

NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*, 2018 edition.

NFPA 12A, *Standard on Halon 1301 Fire Extinguishing Systems*, 2018 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 15, *Standard for Water Spray Fixed Systems for Fire Protection*, 2017 edition.

NFPA 16, *Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems*, 2019 edition.

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

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 2019 edition.

NFPA 22, *Standard for Water Tanks for Private Fire Protection*, 2018 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 45, *Standard on Fire Protection for Laboratories Using Chemicals*, 2019 edition.

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

NFPA 54, *National Fuel Gas Code*, 2018 edition.

NFPA 56, *Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems*, 2017 edition.

NFPA 61, *Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities*, 2017 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 70E®, *Standard for Electrical Safety in the Workplace®*, 2018 edition.

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

NFPA 82, *Standard on Incinerators and Waste and Linen Handling Systems and Equipment*, 2019 edition.

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

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, 2018 edition.

NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids*, 2015 edition.

NFPA 92, *Standard for Smoke Control Systems*, 2018 edition.

NFPA 204, *Standard for Smoke and Heat Venting*, 2018 edition.

NFPA 241, *Standard for Safeguarding Construction, Alteration, and Demolition Operations*, 2019 edition.

NFPA 259, *Standard Test Method for Potential Heat of Building Materials*, 2018 edition.

NFPA 497, *Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*, 2017 edition.

NFPA 499, *Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas*, 2017 edition.

NFPA 600, *Standard on Facility Fire Brigades*, 2015 edition.

NFPA 601, *Standard for Security Services in Fire Loss Prevention*, 2015 edition.

NFPA 654, *Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids*, 2020 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 2001, *Standard on Clean Agent Fire Extinguishing Systems*, 2018 edition.

2.3 Other Publications.

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

ANSI/NEMA Z535.2, *Environmental and Facility Safety Signs*, 2011.

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

ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, 2018.

ASTM E136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C*, 2016a.

ASTM E2652, *Standard Test Method for Behavior of Materials in a Tube Furnace with a Cone-shaped Airflow Stabilizer, at 750°C*, 2016.

ASTM E2965, *Standard Test Method for Determination of Low Levels of Heat Release Rate for Materials and Products Using an Oxygen Consumption Calorimeter*, 2017.

IEEE/ASTM SI 10, *Use of the International System of Units (SI): the Modern Metric System*, 2016.

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

ANSI/UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*, 2008, revised 2013.

2.3.4 Other Publications.

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

2.4 References for Extracts in Mandatory Sections.

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

NFPA 70®, *National Electrical Code*®, 2017 edition.

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

NFPA 652, *Standard on the Fundamentals of Combustible Dust*, 2016 edition.

NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*, 2014 edition.

NFPA 1670, *Standard on Operations and Training for Technical Search and Rescue Incidents*, 2017 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 Activated Carbon. Adsorptive carbon particles or granules usually obtained by heating carbonaceous material in the absence of air or in steam and possessing a high capacity to selectively remove trace and soluble components from solution.

3.3.2 Adjacent. Sharing a common wall, partition, or barrier.

3.3.3 Airlock. A means of egress, consisting of interdependent doors designed to maintain the internal pressure of the room to prevent or significantly reduce re-entry of a surrounding explosive atmosphere.

3.3.4* Anaerobic Digestion. A unit process designed to biologically convert organic matter (sludge) through the action of microorganisms in the absence of elemental oxygen.

3.3.5 Building. Any structure used or intended for supporting or sheltering any use or occupancy. [101, 2018]

3.3.6 Building Drain. In plumbing, the part of the lowest horizontal piping of a drainage system that receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building sewer (house connection or lateral).

3.3.7 Centrifuge. A mechanical device in which centrifugal force is used to separate solids from liquids or to separate liquids of different densities.

3.3.8 Classification of Locations.

N 3.3.8.1 Classified Location. A space where a flammable gas, flammable liquid-produced vapor, combustible liquid-produced vapors, combustible dusts, or combustible fibers/flyings could be present, and the likelihood that a flammable or combustible concentration or quantity is present. Each room, section, or area is considered individually in determining its classification.

N 3.3.8.2 Unclassified Location. A space that does not meet the definition of a classified location.

3.3.9 Combustible. Capable of undergoing combustion.

3.3.10* Combustible Gas Detector. A fixed, permanently mounted instrument used to detect the presence of flammable vapors and gases and warn when concentrations approach the explosive range.

3.3.11 Combustible or Explosive Dust. A dust capable of spontaneous combustion or of exploding or burning when subjected to a source of ignition.

3.3.12 Compost. The product of the thermophilic biological oxidation of sludge or other organic materials.

3.3.13* Constantly Attended Location. An owner or operator-facility that is attended 24 hours a day.

3.3.14 Dissolved Air Flotation. A separation process in which air bubbles emerging from a supersaturated solution become attached to suspended solids in the liquid undergoing treatment and float them up to the surface.

3.3.15 Drying Bed. A confined, underdrained, shallow layer of sand or gravel structures on which digested sludge is distributed for draining and air drying; also an underdrained, shallow, diked earthen structure used for drying sludge.

3.3.16 Enclosed Space. The interior space of any tank or unit process that is closed to the atmosphere, excluding vents or pressure relief, or the area around any open tank or unit process surrounded by a building or other structure constructed with a roof and solid walls.

3.3.17 Equipment. In wastewater treatment facilities, a general term that includes items such as material, fittings, devices, appliances, and fixtures and apparatus, used as part of, or in connection with, a mechanical, instrumentation, or electrical installation.

3.3.17.1* Gas-Handling Equipment. Equipment, including gas compressors, sediment traps, drip traps, gas scrubbers,

and pressure-regulating and control valves, used in the removal of gas evolved from the anaerobic digestion process and the compression, conditioning, or treatment of such gas.

3.3.17.2 Utilization Equipment. Equipment that utilizes electric energy for electronic, electromechanical, chemical, heating, lighting, or similar purposes. [70:100]

3.3.18 Equipment Enclosure. The housing that covers, protects, or guards a piece of equipment that is not intended for personnel occupancy but that can provide access to the equipment.

3.3.19 Filter.

3.3.19.1 Belt Filter. A sludge-dewatering or -concentrating device having continuous bands or belts of filtering media that pass around rollers and from which the material caught on the media is usually removed by gravity and pressure.

3.3.19.2 Pressure or Gravity Filter. A filter used to pass liquid through a medium to remove suspended solids.

3.3.19.3 Trickling Filter. A treatment unit process consisting of stone, plastic, redwood, or similar media over which wastewater is distributed and through which wastewater trickles to the underdrains and is treated by the microbial slimes formed on the surface of the media.

3.3.19.4 Vacuum Filter. A unit process, used to dewater wastewater sludge, consisting of a cylindrical drum mounted on a horizontal axis, covered with a media, and subjected to an internal vacuum.

3.3.20 Filter Press. A plate and frame press used in a unit process that is operated hydraulically and mechanically to produce a semisolid sludge cake from a slurry.

3.3.21 Fire Prevention. Measures directed toward avoiding the inception of fire. [801, 2014]

3.3.22 Fire Protection. Methods of providing for fire control or fire extinguishment. [801, 2014]

3.3.23* Flame Spread Index. See 8.2.3.4.

3.3.24 Flash Mixer. A device for quickly dispersing chemicals uniformly throughout a liquid or semisolid.

3.3.25 Flocculation. A unit process used for the formation of floc in wastewater.

3.3.26 Force Main (Pressure Main). A pressure pipe connecting the pump discharge of a wastewater pumping station under pressure to a point of discharge.

3.3.27* Galleries. Long tunnels or walkways connecting separate buildings or structures that are generally underground, without windows, and with limited entrances and exits.

3.3.28 Gas.

3.3.28.1 Digester Gas. Gas obtained as a by-product from a controlled anaerobic sludge digestion unit process from the decomposition of organic matter.

3.3.28.2* Fuel Gas. A gas used as a fuel source, including natural gas, manufactured gas, sludge gas, liquefied petroleum gas-air mixtures, liquefied petroleum gas in the vapor phase, and mixtures of these gases.

3.3.28.3* Sewer Gas. Gas resulting from the decomposition of organic matter in wastewater in sewers and from the incidental, uncontrolled release of hydrocarbons or decomposition of organic matter in stagnant liquid and septic sludge in wastewater treatment plants.

3.3.28.4* Sludge Gas. Gas obtained as a by-product of the anaerobic sludge digestion process from the decomposition of organic matter in biosolids in liquid or semi-solid state when stored for extended periods of time.

3.3.29 Grit Chamber. A detention chamber or an enlargement of a sewer designed to reduce the velocity of flow of the liquid to permit the separation of mineral from organic solids by differential sedimentation.

3.3.30 Hydrogen Sulfide (H₂S). A toxic and lethal gas produced in sewers and digesters by anaerobic decomposition of wastewater solids or other anaerobic wastewater or sludge treatment processes.

3.3.31 Identified (as applied to equipment). Recognizable as suitable for the specific purpose, function, use, environment, application, and so forth, where described in a particular Code requirement. [70:100]

3.3.32 Incineration. Combustion or controlled burning of volatile organic matter in sludge and solid waste that reduces the volume of the material while producing heat, dry inorganic ash, and gaseous emissions.

3.3.33 Inspection. A visual examination of a system or portion thereof to verify that it appears to be in operating condition and is free of physical damage.

3.3.34 Liquid.

3.3.34.1* Combustible Liquid. Any liquid that has a closed-cup flash point at or above 100°F (37.8°C), 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]

3.3.34.2* Flammable Liquid. A liquid that has a closed-cup flash point that is below 37.8°C (100°F) and a maximum vapor pressure of 2068 mm Hg (absolute pressure of 40 psi) at 37.8°C (100°F).

3.3.34.3 Volatile Liquid. A liquid that evaporates readily at normal temperature and pressure.

3.3.35 Lower Explosive Limit (LEL). See Lower Flammable Limit (LFL) 3.3.36.

3.3.36 Lower Flammable Limit (LFL). That concentration of a flammable vapor in air below which ignition will not occur. Also known as the lower explosive limit (LEL). [30, 2018]

3.3.37 Maintenance. Work performed to ensure that equipment operates as directed by the manufacturer.

3.3.38 Maintenance Hole. A structure located on top of an opening in a gravity sewer, or an opening in the top or side of an enclosed vessel to allow personnel entry; also referred to as manhole or manway.

3.3.39 Material.

3.3.39.1 Limited-Combustible Material. See 8.2.3.3.

3.3.39.2 Noncombustible Material. See 8.2.3.2.

3.3.40 Methane (CH₄). A colorless, odorless, flammable gaseous hydrocarbon present in natural gas and formed by the anaerobic decomposition of organic matter. (See 3.3.4, *Anaerobic Digestion*.)

3.3.41 Not Enclosed. Any tank or unit process open to the atmosphere or the area around any open tank or unit process housed in a building or other structure constructed with a roof and having at least 50 percent of the wall area open to the atmosphere. Fixed open louvered panels with effective openings greater than 50 percent of the wall area and evenly distributed over the wall area are considered open to the atmosphere.

3.3.42 On-Site Treatment System. A self-contained system, including pumping equipment, that provides both treatment and disposal of wastewater on or immediately adjacent to a single residence or group of residences or small commercial establishments.

3.3.43 Oxygen-Enriched Atmosphere. Air atmospheres containing more than 23.5 percent oxygen by volume at one standard atmosphere pressure. [1670, 2017]

3.3.44 Ozonation. The process of contacting wastewater or air with ozone for the purpose of disinfection, oxidation, or odor control.

3.3.45* Physically Separated. A gastight partition between two adjacent spaces, or two nonadjacent spaces, with no means of gas communication between the spaces and where personnel entry into the spaces is by individual, exterior access ports with no physical connection, or an airlock.

3.3.46* Pumping Station. A structure that contains pumps and appurtenant piping, valves, and other mechanical and electrical equipment for pumping wastewater or other liquid.

3.3.47 Pyrolysis. The destructive distillation of organic compounds in an oxygen-free environment that converts the organic matter into gases, liquids, and char.

N 3.3.48 Replacement-in-Kind. A replacement that satisfies the design specifications of the replaced item. [652, 2016]

3.3.49 Rotating Biological Contactor (RBC). A unit process for wastewater treatment that is composed of large, closely spaced plastic discs that are rotated about a horizontal shaft (usually a secondary biological treatment process).

3.3.50 Scum or Skimmings. Grease, solids, liquids, and other floatable material removed from settling tanks.

3.3.51* Sedimentation. The unit process of subsidence of suspended matter carried by water, wastewater, or other liquids by gravity.

3.3.52 Sewer. A single pipe or system of pipes or conduits that carries wastewater or drainage water.

3.3.52.1 Branch Sewer. A sewer that receives wastewater from a relatively small area and discharges into a main sewer serving more than one branch sewer area.

3.3.52.2 Building Sewer. In plumbing, a sewer that consists of the extension from the building drain to the public sewer or other place of disposal; also called house connection or lateral.

3.3.52.3 Collector Sewer. A sewer that consists of a pipe or conduit that receives wastewater from a relatively small area

from two or more lateral sewers and that subsequently discharges into a trunk sewer.

3.3.52.4 Combined Sewer. A sewer intended to receive both wastewater and storm or surface water.

3.3.52.5 Industrial Sewer. A sewer intended to receive only industrial wastewater or other liquid or water-carried wastes that is located on a private property, owned and operated to carry industry-specific contaminants, and properly treated to federal and state requirements before direct discharge or receives proper pre-treatment in accordance with federal or state requirements before discharge to a municipal sewer system. (See also 3.3.52.8, *Sanitary Sewer*; 3.3.52.9, *Storm Sewer*; and 3.3.52.4, *Combined Sewer*.)

3.3.52.6 Outfall Sewer. A sewer that receives wastewater from a collecting system or from a treatment plant and carries it to a point of final discharge.

3.3.52.7 Residential Sewer. A sewer intended to receive only residential, domestic wastewater. (See also 3.3.52.4, *Combined Sewer*; 3.3.52.8, *Sanitary Sewer*; and 3.3.52.9, *Storm Sewer*.)

3.3.52.8 Sanitary Sewer. A sewer that carries liquid and water-carried wastes from residences, commercial buildings, industrial plants, and institutions together with minor quantities of storm water, surface water, and groundwater that are not admitted intentionally.

3.3.52.9 Storm Sewer. A pipe or conduit that carries storm water and surface water, street wash and other wash water, or drainage but that excludes domestic wastewater and industrial wastes (also called storm drain).

3.3.52.10 Trunk Sewer. A sewer consisting of the principal pipe or conduit to which one or more collector sewers or branch sewers are tributaries; also called main sewer.

3.3.53 Sludge. A semiliquid mass of accumulated settled solids deposited from raw or treated wastewater in tanks or basins; also referred to as biosolids.

3.3.53.1 Activated Sludge. A microbial mass grown in aeration tanks, subsequently separated from treated wastewater by sedimentation, and wasted or returned to the process as needed.

3.3.54 Sludge Cake. A semisolid product of a sludge-dewatering process.

3.3.55 Sludge Dewatering. The process of removing a part of the water in sludge by any physical or mechanical method without heat, such as draining, pressing, vacuum filtration, centrifuging, or passing between rollers.

3.3.56 Sludge Drying Process. A process that uses physical or mechanical evaporation techniques with or without the application of heat to achieve solids concentrations greater than 85 percent.

3.3.57 Sludge Thickening. A sludge treatment process designed to concentrate wastewater sludges by gravity, mechanical means, or air flotation.

3.3.58 Structure. That which is built or constructed and limited to buildings and nonbuilding structures as defined herein. [5000, 2018]

3.3.58.1 Ancillary Structure. A structure that is an integral part of the wastewater treatment or collection process.

3.3.58.2 Separate Nonprocess-Related Structure. A structure that is physically separated and does not contain any process-related equipment associated with the collection and treatment of wastewater and solids derived from wastewater treatment processes.

3.3.59 Tank.

3.3.59.1 Imhoff Tank. A deep, two-story wastewater treatment tank consisting of an upper continuous-flow sedimentation chamber and a lower sludge digestion chamber.

3.3.59.2 Nitrification Tank. A unit process tank for the oxidation of ammonia and nitrogen into nitrates through biochemical actions.

3.3.60 Treatment.

3.3.60.1 Anaerobic Wastewater Treatment. A unit process providing treatment of the liquid stream by action of microorganisms in the absence of elemental oxygen, the process by-products of which include a gas containing methane, carbon dioxide, and small quantities of hydrogen sulfide.

3.3.60.2 Heat Treatment. A sludge-conditioning process combining high temperature, time, and pressure to improve the dewaterability of organic sludge.

3.3.60.3* Sludge Treatment. The processing of wastewater sludges to render them stable.

3.3.60.4 Wastewater Treatment.

3.3.60.4.1* Primary Treatment with Skimming. The first major treatment in a wastewater treatment plant, generally consisting of screening, comminution or grinding, grit removal, sedimentation, skimming, or any combination of such unit processes.

3.3.60.4.2 Secondary Treatment. Wastewater treatment unit processes usually consisting of primary treatment with skimming and biological oxidation using activated sludge or trickling filtration followed by clarification.

3.3.60.4.3 Tertiary Treatment. Any physical, chemical, or biological treatment process used to accomplish a degree of treatment greater than that achieved by secondary treatment.

3.3.61 Tunnel. See 3.3.27, Galleries.

3.3.62 Unit Process. A stage or step in the treatment of wastewater.

3.3.63 Vault. An enclosed structure, usually underground, used to permit personnel access to various types of equipment and instrumentation.

3.3.64 Ventilation Rate. A value based on the number of air changes per hour and calculated using 100 percent outside air for the supply air that is exhausted. The number of air changes per hour is calculated on the basis of the maximum aggregate volume (under normal operating conditions) of the space to be ventilated.

3.3.65 Waste.

3.3.65.1 Industrial Waste. Generally liquid, solid, or gaseous wastes originating from the manufacture of specific products.

3.3.66* Waste Gas Burner (flare). A safety device used to combust excess digester gas. Waste gas burners reduce the probability of odors or gas explosions caused by excess digester gas directly vented to the atmosphere by pressure-relief valves.

3.3.67 Wastewater. The spent water of a community that is a combination of the liquid and water-carried wastes from residences, commercial buildings, industrial plants, and institutions, together with any groundwater, surface water, and storm water that might be present.

3.3.67.1 Domestic Wastewater. Wastewater derived principally from sources such as dwellings, commercial establishments, and institutions, that might or might not contain small amounts of groundwater, surface water, or storm water.

3.3.67.2 Residential Wastewater. Wastewater derived from areas consisting of single- and multiple-family residences.

3.3.68 Well.

3.3.68.1* Dry Well. The portion of a pumping station designed to provide isolation and shelter or accommodations for controls or equipment associated with pumping of wastewater and designed to completely and permanently exclude wastewater or wastewater-derived atmospheres.

3.3.68.2* Wet Well. The portion of the pumping station that receives and temporarily stores wastewater for the purpose of pumping.

Chapter 4 Collection Systems

4.1* General.

4.1.1 This chapter shall establish minimum criteria for protection against fire and explosion hazards in the collection and transportation of municipal wastewater.

Δ 4.1.2 This chapter shall not apply to on-site systems or those sewers that principally convey industrial wastes.

N 4.1.3 When electrical work is performed as permitted in accordance with 130.2(A) of NFPA 70E, a portable gas detector and an energized electrical work permit shall be required and documented in order to maintain a safe working condition.

N 4.1.3.1 The atmosphere in the space shall be maintained below 10 percent of the LFL.

N 4.1.4 Before hot work operations such as welding, cutting, and similar spark-producing operations begin in a location that has not been designated for such operations, a portable gas detector and a written hot work permit shall be required and documented as per 5.4.1 of NFPA 51B in order to maintain a safe working condition.

N 4.1.4.1 The atmosphere in the space shall be maintained below 10 percent of the LFL.

N 4.1.5 A sign that meets the requirements of ANSI/NEMA Z535.2, *Environmental and Facility Safety Signs*, shall be posted at

the entrance informing of the potential hazards of a flammable atmosphere in classified locations identified in this chapter.

4.2* Design and Construction.

4.2.1 The design and construction of buildings and structures containing wastewater collection and transport systems shall comply with the applicable building code and the additional requirements in Chapters 7 through 9.

Δ 4.2.2 The design and construction of the components associated with the wastewater collection and transport systems shall conform to Table 4.2.2.

Chapter 5 Liquid Stream Treatment Processes

5.1* General.

5.1.1 This chapter shall establish minimum criteria for protection against fire and explosion hazards associated with liquid stream treatment processes.

5.1.2 This chapter shall not apply to treatment systems serving individual structures or treatment systems that principally treat industrial wastes.

N 5.1.3 When electrical work is performed as permitted in accordance with 130.2(A) of NFPA 70E, a portable gas detector and an energized electrical work permit shall be required and documented in order to maintain a safe working condition.

N 5.1.3.1 The atmosphere in the space shall be maintained below 10 percent of the LFL.

N 5.1.4 Before hot work operations such as welding, cutting, and similar spark-producing operations begin in a location that has not been designated for such operations, a portable gas detector and a written hot work permit shall be required and documented as per 5.4.1 of NFPA 51B in order to maintain a safe working condition.

N 5.1.4.1 The atmosphere in the space shall be maintained below 10 percent of the LFL.

N 5.1.5 A sign that meets the requirements of ANSI/NEMA Z535.2, *Environmental and Facility Safety Signs*, shall be posted at the entrance informing of the potential hazards of a flammable atmosphere in classified locations identified in this chapter.

5.2* Design and Construction.

5.2.1 The design and construction of liquid stream treatment processes associated with wastewater liquids treatment shall comply with the applicable building code and the additional requirements in Chapters 7 through 9.

Δ 5.2.2 The design and construction of liquid stream treatment processes associated with wastewater liquids treatment shall conform to Table 5.2.2.

Table 4.2.2 Collection Systems

Row ^a	Line ^a	Location and Function	Fire and Explosion Hazard	Ventilation ^b	Extent of Classified Location	NEC Hazardous Location Classification (All Class I, Group D)	Materials of Construction ^c	Fire Protection Measures
1		MATERIALS USED IN REHABILITATION, RECONSTRUCTION, OR SLIP-LINING OF SEWERS	N/A	N/A	N/A	N/A	In accordance with 8.3.5	N/A
2		INDUSTRIAL SEWER Sewer transporting industrial wastewater only (no sanitary wastewater)	Not included within the scope of this standard					
3		STORM SEWER Sewer transporting storm water only (no sanitary wastewater)	Possible ignition of flammable gases and floating flammable liquids	NNV	Inside of sewer	Division 2	In accordance with 8.3.5	NR
4		STORM WATER PUMPING STATION WET WELLS Liquid side of pumping station serving only a storm sewer system	Possible ignition of flammable gases and floating flammable liquids	NNV	Entire room or space	Division 2	NC, LC, or LFS	NR
5	a	STORM WATER PUMPING STATION DRY WELLS	Buildup of vapors from flammable or combustible liquids	D	Entire dry well	Division 2	NC, LC, or LFS	FE
	b	Dry side of a pumping station serving only a storm sewer system and physically separated from wet well		C	Entire dry well	Unclassified	NC, LC, or LFS	FE
6	a	FORCE MAIN	Buildup of vapors from flammable or combustible liquids	NNV	Areas within 0.9 m (3 ft) of Air Release Valve and Appurtenances	Division 2	NC, LC, or LFS	NR
	b	Air release valve			Areas beyond 0.9 m (3 ft) of Air Release Valve and Appurtenances	Unclassified	NC, LC, or LFS	NR
7		BUILDING SEWER (Lateral sewer or drain) Sewer serving a house or single building (plumbing)	Not included within the scope of this standard					
8		INDIVIDUAL RESIDENTIAL SEWER Sewer serving one or more individual residences with a total flow of not more than 1500 gallons per day (gpd)	N/A	NNV	Within enclosed space	Unclassified	NR	NR

(continues)

Table 4.2.2 *Continued*

Row ^a	Line ^a	Location and Function	Fire and Explosion Hazard	Ventilation ^b	Extent of Classified Location	NEC Hazardous Location Classification (All Class I, Group D)	Materials of Construction ^c	Fire Protection Measures
9		INDIVIDUAL RESIDENTIAL PUMPING UNITS Pumping units serving one or more individual residences with a total flow of not more than 1500 gallons per day (gpd) (e.g., grinder pumps, septic tank effluent pumps, ejector pumps)	N/A	NNV	Within enclosed space	Unclassified	NR	NR
10	a	RESIDENTIAL SEWER	Possible ignition of flammable gases and floating flammable liquids	NNV	Within enclosed space	Division 2	In accordance with 8.3.5	NR
	b	Sewer transporting primarily residential wastewater		B	Within enclosed space	Unclassified	In accordance with 8.3.5	NR
11		OUTFALL SEWER Final discharge pipe from a treatment plant, transporting treated wastewater	N/A	NNV	N/A	Unclassified	NR	NR
12	a	SANITARY SEWER	Possible ignition of flammable gases and floating flammable liquids	NNV	Inside of sewer	Division 1	In accordance with 8.3.5	NR
	b	Sewer transporting domestic, commercial, and industrial wastewater		B	Inside of sewer	Division 2	In accordance with 8.3.5	NR
13	a	COMBINED SEWER	Possible ignition of flammable gases and floating flammable liquids	NNV	Inside of sewer	Division 1	In accordance with 8.3.5	NR
	b	Sewer transporting domestic, commercial, and industrial wastewater and storm water		B	Inside of sewer	Division 2	In accordance with 8.3.5	NR
14	a	WASTEWATER PUMPING STATION WET WELLS	Possible ignition of flammable gases and floating flammable liquids	A	Entire room or space	Division 1	NC, LC, or LFS	CGD required if mechanically ventilated or opens into a building interior
	b	Liquid side of a pumping station serving a sanitary sewer or combined system		B	Entire room or space	Division 2	NC, LC, or LFS	CGD (if enclosed)
15	a	BELOWGRADE OR PARTIALLY BELOWGRADE WASTEWATER PUMPING STATION DRY WELL	Buildup of vapors from flammable or combustible liquids	C	Entire space or room	Unclassified	NC, LC, or LFS	FE
	b	Pump room physically separated from wet well; pumping of wastewater from a sanitary or combined sewer system through closed pumps and pipes		D	Entire space or room	Division 2	NC, LC, or LFS	FE

(continues)

Table 4.2.2 *Continued*

Row ^a	Line ^a	Location and Function	Fire and Explosion Hazard	Ventilation ^b	Extent of Classified Location	NEC Hazardous Location Classification (All Class I, Group D)	Materials of Construction ^c	Fire Protection Measures
16		ABOVEGRADE WASTEWATER PUMPING STATION Pump room physically separated with no personnel access to wet well; pumping of wastewater from a sanitary or combined sewer system through closed pumps and pipes	N/A	NR	N/A	Unclassified	NC, LC, or LFS	FE
17	a	ABOVEGRADE WASTEWATER PUMPING STATION	Possible ignition of flammable gases and floating flammable liquids	A	Entire space or room	Division 1	NC	FE
	b	Pump room not physically separated from wet well; pumping of wastewater from a sanitary or combined sewer system through closed pumps and pipes		B	Entire space or room	Division 2	NC, LC, or LFS	FE
18	a	ODOR-CONTROL AND VENTILATION SYSTEMS SERVING CLASSIFIED LOCATIONS	Leakage and ignition of flammable gases and vapors	D	Entire area if enclosed	Division 2	NC, LC, or LFS	CGD and FAS
	b			C	Areas within 0.9 m (3 ft) of leakage sources such as fans, dampers, flexible connections, flanges, pressurized unwelded ductwork, and odor-control vessels	Division 2	NC, LC, or LFS	CGD and FAS
	c			C	Areas beyond 0.9 m (3 ft)	Unclassified	NC, LC, or LFS	CGD and FAS
	d			Not enclosed, open to the atmosphere	Areas within 0.9 m (3 ft) of leakage sources such as fans, dampers, flexible connections, flanges, pressurized unwelded ductwork, and odor-control vessels	Division 2	NC, LC, LFS	FE
	e			Not enclosed, open to the atmosphere	Areas beyond 0.9 m (3 ft)	Unclassified	NC, LC, LFS	FE
19	a	MAINTENANCE HOLES	Possible ignition of flammable gases and floating flammable liquids	NNV	Inside	Division 1	In accordance with 8.3.5	NR
	b	Access to sewer for personnel entry		B	Inside	Division 2	In accordance with 8.3.5	NR
20	a	JUNCTION CHAMBERS	Buildup of vapors from flammable or combustible liquids	NNV	Inside	Division 1	In accordance with 8.3.5	NR
	b	Structure where sewers intersect		B	Open and above grade or inside and ventilated	Division 2	In accordance with 8.3.5	NR

(continues)

Table 4.2.2 *Continued*

Row ^a	Line ^a	Location and Function	Fire and Explosion Hazard	Ventilation ^b	Extent of Classified Location	NEC Hazardous Location Classification (All Class I, Group D)	Materials of Construction ^c	Fire Protection Measures
21		INVERTED SIPHONS Depressed section of gravity sewer	Possible ignition of flammable gases and floating flammable liquids	NNV	Interior of inlet and outlet structures	Division 1	NC	NR
22		CATCH BASINS (Curb inlet) Inlet where street water enters a storm or combined sewer	Buildup of vapors from flammable or combustible liquids	NNV	Enclosed space	Division 2	In accordance with 8.3.5	NR
23	a	RESIDENTIAL DIVERSION STRUCTURES	Buildup of vapors from flammable or combustible liquids	NNV	Enclosed space	Division 2	In accordance with Chapter 8	NR
	b	Enclosed structures where residential wastewater can be diverted		B	Enclosed space	Unclassified	In accordance with Chapter 8	NR
24	a	RESIDENTIAL BELOWGRADE VALVE VAULT	Possible ignition of gases and floating flammable liquids	NNV	Enclosed space	Division 2	In accordance with 8.3.5	NR
	b	With an exposed residential wastewater surface		B	Enclosed space	Unclassified	In accordance with 8.3.5	NR
25	a	RESIDENTIAL CONTROL STRUCTURES	Buildup of vapors from flammable or combustible liquids	A	Enclosed space	Division 2	In accordance with Chapter 8	NR
	b	Enclosed structures where residential wastewater flow is regulated		B	Enclosed space	Unclassified	In accordance with Chapter 8	NR
26	a	RESIDENTIAL BELOWGRADE METERING VAULT	Possible ignition of flammable gases and floating flammable liquids	NNV	Enclosed space	Division 2	In accordance with 8.3.5	NR
	b	With an exposed residential wastewater surface		B	Enclosed space	Unclassified	In accordance with 8.3.5	NR
27	a	DIVERSION STRUCTURES	Buildup of vapors from flammable or combustible liquids	NNV	Enclosed space	Division 1	In accordance with Chapter 8	NR
	b	Enclosed structures where wastewater can be diverted		B	Enclosed space	Division 2	In accordance with Chapter 8	NR
28		ABOVEGRADE VALVE VAULT Physically separated from the wet well; valves in vault in closed piping system	N/A	NR	N/A	Unclassified	NC, LC, or LFS	NR
29	a	BELOWGRADE VALVE VAULT	Buildup of vapors from flammable or combustible liquids	NNV	Enclosed space	Division 2	NC, LC, or LFS	NR
	b	Physically separated from the wet well and with closed piping system		C	Enclosed space	Unclassified	NC, LC, or LFS	NR
30	a	BELOWGRADE VALVE VAULT	Possible ignition of gases and floating flammable liquids	NNV	Enclosed space	Division 1	NC	NR
	b	With an exposed wastewater surface		B	Enclosed space	Division 2	NC, LC, or LFS	NR

(continues)

Table 4.2.2 *Continued*

Row ^a	Line ^a	Location and Function	Fire and Explosion Hazard	Ventilation ^b	Extent of Classified Location	NEC Hazardous Location Classification (All Class I, Group D)	Materials of Construction ^c	Fire Protection Measures
31	a	CONTROL STRUCTURES	Buildup of vapors from flammable or combustible liquids	A	Enclosed space	Division 1	In accordance with Chapter 8	NR
	b	Enclosed structures where wastewater or storm water flow is regulated		B	Enclosed space	Division 2	In accordance with Chapter 8	NR
32	a	WASTEWATER HOLDING BASINS	Possible ignition of flammable gases and floating flammable liquids	A	Enclosed space	Division 1	NC	NR
	b	Enclosed structures temporarily holding untreated or partially treated wastewater		B	Enclosed space	Division 2	NC, LC, or LFS	NR
33		WASTEWATER HOLDING BASINS, LINED OR UNLINED Open structures holding storm water, combined wastewater, untreated or partially treated wastewater	NR	NR	NR	NR	NR	NR
34	a	BELOWGRADE METERING VAULT	Buildup of vapors from flammable or combustible liquids	NNV	Enclosed space	Division 2	NC, LC, or LFS	NR
	b	Physically separated from the wet well and with closed piping system		C	Enclosed space	Unclassified	NC, LC, or LFS	NR
35	a	BELOWGRADE METERING VAULT	Possible ignition of flammable gases and floating flammable liquids	NNV	Enclosed space	Division 1	NC	NR
	b	With an exposed wastewater surface		B	Enclosed space	Division 2	NC, LC, or LFS	NR
36		COARSE AND FINE SCREEN FACILITIES (See "Coarse and Fine Screen Facilities" in Table 5.2.2.)						

Note: The following codes are used in this table:

A: No ventilation or ventilated at less than 12 air changes per hour

B: Continuously ventilated at 12 changes per hour

C: Continuously ventilated at six air changes per hour

CGD: Combustible gas detection system

D: No ventilation or ventilated at less than six air changes per hour

FAS: Fire alarm system

FE: Portable fire extinguisher

LC: Limited-combustible material

LFS: Low flame spread index material

N/A: Not applicable

NC: Noncombustible material

NEC: In accordance with NFPA 70

NNV: Not normally ventilated

NR: No requirement

^aThe "Row" and "Line" columns are used to refer to specific figures in A.4.2 and specific requirements for each location and function.

^bThis column indicates the ventilation requirements for processes. Additional ventilation requirements are provided in Chapter 9. Ventilation signaling and alarm requirements are provided in Chapter 7.

^cThis column indicates the materials of construction for processes. Materials of construction for buildings in which these processes are housed are in accordance with the applicable building code and construction requirements provided in Chapter 8.

Table 5.2.2 Liquid Stream Treatment Processes

Row ^a	Line ^a	Location and Function	Fire and Explosion Hazard	Ventilation ^b	Extent of Classified Location ^c	NEC Hazardous Location Classification (All Class I, Group D) ^d	Materials of Construction ^e	Fire Protection Measures
1	a	DIVERSION AND CONTROL STRUCTURES Not preceded by Primary Treatment with Skimming	Possible ignition of flammable gases and floating flammable liquids	A	Enclosed — entire space	Division 1	NC	FE, H; CGD if enclosed in building
	b			B	Enclosed — entire space	Division 2	NC, LC, or LFS	FE, H; CGD if enclosed in a building
	c			Not enclosed, open to atmosphere	Within a 3 m (10 ft) envelope around equipment and open channel	Division 2	NC, LC, or LFS	FE and H
2	a	COARSE AND FINE SCREEN FACILITIES	Possible ignition of flammable gases and floating flammable liquids	A	Enclosed — entire space	Division 1	NC	FE, H, CGD
	b	Removal of screenings from raw wastewater		B	Enclosed — entire space	Division 2	NC, LC, or LFS	FE, H, CGD
	c			Not enclosed, open to atmosphere	Within a 3 m (10 ft) envelope around equipment and open channel	Division 2	NC, LC, or LFS	FE, H
3		PUMPING STATIONS, DIVERSION STRUCTURES AND CONTROL STRUCTURES (See Table 4.2.2.)						
4	a	FLOW EQUALIZATION TANKS	Possible ignition of flammable gases and floating flammable liquids	A	Enclosed — entire space	Division 1	NC	FE, H; CGD if enclosed in a building
	b	Storage of raw or partially treated wastewater		B	Enclosed — entire space	Division 2	NC, LC, or LFS	FE, H; CGD if enclosed in a building
	c			Not enclosed, open to atmosphere	Within a 3 m (10 ft) envelope around equipment and open channel ^{f,g}	Division 2	NC, LC, or LFS	FE, H
5	a	GRIT REMOVAL TANKS Separation of grit from raw wastewater	Possible ignition of flammable gases and floating flammable liquids	A	Enclosed — entire space	Division 1	NC	FE, H; CGD if enclosed in a building
	b			B	Enclosed — entire space	Division 2	NC, LC, or LFS	FE, H; CGD if enclosed in a building
	c			Not enclosed, open to atmosphere	Within a 3 m (10 ft) envelope around equipment and open channel ^{f,g}	Division 2	NC, LC, or LFS	FE, H
6	a	PRE-AERATION TANKS	Possible ignition of flammable gases and floating flammable liquids	A	Enclosed — entire space	Division 1	NC	H; CGD if enclosed in a building
	b	Conditioning of wastewater prior to further treatment		B	Enclosed — entire space	Division 2	NC, LC, or LFS	H; CGD if enclosed in a building
	c			Not enclosed, open to atmosphere	Within a 3 m (10 ft) envelope around equipment and open channel ^{f,g}	Division 2	NC, LC, or LFS	H

(continues)