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NFPA 120 Coal Preparation Plants 1988 Edition

National Fire Protection Association Batterymarch Park, Quincy, MA 02269

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Policy Adopted by NFPA Board of Directors on December 3, 1982

The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

Statement on NFPA Procedures

This material has been developed under the published procedures of the National Fire Protection Association, which are designed to assure the appointment of technically competent Committees having balanced representation. While these procedures assure the highest degree of care, neither the National Fire Protection Association, its members, nor those participating in its activities accepts any liability resulting from compliance or noncompliance with the provisions given herein, for any restrictions imposed on materials or processes, or for the completeness of the text.

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NATIONAL FIRE PROTECTION ASSOCIATION

NFPA 120

Standard for

Coal Preparation Plants

1988 Edition

This edition of NFPA 120, *Standard for Coal Preparation Plants*, was prepared by the Technical Committee on Mining Facilities, and acted on by the National Fire Protection Association, Inc. at its Annual Meeting held May 16-18, 1988, in Los Angeles, California. It was issued by the Standards Council on June 8, 1988, with an effective date of June 28, 1988, and supersedes all previous editions.

The 1988 edition of this document has been approved by the American National Standards Institute.

Origin and Development of NFPA 120

The 1984 edition of Coal Preparation Plants was prepared by the Technical Committee on Mining Facilities and issued on December 8, 1983, with an effective date of December 28, 1983.

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 Coal Preparation Plants, NFPA 653, which was the same as the 1959 edition, 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.

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This list represents the membership at the time the Committee was balloted on the text of this edition. Since that time, changes in the membership may have occurred.

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.

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Standard for

Coal Preparation Plants

1988 Edition

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

Information on referenced publications can be found in Chapter 5.

Chapter 1 Introduction

1-1 Scope.

1-1.1* This standard covers minimum requirements for reducing the potential for losses of life and property from fire and explosion in coal preparation plants. Only plants designed to prepare or condition coal for use are included in this standard. Coal pulverizers and other equipment used to transport or prepare coal for firing in boilers at power generating plants or for utilization in certain special processes are not covered in this standard.

1-1.2 This standard is not retroactive, but operators are urged to avail themselves of any information herein that will prevent dust dispersions, eliminate sources of ignition, or otherwise reduce fire and explosion hazards by improving conditions in their plants.

1-1.3 Nothing in this standard is intended to prevent the use of new methods or devices, provided sufficient technical data are submitted to the authority having jurisdiction to demonstrate that the new method or device is equivalent in quality, effectiveness, durability, and safety to that prescribed by this standard.

1-2 Purpose.

1-2.1 This standard is prepared for the use and guidance of those charged with designing, constructing, and operating coal preparation plants.

1-2.2 Coal preparation plants shall be designed by experienced persons familiar with fire and explosion hazards in coal processing plants.

1-3 Definitions. The common terms in this standard are in accordance with general usage or dictionary definitions. The following terms are used with the meanings indicated. A number of special terms are individually defined in the text.

Approved. Acceptable to the "authority having jurisdiction."

NOTE: The National Fire Protection Association does not approve, inspect or certify any installations, procedures, equipment, or materials nor does it approve or evaluate testing laboratories. In determining the acceptability of installations or procedures, equipment or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization concerned with product evaluations which is in a position to determine compliance with appropriate standards for the current production of listed items.

Authority Having Jurisdiction. The "authority having jurisdiction" is the organization, office or individual responsible for "approving" equipment, an installation or a procedure.

NOTE: The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner since jurisdictions and "approval" agencies vary as do their responsibilities. Where public safety is primary, the "authority having jurisdiction" may be a federal, state, local or other regional department or individual such as a fire chief, fire marshal, chief of a fire prevention bureau, labor department, health department, building official, electrical inspector, or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the "authority having jurisdiction." In many circumstances the property owner or his designated agent assumes the role of the "authority having jurisdiction"; at government installations, the commanding officer or departmental official may be the "authority having jurisdiction."

Coal. Where the word "coal" is used in the recommendations or requirements of this standard, it is understood that the term includes lignite and all grades of coal that may present a fire or explosion hazard.

Deduster. A mechanical device used to separate coal dust from the coal surface.

Labeled. Equipment or materials to which has been attached a label, symbol or other identifying mark of an organization 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.

Listed. Equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

Noncombustible Material. A material which, 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. Materials reported as passing the test method of ASTM E-136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C*, shall be considered as noncombustible materials.

Shall. Indicates a mandatory requirement.

Should. Indicates recommendations or that which is advised but not required.

Chapter 2 General

2-1 Materials and Construction.

2-1.1 Coal mine surface buildings and structures, housing and supporting coal processing and handling equipment shall be of noncombustible construction.

2-1.2 Dry coal screening, crushing, dry cleaning, and other operations producing coal dust shall be conducted in open structures to prevent the accumulation of dust concentration levels to prevent explosion hazards. Where open structures are impractical, enclosed buildings shall be provided with explosion venting in accordance with Section 4-7 and shall be located so as to minimize fire and explosion exposure to major buildings and equipment.

Exception: Location of these processes in the main plant building is permissible provided the dust producing area is provided with explosion venting in accordance with Section 4-7 and is separated from the remainder of the building by construction designed to withstand the pressure buildup from an explosion prior to pressure relief by explosion vents.

2-1.3 Buildings and equipment shall be shaped, installed, or protected to minimize the surface area on which coal dust can accumulate. Adequate access for cleaning or washing down shall be provided.

2-1.3.1 Access platforms or walkways installed between floors may be open grid construction to facilitate cleaning.

2-1.4 Walls or partitions isolating sections of the plant containing dust-producing operations shall be constructed and installed in such a manner as to prevent the transmission of dust to adjacent areas. To prevent the accumulation of dust on exposed wall or partition framing, metal siding or other equivalent material shall be installed on the side facing the dust-producing section.

2-1.5 Doors through the walls or partitions required under 2-1.4 shall be self-closing.

2-1.6 Drain systems shall be provided in areas where cleaning is accomplished by washing down.

2-1.7 Explosion venting shall be provided in areas where coal dust may be present in explosive or ignitable quantities by the provision of a minimum ratio of 1 ft^2 (.1 m^2) of explosion vent area for each 65 ft^3 (19.813 m^3) of enclosured volume in accordance with NFPA 68, *Guide for Venting of Deflagrations.*

2-2 Storage.

2-2.1* Coal bins, bunkers, and silos shall meet the following requirements: (a) Storage shall be limited to as short a duration as feasible; (b) Equipment shall be of noncombustible construction designed to minimize coal hangup; (c) Means shall be provided to remove burning, wet, or smoldering coal so that it can be disposed of safely.

2-2.2 All interior bins handling dusty material shall be suitably vented in accordance with Section 4-6.

2-2.3 Storage bins for coal shall be so located that sources of heat not intended to specifically control the temperature of coal will not materially raise the temperature of the contents of the bin.

2-3 Driers.

2-3.1 Drying system structures shall be essentially open structures to facilitate optimum explosion venting.

Exception: Where winter conditions make open structures impractical, enclosed buildings shall be provided with explosion venting in accordance with Section 4-7 and shall be located to minimize fire and explosion exposure to other buildings and equipment.

2-3.2 Access floors, platforms, walkways, and stairs on the thermal drier structure shall be located so that personnel will not be directly exposed to an explosion vent.

2-3.3 All newly constructed thermal coal drying systems shall be located at least 100 ft (30.5 m) from any underground coal mine opening.

2-4 Electrical Classification of Hazard.

2-4.1 Plant areas of open construction where coal dust or any combustible gases liberated from the coal will be freely dispersed to the open atmosphere shall be classified nonhazardous.

2-4.2 Plant areas isolated from the coal process, such as control rooms, electrical equipment rooms, or substations, provided with adequate ventilation to prevent the accumulation of combustible gases or coal dust shall be classified nonhazardous.

2-4.3 Enclosed areas of processing plants where coal is sufficiently wet to prevent particles from becoming airborne or dry coal dust does not accumulate shall be classified nonhazardous.

2-4.4 Enclosed areas where the failure or malfunction of the ventilation would result in the accumulation of ignitable concentrations of methane gas shall be designated as Class I, Division 2 locations in accordance with NFPA 70, Article 500, *National Electrical Code®*.

Exception: Areas of a processing plant normally designated as Class I may be considered nonhazardous provided the following conditions are met: (1) Adequate ventilation, (2) Fail-safe continuous methane monitoring designed to sound an alarm when the methane-air mixture reaches 20 percent of the lower explosive level (LEL); (3) An interlock to automatically stop the process equipment when the methane-air mixture reaches 40 percent of the LEL, (4) An electrical system so arranged that when methane concentrations reach 40 percent of LEL, all electrical circuits including control circuit conductors will be deenergized, (5) Any equipment that is needed to restore the plant to a safe condition, such as lighting, ventilation, or sump pumps, is installed according to Class I, Division 1 requirements.

NOTE: Electrical components of ventilation equipment installed in the open and out of the ventilation air being pulled from the hazardous area may be considered nonhazardous.

2-4.4.1 Electrical equipment approved as "permissible" by the Mine Safety and Health Administration (MSHA) shall be acceptable in locations classified Class I, Division 1.

NOTE: Electrical equipment classed as "permissible" is certified as meeting the requirements of 30 CFR Chapter I, Part 18.

2-4.5 Enclosed areas, where coal dust will normally not be in suspension in explosive or ignitable quantities or where coal dust may be present in explosive or ignitable quantities or may be in suspension in the air due to a malfunction, shall be designated as Class II, Division 2 in accordance with NFPA 70, Article 500, *National Electrical Code*.

NOTE: Approved, intrinsically safe electrical equipment may be used in any areas classified hazardous.

2-4.6* The structure of a preparation plant shall be connected to a common and an adequate electrical ground.

2-4.6.1 Any electrical equipment that is mounted on a concrete pad shall be grounded to the metal structure with a shunt. When the structure is nonmetallic, a separate grounding grid for equipment shall be provided.

2-5 Gas or Electric Welding and Cutting.

2-5.1 Gas or electric welding or cutting procedures shall be in accordance with NFPA 51B, *Standard for Fire Prevention in Use of Cutting and Welding Processes*, and the following requirements.

2-5.2 Welding and flame cutting shall be performed only by experienced personnel who have been instructed in precautions and procedures for safety in these operations. Before any cutting or welding is performed, prior approval shall be granted by the plant superintendent or designated agent.

2-5.2.1 All welding and cutting equipment shall be maintained in proper condition. Flashback preventers shall be installed at the outlets of all pressure regulators. When not in use, the compressed gas cylinder valve shall be closed. Appropriate personal protective equipment, including gloves, goggles, or welding hood, shall be worn by persons during welding or flame cutting operations.

2-5.3 All machinery and operations producing dust within range of welding sparks shall be shut down prior to the start of the welding or cutting job and remain inoperative until a final inspection is completed.

2-5.4 Tests for methane gas (CH_4) shall be made before cutting or welding in any area where methane gas is likely to be present. Cutting or welding shall not be allowed unless the concentration is less than one percent by volume.

2-5.4.1 In confined areas, positive ventilation shall be established prior to start-up of cutting or welding operations.

2-5.5 Combustibles, such as oil, grease, and coal, within 15 ft (4.6 m) of the welding or flame cutting work, shall be cleaned up or wetted down before cutting or welding commences. Open gear cases or other exposed machinery components containing lubricants within 15 ft (4.6 m) shall be covered with noncombustible material.

2-5.5.1 Noncombustible barriers shall be installed below welding or cutting operations that are being performed in or over shafts, silos, and similar openings.

2-5.6 A charged water hose line or a multipurpose dry chemical, hand portable extinguisher having a minimum nominal capacity of 20 lb (9.07 kg) shall be at the work site before cutting or welding commences.

2-5.7 Inspection for sparks, smoldering material, and fire shall be made frequently during cutting or welding.

2-5.7.1 Where welding or cutting with arc or flame is being performed in the proximity of combustible materials that cannot be removed or protected from ignition sources, a responsible person equipped with extinguishing devices shall be stationed to guard against fire due to sparks. After completion of the work, a thorough search of the area, including the floors above and below, shall be made for fires and for potential development of smoldering fires.

2-5.8 If a major welding or cutting operation is to be undertaken, and the plant cannot be shut down, special precautions shall be taken as deemed appropriate by the plant superintendent in addition to those required in 2-5.7.1.

2-5.9 Welding or cutting shall not be performed on flammable or combustible liquid or gas containers.

2-6 Maintenance. The responsibility for establishing a maintenance program that ensures that the equipment is in proper working order shall rest with the user. All coal-handling equipment and machinery shall be maintained in accordance with the manufacturer's recommendations.

2-7 Housekeeping. Provision shall be made for periodic cleaning to prevent the excessive accumulation of dust. Combustible waste materials shall not be permitted to accumulate in locations where a fire or explosion hazard would be created.

2-8 Flammable and Combustible Liquids.

2-8.1 The storage, use, and handling of flammable and combustible liquids in and around buildings and active workings shall conform with NFPA 30, *Flammable and Combustible Liquids Code*, except Sections 2-8, 4-7, 5-5, and Chapters 1, 6, 7, and 9. When storage involves 1100 gal (4.2 m^3) or less, applicable provisions of NFPA 395, *Standard for the Storage of Flammable and Combustible Liquids on Farms and Isolated Construction Projects*, may be used.

NOTE: Combustible liquids may be stored in collapsible tanks provided that (1) the temperature of the liquid is maintained at less than its flash point; (2) a liquidtight dike, at least 1½ times greater in volume, surrounds the tank; (3) a vent having a free opening at least equivalent to the inlet port is provided; and (4) the tank is conspicuously marked "Combustible — Keep Fire and

Flame Away" with the name of the stored liquids prominently displayed.

2-8.2 The mine operator shall provide the authority having jurisdiction, upon request, information about the composition and flash point of the flammable and combustible materials.

2-8.3 Smoking and open flames shall be prohibited in areas or places where fire or explosion hazards exist. Signs warning against smoking and open flames shall be conspicuously posted.

2-9 Lightning Protection. If lightning protection is required, it shall be in accordance with NFPA 78, *Lightning Protection Code.*

2-10 Miscellaneous.

2-10.1 Vehicles using liquid fuels shall be refueled only at locations designated for that purpose and from approved dispensing pumps. Engines, except diesel engines, shall be shut off during refueling.

2-10.1.1* Bulk storage of flammable and combustible liquids shall be in accordance with applicable provisions of NFPA 30, *Flammable and Combustible Liquids Code,* or NFPA 395, *Standard for the Storage of Flammable and Combustible Liquids on Farms and Isolated Construction Projects.*

2-10.2 Battery charging installations shall be located in areas designated for that purpose; such areas shall be kept free of extraneous combustible materials. Facilities shall be provided for flushing spilled electrolyte, for fire protection, for protecting charging apparatus from damage by trucks, and for adequate ventilation for dispersal of fumes from gassing batteries.

Chapter 3 Fire Protection

3-1 Portable Extinguishers.

3-1.1 Every building or room in the plant where combustible material is present or dry coal is processed or handled shall be provided with approved portable multipurpose fire extinguishers. The number of such extinguishers, the type, and distribution shall be in accordance with NFPA 10, *Standard for Portable Fire Extinguishers*; except that the smallest extinguisher shall have a nominal capacity of 20 lb (9.07 kg) of agent and a minimum rating of 10A, 60BC.

3-1.2 Extinguishers employing sodium bicarbonate or potassium bicarbonate based agent may be used if the hazard is confined solely to electrical equipment.

3-2 Fixed Fire Suppression Systems.

3-2.1 Where required by the authority having jurisdiction, fixed fire suppression systems shall be provided for the protection of conveyor belts that carry coal from below-ground galleries or tunnels, beneath bins, storage piles, chutes, hoppers, junction houses, transfer houses, silo head houses, switch gear, control rooms, main and secondary belt drives, and combustible and flammable liquid storage or process areas. Areas except where Class I or Class II liquids are stored shall be considered as ordinary hazard.

3-2.1.1 Fire protection systems shall be designed by a qualified person in accordance with the appropriate NFPA standards depending upon the extinguishing agent utilized. Working plans for the sprinkler system shall be submitted for approval to the authority having jurisdiction.

3-2.2 Automatic sprinkler systems shall be dry-pipe or shall be filled with antifreeze solution if freezing temperatures may be encountered.

3-2.2.1 Antifreeze protected systems shall be equipped with a soft seat check valve at or near the shutoff valve. The check valve and the shutoff valve shall be protected against freezing. The antifreeze solution shall be tested annually before the advent of cold weather to be sure that the solution is adequate for the lowest temperature that may be encountered.

3-3 Standpipe and Hose Systems.

3-3.1* Class II Standpipe Systems shall be provided in all coal preparation plants in accordance with the applicable sections of NFPA 14, *Standard for the Installation of Standpipe and Hose Systems.*

NOTE: Care should be exercised in the application of water to avoid the use of solid hose streams in locations where they could create explosions by disturbing dust deposits.

3-3.2 When automatic sprinkler systems are to be supplied through the standpipe system, hydraulic calculations shall be made to assure that the piping and water supply will be adequate to supply hose and automatic sprinkler demand simultaneously.

3-4 Inspection and Maintenance.

3-4.1 Portable extinguishers shall be maintained in accordance with NFPA 10, *Standard for Portable Fire Extinguishers.*

3-4.2 Any fire suppression system, including sprinklers, installed under the requirements of this standard shall be properly maintained to provide maximum assurance that the system will operate effectively. The occupant is responsible for the condition and maintenance of the system and shall use due diligence in keeping the system in good operating condition.

3-4.2.1 Any troubles or impairments shall be corrected promptly by competent personnel.

3-4.2.2 All persons who may be expected to inspect, test, or maintain fire suppression systems shall be thoroughly trained in the functions they are expected to perform with periodic refresher instructions.

3-5 Training.

3-5.1 All operating employees shall be instructed annually on the different classes of fires, types of fire fighting equipment, fire prevention, and fire fighting tactics.

3-5.2 All employees shall be instructed annually on the procedures for discharging portable fire extinguishers and the proper method of fire attack.

3-5.3 All employees shall be instructed on emergency evacuation procedures annually.

Chapter 4 Fire and Explosion Prevention of Specific Hazards

4-1 Chutes and Hoppers. Equipment such as chutework and hoppers that control the flow of material to and from screening or crushing equipment shall have minimum openings to the atmosphere to reduce dust dispersion.

4-2* Conveyors.

4-2.1* Belt conveyors installed in coal preparation plants shall meet the following minimum requirements:

(a) Conveyor belts shall be of a material designed to resist ignition.

(b) Each conveyor system shall be provided with a device arranged to automatically shut off driving power in the event of belt slowdown.

(c) Hydraulic systems for belt alignment, if provided, shall use only listed fire retardant hydraulic fluids or be protected by an automatic fire protection system.

(d) Means shall be provided to remove tramp metal and other foreign objects as early in the handling process as possible.

4-2.2* Structure-supporting belt conveyors shall be designed to minimize horizontal flat surfaces either between the top and bottom strands of the belt or beneath the bottom strand of the belt. The effort shall be to minimize the surfaces near the belting which can catch and retain fine coal liable to ignite spontaneously.

4-2.3 Special attention shall be given to preventing and cleaning up accumulations of fine coal dust beneath and relatively close to belt conveyors.

4-3 Dedusters. All dedusting equipment shall be directly connected to a suction system capable of moving enough air to prevent the leakage of dust out of the system. The suction system shall discharge the dust-laden air by the shortest possible route to collectors outside the building.

4-4* Pneumatic Cleaners. Adequate dust-collecting systems with suction hoods at the cleaners, suction ducting that maintains at least a 4000 fpm (20 m/s) air velocity, and dust collectors having pressure release venting shall be installed. Belt conveyor-type transfers and loading points associated with the cleaners shall be similarly hooded and connected to dust collectors.

4-5* Driers.

4-5.1 Drier heating units that are fired by pulverized coal shall be installed, operated, and maintained in accordance with NFPA 85F, *Standard for the Installation and Operation of Pulverized Fuel Systems*.

4-5.1.1 Driers of the direct-fired type shall be designed and operated so that combustion is substantially complete in the furnace/air heater before the gases of combustion come in direct contact with the coal being dried in the drying chamber.

4-5.1.2 Driers shall be designed and constructed to be dusttight with smooth surfaces to prevent accumulation of coal.

4-5.1.3 Where coal may be exposed to excessive heat on normal or emergency shutdown, a bypass stack with an automatically controlled damper shall be installed to direct the products of combustion away from the coal.

4-5.1.4 Thermal drier systems that have a hot gas inlet or plenum chambers where fly ash or coal siftings may accumulate shall be equipped with drop-out doors or ports to facilitate removal of these solids. Where continuous means of removing drop-out solids are not provided, frequent checking and manual clean-out shall be provided as conditions warrant.

4-5.1.5 Boilers (heat sources) for indirect heat exchange-type driers shall be located in an isolated area of the plant.

4-5.1.6 All internal areas of thermal coal driers where coal solids could possibly hang up or accumulate under any abnormal operating condition, such as in the drying chamber or dry cyclone collector, shall be equipped with explosion relief vents that open directly to the outside atmosphere. These vents shall be of sufficient number, size, and location to operate in excess of the design normal pressure. Explosion vents shall be checked or tested at least once each month and records kept to verify these checks. (*See NFPA 68, Guide for Venting of Deflagrations.*)

4-5.1.7 During system operation, frequent visual checks shall be made of all the mechanical components and equipment associated with the drying system.

4-5.2 Instrumentation Panels on thermal driers shall be located in an area relatively free of moisture, vibration, dust, and noise. The Control Panel shall be located within the continuous range and view of the supervising operator. The Main Control Panel supervising operator shall be provided with windows that give visual contact with the thermal drying system. The Drier Control Panel shall include recording-type control instruments, monitoring indicators, alarms, and temperature limits set to maintain proper operation. Audible and visual alarms shall be electrically interlocked to provide safe shutdown of the drier when unsafe temperatures or other emergency malfunctions occur. Control instruments shall be checked and serviced by a qualified technician every three months.

4-5.2.1 Where pneumatic controls are used, instrument quality air shall be provided.

4-5.3 Drying chambers shall be protected by an automatic water spray system. The automatic spray system shall include a manual control. The source for the fire pro-

tection water shall be such that the required volume flow rate and pressure of clean (solids-free) water is available at all times and that the exposed piping shall be protected against freezing.

4-5.4 All main fans shall be inspected on a regular basis and shall have bearing temperature and vibration detectors.

4-5.5 Driers that have been shut down because of a fire or any other emergency condition during regular operation shall be checked to be sure burning material does not exist within the system before being placed back in service. Driers that have remained idle for a long period shall be carefully inspected before being placed back in operation.

4-5.6 Driers shall be designed and installed, if possible, with their explosion vents opening directly to the outside. This can usually be accomplished by installing the drier along an outside wall of the building, directly under the roof, or by having a portion of the drier extend through the roof. If such locations are not practicable, ducts to the outside of the building shall be as short as possible and designed to resist explosion pressure.

4-5.7 Cyclone collectors used with driers shall be equipped with explosion vents equal in size to the cross-sectional area of the exhaust sleeve to supplement the venting area provided at the exhaust opening.

4-6 Dust Collectors and Dust Removal Equipment.

4-6.1 Those areas in which combustible dust is or may be in suspension in the air continuously, intermittently, or periodically under normal operating conditions shall be provided with a dust-collecting system or systems to collect such dust and prevent its discharge to the atmosphere.

4-6.1.1 All coal-handling equipment or machinery that produces dust shall be connected to a dust collector with ducts and hoods that have sufficient suction volume and velocity to collect and transport all the dust produced. Hoods, enclosures, and ducts shall be of noncombustible construction, designed and maintained in accordance with the *Industrial Ventilation Manual of Recommended Practice* by the American Conference of Governmental Industrial Hygienists, and NFPA 91, *Standard for the Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying.*

4-6.1.2 All dust collectors, other than those that are an integral part of dust-producing equipment, shall be located outside the working areas, preferably outside the building or in separate rooms properly vented to the outside.

4-6.2 When a plant or handling facility is planned, special attention shall be given to the location of the dust-producing equipment with respect to the location of the dust collection devices to ensure that the connecting ducts will be as straight and as short as possible.

4-6.2.1 All dry dust collectors shall be of noncombustible construction, equipped with adequate explosion doors or vents. (*See NFPA 68, Guide for Venting of Deflagrations.*)

4-6.2.2 The entire dust-collecting system shall conform to applicable sections of NFPA 91, *Standard for the Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying.*

4-6.3 In no case shall the design of the dust removal system be such that the dust is drawn through the fan before entering the collector. Fans shall be of noncombustible construction.

4-6.4 Ducts shall be designed to maintain a velocity of not less than 4500 fpm (22.9 m/s) to ensure the transport of both coarse and fine particles and to ensure reentrainment if for any reason the particles should fall out before delivery to the dust collector (for example, in the event of a power failure).

4-6.4.1 Round ducts shall be used wherever possible. Rectangular ducts shall be used only where clearance prevents the use of round ducts. Rectangular ducts shall be made as nearly square as possible to minimize the deposit of combustible materials. All ducts shall have a minimum number of bends and irregularities that may interfere with free airflow.

4-6.4.2 In bag-type dust collectors, the bags shall be constructed of antistatic, fire resistant material and shall be provided with a suitable electrical ground.

4-6.4.3 Dust collector hoppers shall be sloped at approximately 60° to assure material flow. Hopper discharge valves or screw conveyors to continually discharge the dust shall be provided. Hoppers are not to be used as storage bins.

4-6.4.4 Hood take-offs shall have a minimum area of four times the area of the duct. Duct-work shall also be supplied with blast gates and dampers for individual pickup volume adjustment.

4-7 Explosion Venting.

4-7.1* Provisions shall be made for venting an explosion from coal preparation plant buildings or sections of buildings housing screens, pneumatic coal-cleaning equipment, driers, and other dust-producing machinery.

NOTE 1: Additional information on explosion venting and descriptions of different types of vents and vent closures will be found in NFPA 68, *Guide for Venting of Deflagrations.*

NOTE 2: Individual vents are recommended for certain types of equipment in which ignition of dust clouds may occur.

NOTE 3: The requirements for explosion vents should not be confused with recommendations dealing with ventilation or the provision of vents for the control or equalization of pressure in operating processes.

4-7.2 Ventilating hoods and exhaust ducts shall not be acceptable as explosion venting devices unless they are properly designed for a dual purpose and function to provide direct release of excess pressure to the outside.

4-7.3 Equipment vents or ducts used to direct the energy of an explosion in equipment to the outside of the building

or a safe location shall be as short as possible and shall be designed to withstand the explosion pressure. Vent closures, which may be necessary to permit proper functioning of equipment and to prevent the escape of dust during normal operation, shall be designed to open at the lowest possible increase in pressure or be of flexible or frangible materials that will blow out or rupture readily to permit the release of explosion pressure.

4-8 Control Rooms. Positive pressure shall be maintained in control rooms to keep out fugitive dust.

4-9 Miscellaneous Equipment. Powder-actuated tools shall not be used in hazardous atmospheres.

4-10* Coal Storage. Coal storage piles shall meet the following requirements.

(a) Short duration, active or "live" storage piles shall be worked to prevent dead pockets of coal, a potential source of spontaneous heating.

(b) Coal piles shall not be located above sources of heat such as steam lines or sources of air such as manholes.

(c) Coal placed in long-term storage shall be piled in layers, appropriately spread and compacted prior to the addition of subsequent layers to reduce air movement and to minimize water infiltration into the pile.

(d) Where possible, storage piles shall be arranged to allow access to the pile with earthmoving equipment in the event of developing hotspots or fire.

Chapter 5 Referenced Publications

5-1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

5-1.1 NFPA Publications. National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

NFPA 10-1988, *Standard for Portable Fire Extinguishers*

NFPA 14-1986, *Standard for the Installation of Standpipe and Hose Systems*

NFPA 30-1987, *Flammable and Combustible Liquids Code*

NFPA 51B-1984, *Standard for Fire Prevention in Use of Cutting and Welding Processes*

NFPA 68-1988, *Guide for Venting of Deflagrations*

NFPA 70-1987, *National Electrical Code*

NFPA 78-1986, *Lightning Protection Code*

NFPA 85F-1988, *Standard for the Installation and Operation of Pulverized Fuel Systems*

NFPA 91-1983, *Standard for the Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying*

NFPA 395-1988, *Standard for the Storage of Flammable and Combustible Liquids on Farms and Isolated Construction Projects*

5-1.2 Other Publications.

ASTM E-136-81, *Standard Test Method For Behavior of Materials In a Vertical Tube Furnace at 750°C*, American Society for Testing and Materials, 1916 Race St., Philadelphia, PA 19103.

Appendix A

This Appendix is not a part of the requirements of this NFPA document but is included for information purposes only.

A-1-1.1 The subcommittee studied the record of fires in and around coal preparation plants since the passage of the Coal Mine Health and Safety Act of 1969, using the data from "An Annotated Bibliography of Coal Mine Fire Reports" prepared by the Allen Corp. under Bureau of Mines Contract No. JO275008. Additional reports were obtained from MSHA covering the period since the Allen report and through 1980.

After eliminating certain fires that occurred in wooden structures, the subcommittee made a simplified classification of these fires covering the eleven-year period.

	Preparation Plants			Coal Bins, Silos	Storage Stock-piles	Tun-nels	Belt Gal-leries
	Belt	Dryer	Other				
1970			1	2			
1971	1	1					
1972							
1973	1						
1974							
1975		1		1			
1976					1		
1977				1		1	
1978		1					
1979		1		1			1
1980		1		2		1	2

The subcommittee recognizes that the listing above is incomplete, since only fires having a duration in excess of thirty minutes must be reported. Also, many fires that ignite spontaneously in storage piles and silos are loaded out and extinguished without incident. Many of these fires of stored coal are not reported. However, certain generalizations can be made.

Because of the wide range of chemical and structural characteristics of coals, it is not possible to rate clearly the spontaneous ignition characteristics of coals. In general, lower volatile coals do not ignite readily. Higher sulfur content and higher oxygen content coals ignite more readily. Usually, experience with a given coal is the only way to know how it must be handled and compacted or how long it can be stored before it will start to heat seriously. As new mines are opened to mine the lower rank coals of the western United States, the problems of spontaneous ignition and fires in stored coal will increase.

A-2-2.1 Provision for removing burning coal to a safe area should be considered utilizing conveyors. These conveyors may require manual waterspray to cool smoldering coal. Flanged openings can be used for removing burning coal if adequate planning and equipment have been provided.

A-2-4.6 The intent of this requirement is the avoidance of arcing ignition sources resulting from differing electrical potentials between metal structural elements or between any such element and ground. The metal building elements may include the building frame (beams, columns, etc.), roof panels, building or control room panels, building utilities such as piping, ducts, or conduit, or other items. The objective of connecting metal parts to a ground is recognized as the best means of avoiding arcing between building elements or between those elements and ground or other grounded items. Any arrangement that provides both a good ground and a system of metal continuity from the ground to all metal elements achieves the intent. Where construction provides solid, secure metal-to-metal contact, the necessary continuity is normally provided. In any case where grounding is in question, resistance measurements should be made between the most remote and/or suspected elements and ground. If the tests show less than 0.1 ohm resistance to ground, the arrangement can be considered satisfactory. Testing should be done during dry weather when ground moisture is at a minimum. If lightning protection is provided (*see Section 2-9*), additional bonding of major building members to lightning system conductors may be required. Such bonding can, however, serve the grounding needs covered by this requirement.

A-2-10.1.1 Bulk storage of Class II combustible liquids should be outside of the preparation plant and should be appropriate for the nature of the liquids and the quantities being stored. Tanks within the preparation plant should be of limited size, holding no more than the quantities needed for one and one-half shifts of operation. Each tank should be fitted with an overflow pipe of ample size to return the full volume of the transfer pump to the bulk storage tank. Tanks within the preparation plant should be isolated from the rest of the plant. The isolated area containing the tanks should be protected with an automatic sprinkler system able to give a density of 0.15 gpm/sq ft (6.1 Lpm/m^2) over the entire area with all heads flowing. The floors beneath these tanks should have curbs, adequate slope, and floor drains able to handle the liquid from the tanks as well as the discharge from all automatic sprinklers.

A-3-3.1 In plants where sufficient vibration is anticipated that will cause movement of the fire protection system resulting in wear of water piping at the hangers, it may be necessary to install vibration absorbers.

A-4-2 Unless the conveyor is very long, burning coal on a moving belt is not likely to ignite the belt. Also, if the belt should ignite, the burning of the belt is likely to be extinguished after the burning coal has been discharged and the belt continues to run. The subcommittee has not found any report of running conveyor belts, in and around preparation plants, catching fire and burning. Every case reported of belts catching fire and burning has occurred after the belts have been stopped.

Some preparation plants use the froth flotation process to separate impurities from fine coal. The agents typically used in froth flotation are Class II combustible liquids. The coal recovered from the froth cells is minimally coated with these agents. It has been found that frothed coal carried on conveyor belts will coat the belting with the agents and the coated belting will ignite easily and the flame spread will be much more rapid. It is recommended that belts that carry frothed coal be protected with automatic sprinklers. While the froth flotation process operates as a water slurry and presents no risk of fire, the reagents normally used are No. 2 fuel oil and methyl isobutyl carbinol (MIBC), which are Class II combustible liquids.

A-4-2.1 U.S. Mine Safety and Health Administration Standards for fire retardant conveyor belt materials should be used as a guide. Fire retardant belt materials will burn and, therefore, may require additional fire protection.

A-4-2.2 A steel deck, which is often placed between top and bottom strands of a belt conveyor, should not be used. It is recommended that existing decks be removed.

Belt galleries that use supporting trusses with substantial length of span should be set entirely beneath the belt so that in the event of a fire, the loaded structural members of the truss will not be seriously exposed to the heat of the burning belt. The supports for the troughing and return idlers should not be structural parts of the truss. The covering for the belt should be open partially on the walkway side, allowing access to the belt and to the belt idlers for maintenance and fire fighting.

Belts that are located entirely within relatively long span supporting trusses should be protected by a fixed fire protection system.

A-4-4 Pneumatic coal-cleaning systems employ low-pressure air, usually pulsed, to effect a separation between relatively dry coal and the mechanically associated impurities. The coal is usually ¾ in. (19 mm) and smaller with up to 4 percent surface moisture. The pickup of fines from the feed coal in the process air stream creates a potentially explosive mixture. However, approximately 400 fpm (2.03 m/s) air velocity dissipates methane from the coal and in practice has resulted in explosion and fire hazards of very low proportions inside the equipment. Nonetheless, around the equipment the fire hazard exists from unintentionally vented fine coal, and all hazards are greater where the cleaners are preceded by thermal driers.

A-4-5 Thermal coal driers may be of any type that conforms to the requirements of this section, including rotary driers, continuous carrier driers, vertical tray and cascade driers, multilouver driers, suspension or flash driers, and fluidized bed driers. These direct-fired convection-type driers constitute the majority of the current operational units. Almost all of these units utilize special direct-fired air heater-type furnaces, usually coal-fired by stokers or by pulverized fuel systems. Indirect drying or conduction-type driers provide contact of solids to areas that are indirectly heated by another media such as steam or oil. The media in these systems is normally recirculated and reheated by special gas- or oil-fired furnaces.

A-4-7.1 Provision of 1 sq ft (.1 m^2) of building vent for each 80 cu ft (2.3 m^3) of volume or space in which an explosion may occur is generally considered adequate for coal preparation plants, although the amount of venting required to minimize structural damage that may be caused by a dust explosion will vary according to the strength of the building, extent of the hazard, location and distribution of vents, properties of the coal dust, and other factors.

A-4-10 Fortunately, evidence of heating is easy to detect. During the early stage of heating, the odor is unmistakable. When heating is more advanced, smoke and steam may also be apparent. If the hot coal is in an exposed storage pile, the hot material can be dug out and wetted. If the hot material must be loaded onto a conveyor belt, the loading areas should be hosed down and water should be applied to the hot material before or as it gets onto the belt.

Tunnels under silos or storage piles should be adequately ventilated and should be protected with a system of automatic sprinklers. Hoses for wash down and for fire fighting should be provided. The main tunnel should have exit routes at opposite ends of the tunnel.

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SUBMITTING PROPOSALS ON NFPA TECHNICAL COMMITTEE DOCUMENTS

Contact NFPA Standards Administration for final date for receipt of proposals on a specific document.

INSTRUCTIONS

Please use the forms which follow for submitting proposed amendments. Use a separate form for each proposal.

1. For each document on which you are proposing amendment indicate:
   (a) The number and title of the document
   (b) The specific section or paragraph.

2. Check the box indicating whether or not this proposal recommends new text, revised text, or to delete text.

3. In the space identified as "Proposal" include the wording you propose as new or revised text, or indicate if you wish to delete text.

4. In the space titled "Statement of Problem and Substantiation for Proposal" state the problem which will be resolved by your recommendation and give the specific reason for your proposal including copies of tests, research papers, fire experience, etc. If a statement is more than 200 words in length, the technical committee is authorized to abstract it for the Technical Committee Report.

5. Check the box indicating whether or not this proposal is original material, and if it is not, indicate source.

6. If supplementary material (photographs, diagrams, reports, etc.) is included, you may be required to submit sufficient copies for all members and alternates of the technical committee.

NOTE: The NFPA Regulations Governing Committee Projects in Paragraph 10-10 state: Each proposal shall be submitted to the Council Secretary and shall include:

(a) identification of the submitter and his affiliation (Committee, organization, company) where appropriate, and

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(c) a statement of the problem and substantiation for the proposal, and

(d) proposed text of proposal, including the wording to be added, revised (and how revised), or deleted.

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National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269

Date 5/18/85 Name John B. Smith Tel. No. 617-555-1212

Address 9 Seattle St., Seattle, WA 02255

Representing (Please indicate organization, company or self) Fire Marshals Assn. of North America

1. a) Document Title: Protective Signaling Systems NFPA No. & Year NFPA 72D

   b) Section/Paragraph: 2-7.1 (Exception)

2. Proposal recommends: (Check one) ☐ new text
   ☐ revised text
   ☒ deleted text.

3. Proposal (include proposed new or revised wording, or identification of wording to be deleted):

   Delete exception.

4. Statement of Problem and Substantiation for Proposal:

   A properly installed and maintained system should be free of ground faults. The occurrence of one or more ground faults should be required to cause a "trouble" signal because it indicates a condition that could contribute to future malfunction of the system. Ground fault protection has been widely available on these systems for years and its cost is negligible. Requiring it on all systems will promote better installations, maintenance and reliability.

5. ☒ This Proposal is original material.
   ☐ This Proposal is not original material; its source (if known) is as follows: _____

(Note: Original material is considered to be the submitter's own idea based on or as a result of his own experience, thought, or research and, to the best of his knowledge, is not copied from another source.)

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