

DOSH DIRECTIVE

Department of Labor and Industries
Division of Occupational Safety and Health
Keeping Washington safe and working

12.85

Enforcement and Consultation Guidance for Combustible Dust Hazards

Updated: September 27, 2023

I. Purpose

This directive establishes statewide DOSH enforcement and consultation policy for workplaces that generate or handle combustible dusts having the potential to cause dust deflagrations, other fires, or explosions. To reduce the risk of combustible dust incidents within Washington workplaces, enforcement and consultation of existing rules are being emphasized in response to Federal OSHA's National Emphasis Program (NEP) on combustible dust, OSHA CPL 03-00-008, Revised Combustible Dust National Emphasis Program. DOSH has not adopted the OSHA Combustible Dust NEP, however, the guidance provided in this directive, when applied appropriately to facilities with potential combustible dust hazards, is expected to result in safer workplaces with reduced hazard potential from the dusts encountered.

II. Scope and Application

This directive applies to all workplaces that generate or handle combustible dusts having the potential to cause dust deflagrations, other fires, or explosions. **This is an update to the version issued December 30, 2008.**

CSHOs should consult WAC 296-99, *Safety standards for grain handling facilities* where applicable. In addition, this directive is not intended for inspections or consultations of explosives and pyrotechnics manufacturing facilities covered by chapter 296-67 WAC, Process Safety Management of Highly Hazardous Chemicals (PSM). However, the directive may apply to facilities that manufacture or handle other types of combustible dusts such as ammonium perchlorate covered under the PSM standard.

III. References

- WAC 296-99 – Safety Standards for Grain Handling Facilities
- WAC 296-24-95601--Definitions applicable to WAC 296-24-956 through 29624-985.

- OSHA CPL 03-00-008, Combustible Dust National Emphasis Program (Reissued)
https://www.osha.gov/sites/default/files/enforcement/directives/CPL_03-00-008.pdf
- Safety and Health Information Bulletin (SHIB)--Improper Installation of Wood Dust Collectors in the Woodworking Industry—May 2, 1997. [OSHA Hazard Information Bulletins Improper Installation of Wood Dust Collectors in the Woodworking Industry | Occupational Safety and Health Administration](#)
- OSHA Regional Administrators Memorandum [Evaluating Hazardous Levels of Accumulation Depth for Combustible Dusts | Occupational Safety and Health Administration \(osha.gov\)](#) April 21, 2015.
- [OSHA Technical Manual - Section IV, Chapter 6, Combustible Dusts](#)

Additionally, the following references apply to combustible dust hazards and industries.

- NFPA 33, Standard for Spray Application Using Flammable or Combustible Materials.
- NFPA 61, Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities.
- NFPA 68, Standard on Explosion Protection by Deflagration Venting.
- NFPA 69, Standard on Explosion Prevention Systems.
- NFPA 70, National Electrical Code.
- NFPA 77, Recommended Practice on Static Electricity.
- NFPA 85, Boiler and Combustion Systems Hazards Code.
- NFPA 86, Standard for Ovens and Furnaces.
- NFPA 91, Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids.
- NFPA 120, Standard for Fire Prevention and Control in Coal Mines.
- NFPA 484, Standard for Combustible Metals.
- NFPA 499, Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas.
- NFPA 505: Fire Safety Standard for Powered Industrial Trucks.
- NFPA 652, Standard on the Fundamentals of Combustible Dust.
- NFPA 654, Standard for the Prevention of Fires and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids.
- NFPA 655, Standard on Prevention of Sulfur Fires and Explosions.
- NFPA 664, Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities.
- NFPA 850 Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations.

- NFPA 2113, Standard on Selection, Care, Use and Maintenance of Flame- Resistant Garments for Protection of Industrial Personnel Against Flash Fire.
- ASTM E1226-12a, Standard Test Method for Explosibility of Dust Clouds.
- ASTM E1515, Standard Test Method for Minimum Explosible Concentration of Combustible Dusts.
- FM Global, Datasheet No. 5-1, Electrical Equipment in Hazardous (Classified) Locations.
- FM Global, Datasheet No. 5-8, Static Electricity.
- FM Global, Datasheet No. 6-9, Industrial Ovens and Dryers.
- FM Global, Datasheet No. 6-17, Rotary Kilns and Dryers.
- FM Global, Datasheet No. 7-04, Paper Machines and Pulp Dryers.
- FM Global, Datasheet No. 7-10, Wood Processing and Woodworking Facilities.
- FM Global, Datasheet No. 7-17, Explosion Protection Systems.
- FM Global, Datasheet No. 7-27, Spray Application of Ignitable and Combustible Materials.
- FM Global, Datasheet No. 7-36, Pharmaceutical Operations.
- FM Global, Data Sheet No. 7-73, Dust Collectors and Collection Systems.
- FM Global, Data Sheet No. 7-76, Prevention and Mitigation of Combustible Dust Explosion and Fire.
- FM Global, Datasheet No. 7-78, Industrial Exhaust Systems.
- FM Global, Datasheet No. 7-85, Metals and Alloys.
- National Materials Advisory Board (NMAB) 353-3-80, Classification of Combustible Dusts in Accordance with the National Electrical Code.
- ANSI/AMCA 99-16, “Standards Handbook.”
- Center for Chemical Process Safety, Guidelines for Safe Handling of Powders and Bulk Solids, AIChE, 2010.

IV. Background

A number of combustible dust incidents have resulted in deaths and serious injuries. In many cases, the employer did not recognize the hazards posed by combustible dust.

A dust deflagration occurs when the right concentration of finely divided dust suspended in air contacts a source of ignition. If the deflagration is in a confined area, an explosion potential exists. These materials can also cause other fires. Combustible dust is often either organic or metal dust finely ground into very small particles. The actual quantity of dust that may accumulate in an affected

area may vary, depending upon air movement, particle size, or any number of other factors. These dusts include, but are not limited to:

- Metal dust such as aluminum, magnesium, and some forms of iron dusts
- Wood dust
- Coal and other carbon dusts, including carbon black
- Plastic dust, phenolic resins, toner, and additives
- Rubber dust
- Biosolids
- Organic dust such as sugar, flour, paper, soap, vegetation, and dried blood
- Dust from certain textile materials.
- Dust from cannabis operations

Industries that may handle combustible dusts include, but are not limited to:

- Agriculture
- Food Products
- Chemicals
- Textiles
- Forest and furniture products
- Metal processing
- Tire and rubber manufacturing plants
- Paper products
- 3D printing
- Pharmaceuticals
- Wastewater treatment
- Recycling operations (metal, paper, and plastic.)
- Coal dust in coal handling and processing facilities.

V. **Definitions – Chapter 296-24-990 WAC**

A. Class II locations. Class II locations are those that are hazardous because combustible dust is present. Class II locations are divided by the source and quantity of dust into the following divisions:

1. **Class II, Division 1.** A location in which:

- Combustible dust is or may be in suspension in the air under normal operating conditions, in quantities sufficient to produce explosives or ignitable mixtures; or
- Mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced, and might also provide a source of ignition through simultaneous failure of electric equipment, operation of protection devices, or from other causes; or

- Combustible dusts of an electrically conductive nature may be present.

2. **Class II, Division 2.** A location in which:

- Combustible dust will not normally be in suspension in the air in quantities sufficient to produce explosive or ignitable mixtures; and dust accumulations are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus; or
- Dust may be in suspension in the air as a result of infrequent malfunctioning of handling or processing equipment, and dust accumulations resulting may be ignitable by abnormal operation or failure of electrical equipment or other apparatus.

Note: This classification includes locations where dangerous concentrations of suspended dust would not be likely but where dust accumulations might form on or in the vicinity of electric equipment. These areas may contain equipment from which appreciable quantities of dust would escape under abnormal operating conditions; or be adjacent to a Class II Division 1 location as described above, into which an explosive or ignitable concentration of dust may be put into suspension under abnormal operating conditions.

3. Class II locations with combustible dust atmospheres further divide by the type of dust into the following groups:

- **Group E.** Atmospheres containing combustible metal dusts, including aluminum, magnesium, and their commercial alloys, and other combustible dusts whose particle size, abrasiveness, and conductivity present similar hazards in the use of electrical equipment.
- **Group F.** Atmospheres containing combustible carbonaceous dusts that have more than 8 percent total entrapped volatiles (see ASTM D 3175, *Standard Test Method for Volatile Matter in the Analysis Sample of Coal and Coke*, for coal and coke dusts) or that have been sensitized by other materials so that they present an explosion hazard. Coal, carbon black, charcoal, and coke dusts are examples of carbonaceous dusts.
- **Group G.** Atmospheres containing other combustible dusts, including flour, grain, wood flour, plastic and chemicals.

- B. Combustible dust.** A finely divided combustible particulate solid that presents a flash fire or deflagration hazard when suspended in air or some other oxidizing medium over a range of concentrations, regardless of particle size or shape.
- C. Combustible Particulate Solid.** Any solid material composed of distinct particles or pieces, regardless of size, shape, or chemical composition that, when processed, stored, or handled in the facility, has the potential to produce a combustible dust.

- D. **Deflagration.** Propagation of a combustion zone at a speed that is less than the speed of sound in the un-reacted medium.
- E. **Deflagration Isolation.** A method employing equipment, such as flame arresters, flame front diverters, spark detection, spark extinguishing equipment, and rotary valves, and procedures that interrupts the propagation of a deflagration flame front, past a predetermined point.
- F. **Deflagration Suppression.** The technique of detecting and arresting combustion in a confined space while the combustion is still in its incipient stage, thus preventing the development of pressures that could result in an explosion.
- G. **Detachment.** Location in a separate building or an outside area removed from other structures to be protected by a distance.
- H. **Detonation.** Propagation of a combustion zone at or above the speed of sound in the unreacted medium.
- I. **Dust Collector / System.** A combination of equipment and associated piping/ductwork/instrumentation designed to capture, contain, and transport fugitive dust to an air-material separator to remove the dust from the process equipment or surrounding area.
- J. **Dust Explosion Hazard Area.** A room or building volume where an unvented deflagration of the entrainable dust mass can result in a pressure exceeding the strength of the weakest structural element not intended to fail.
- K. **Dust Flash-Fire Hazard Area.** An area where combustible dust accumulation on exposed or concealed surfaces, external to equipment or containers, can result in personnel injury from thermal dose during a dust deflagration, as well as any areas where a dust cloud of a hazardous concentration exists.
- L. **Dust Hazards Analysis (DHA):** A systematic review to identify and evaluate the potential fire, flash fire, or explosion hazards associated with the presence of one or more combustible particulate solids in a process or facility.
- M. **Explosion.** The bursting or rupture of an enclosure or a container due to the development of internal pressure from deflagration.
- N. **Flash Fire.** A fire that spreads by means of a flame front rapidly through a diffuse fuel, such as dust, gas, or the vapors of an ignitable liquid, without the production of damaging pressure.
- O. **Minimum Explosible Concentration (MEC).** The minimum concentration of combustible dust suspended in air, measured in mass per unit volume that will support a deflagration. Note that in some references, including some tables in NFPA standards, MEC may be referred to as LFL (Lower Flammable Limit) or LEL (Lower Explosive Limit).
- P. **Hybrid mixtures.** An explosible heterogeneous mixture, comprising of gas with suspended solid or liquid particulates, in which the total flammable gas concentration is ≥ 10 percent of the lower flammable limit (LFL) and the total

suspended particulate concentration is ≥ 10 percent of the minimum explosible concentration (MEC).

- Q. Dust deflagration index, K_{st} .** The maximum rate of pressure rise generated when dust is tested in a confined enclosure and normalized for vessel volume. It provides an indication of the severity of a dust explosion.
- R. Minimum Ignition Energy (MIE).** The lowest capacitive spark energy capable of igniting the most ignition-sensitive concentration of a flammable vapor-air mixture or a combustible dust-air mixture as determined by a standard test procedure.
- S. Minimum Ignition Temperature (MIT).** The lowest surface temperature capable of igniting a powder or dust dispersed in the form of a dust cloud or as a layer on a hot surface.
- T. Pressure Ratio (PR).** The ratio of the maximum pressure due to combustion (minus ignitor pressure) to the pressure at ignition.
- U. Non-separated.** Dust accumulations are considered non-separated unless segregation, separation, or detachment is used to limit the hazard area.
- V. Segregation.** The establishment of a physical barrier between the dust hazard area and an area to be protected.
- W. Separation.** The inclusion of minimum separation distance between the combustible particulate solid process and other operations that are in the same [compartment/subdivision of an enclosure].

VI. Inspection and Consultation Procedures

- A. Use Professional Judgment:** DOSH compliance and consultation staff must use professional judgment when evaluating facilities with potential combustible dust hazards. Only CSHOs trained and knowledgeable in recognizing hazards associated with combustible dust should be assigned to conduct inspections related to combustible dust. One training option is the OTI Course 3320, Combustible Dust Hazards and Controls. Contact Industrial Hygiene Technical Services as needed. Also, use appropriate personal precautionary measures for the particular hazards presented in facilities with combustible dust hazards.
- B. Personal Protective Equipment (PPE):** In addition to the normally required personal protective equipment, wear non-spark-producing clothing such as natural fiber (e.g., cotton). It is also recommended that non-spark producing or flame-resistant (FR) clothing complying with NFPA 2112 during the inspections under this NEP. NFPA 2113 should be consulted for selection, care, and maintenance of FR clothing.

FR clothing should meet the design and testing requirements of NFPA 2112 and should include the label: "THIS GARMENT MEETS THE REQUIREMENTS OF NFPA 2112, STANDARD ON FLAME- RESISTANT GARMENTS FOR PROTECTION OF INDUSTRIAL PERSONNEL AGAINST FLASH FIRE. NFPA 2113 REQUIRES UPPER AND LOWER BODY COVERAGE."

For inspections involving combustible metal or other low -MIE dusts, and where employers have installed static dissipative flooring to reduce ignition hazards, static dissipative footwear must be worn, or other means used to ensure that CSHOs are appropriately grounded.

- C. Photos:** Cameras and video cameras must be appropriate (i.e. intrinsically safe) for the work environment. However, if such cameras are not available, take photographs or videos using a telephoto feature from locations within the plant that are not hazardous (classified) locations.

NOTE: Because of its spark-producing potential, no equipment including cameras with electronic flashes or electrical equipment may be used in hazardous (classified) locations of the facilities unless the equipment is intrinsically safe, approved, or safe as defined in WAC 296-24-95613 for use in these types of areas.

- D. Interviews:** Take written or verbal statements both from employees and, if possible, from employers regarding the hazardous conditions including alleged violations such as dust accumulations or explosion vents not directed to safe locations away from the employees working in the area.
- E. Sampling:** Use safe practices when collecting potentially combustible dust samples, such as not generating a dust cloud while collecting a sample and using the right tools in collecting the samples. When collecting a sample from a large area, a paintbrush and dustpan can be used. Contact the DOSH Lab for advice on dust collection equipment. If a means of safe access is not available when entering potentially hazardous areas of a facility, do not collect samples.

Pictures of dust layer thicknesses, and quantities/extent of dust accumulations are also valuable, and should be used to document CSHO findings. Obtaining photographs of elevated or otherwise inaccessible areas may be possible by using a camera mounted on an extension pole with remote or timed exposure control.

If you have questions about collecting dust samples, contact the DOSH Lab.

Locations from which to collect separate samples include:

- "High spaces" such as roof beams, open web beams, tops of pipes and ductwork, and other horizontal surfaces located as high in the overhead as

possible. Note: These are the preferred locations; however, if a means of safe access is not available, do not collect samples.

- Equipment and floors where dust has accumulated.
- The interior of a dust collector, for example a bin or bag.
- Within ductwork.

F. Identifying Combustible Dust Hazards: A dust deflagration occurs when the right concentration of finely divided dust suspended in air is exposed to a source of ignition. The following criteria must be met before a deflagration can occur:

- The dust must be combustible.
- The dust must be dispersed in air or another oxidant, and the concentration of dispersed dust must be at or above the minimum explosible concentration (MEC).
- There must be an ignition source, such as an electrostatic discharge, spark, glowing ember, hot surface, friction heat, or a flame that can ignite the dispersed combustible mixture.

An explosion could result if the combustible dust is dispersed within a confined enclosure such as a vessel, storage bin, ductwork, room, or building and the confined enclosure does not contain sufficient deflagration venting capacity to safely release the pressures. A small deflagration can disturb and suspend the combustible dust, which could then serve as the fuel for a secondary (and often more damaging) deflagration or explosion.

Dust in the workplace typically falls into two categories. The first category is process dust used in or generated by the workplace processes and equipment. This includes machinery and equipment that collects, transports, stores and/or disposes of the combustible dust. The second category, fugitive dust, was never “captured” by the dust collection system or was collected and subsequently “escaped” back into the workplace.

The following conditions may indicate that a potential dust deflagration, other fire, or explosion hazard exists:

- **History of Plant Fires:** The plant has a history of fires involving combustible dusts.
- **Safety Data Sheets (SDS):** The SDS may indicate that a particular dust is combustible and can cause explosions, deflagrations, or other fires. However, do not use the SDS as a sole source of information because this information is often not included in the SDS.
Testing/sampling must be performed to determine the explosion and combustibility parameters of the dust samples.

- **Dust Accumulations:** Areas of the plant with hazardous accumulations of dust. Likely areas of dust accumulations within a plant are:
 - Horizontal and structural members
 - Conduit and pipe racks
 - Cable trays
 - Floors
 - Areas above suspended ceilings
 - On and around equipment (leaks around dust collectors and ductwork), particularly on elevated horizontal surfaces
- **Electrical area classification drawings/documents:** Electrical area classification drawings/documents are required for the facility. Class II, Division I or Division 2 areas must be identified and electrical equipment must be approved for the hazardous location.
- **Dust Hazard Analysis (DHA):** A systematic hazard analysis performed by an employer to identify, evaluate the potential fire, flash fire, or explosion hazards associated with the presence of combustible dust in a process or facility.
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There are several ways to calculate the hazard from settled dust outlined in NFPA 654. For many situations, the Layer Depth Method is easiest. To use the Layer Depth Method, CSHOs must determine the bulk density of combustible dusts as part of the combustible dust hazard documentation, unless dust accumulations are documented to exceed one inch in depth (extending over five percent of the floor area of a room or a building, or 1000 ft², whichever is less).

Consult the [OSHA Regional Administrators Memorandum Evaluating Hazardous Levels of Accumulation Depth for Combustible Dusts, April 21, 2015](#) for guidance on determining the hazard from settled combustible dust. Additional details are found in NFPA 654.

Consult with the DOSH Industrial Hygiene Laboratory prior to sending in samples of combustible dust.

Note: NFPA 654 is currently under revision and is undergoing consolidation into NFPA 660. DOSH Directive 12.85 will be updated after NFPA 660 is released. Contact Industrial Hygiene Technical Services for more details.

G. Site Evaluation.

1. Dust Control in Process Equipment

Examine dust collectors, ductwork, associated equipment, and containers, like mixers or storage bins. Gather the following information during the course of the inspection or consultation:

- Explosion prevention and mitigation controls such as the isolation or segregation of dust-generating processes, building damage limiting construction, explosion venting for dust-processing areas; process equipment relief (see NFPA 68), and process isolation and explosion suppression (see NFPA 69).
- Design information on the dust collection systems, along with model numbers and serial numbers (located on the side of the equipment along with the manufacturer and phone numbers).
- Size (volume) of dust collectors (Note: Dust collectors are referred to as "air-material separators" in NFPA 654).

2. Fugitive Dust Control

Does the facility have a housekeeping program with regular cleaning frequencies established for floors and horizontal surfaces, such as ducts, pipes, hoods, ledges, and beams, to minimize dust accumulations within operating areas of the facility? Under the housekeeping program, is the dust on floors, structural members, and other surfaces removed concurrently with operations?

Document the dimensions of the work area and the areas **and depth** of the dust accumulations.

Are the dust-containing systems (ducts and dust collectors) designed **and continuously operated** in a manner that fugitive dusts are not allowed to accumulate in the work area?

3. Sources of Ignition

Does the facility use grounding and bonding or other methods, for dissipating any electrostatic charge that could be generated while transporting the dust through the ductwork? Are duct systems, dust collectors, and dust-producing machinery bonded and grounded to minimize the accumulation of static electrical charge?

Does the facility have separator devices to remove foreign materials capable of igniting combustible dusts?

Are electrically-powered cleaning devices used in dusty areas, such as sweepers or vacuum cleaners, approved for the hazard classification as required under WAC 296-24-**95711**?

In areas where a hazardous quantity of dust accumulates or is in suspension in the air, does all electrical wiring and equipment comply with WAC 296-24-95711?

Does the facility allow hot work only in safe, designated areas?

VII. Enforcement and Consultation Policy

- A. Vertical Standards.** If a vertical standard addresses a hazard caused by combustible dust, cite that standard if a violation is discovered.
- B. Housekeeping Violations.** If the facility being evaluated is not a grain handling facility, and the surface dust accumulations (i.e., those outside the dust collection system or other containers, such as mixers) can create an explosion, deflagration or other fire hazard, then violations of WAC 296-800-22005 (housekeeping) shall be issued. The standard requires:

“Keep all areas of your workplace, passageways, storage rooms, and service rooms in a clean, orderly and sanitary condition to the extent the nature of the work allows.”

Small amounts of dust accumulations in isolated spots of the floor or other areas is not normally classified as a violation of the housekeeping requirement. Take representative measurements to substantiate housekeeping violations. Thickness measurements of the dust layer must be made at several locations within the area covered by dust.

As a part of determining whether the housekeeping violation is serious, it is necessary to determine whether the dust is combustible or can cause deflagration. Also document heat and ignition sources.

NOTE: This directive does not affect the application of WAC 296-800-22005 or other housekeeping standards to correct the general cleanliness of workplaces for conditions unrelated to a combustible dust hazard.

- C. Housekeeping violations in storage areas.** Cite WAC 296-800-22035 for housekeeping violations if the problem exists only in storage areas. The standard requires:

“Keep workplace storage areas free from accumulation of materials that could create hazards from tripping, fire, or explosion.”

Use the dust hazard criteria applicable to WAC 296-800-20005 violations when determining storage area violations. Document whether a reasonable person would recognize a combustible dust hazard under the circumstances.

NFPA standards may be used in this regard. The CSHO must also document feasible abatement methods. For examples, see NFPA 654 Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids.

If the dust accumulations outside of the storage areas are also being cited, then WAC 296-800-22005 should be used for the entire workplace.

D. Process machines and equipment violations. A citation under WAC 296-800-11010 (safe place) may be issued for deflagration, explosion or other fire hazards that may be caused by combustible dust within a dust collection system or other containers, such as mixers. The NFPA standards, which represent the opinions of experts familiar with combustible dust hazards, are useful in providing evidence of industry recognition of the hazard. For example, see NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids. Look at the employer's safety manuals or other instructions to determine whether there is employer recognition of the combustible dust hazard. Consult relevant NFPA standards for feasible means of abatement. The essence of a safe place citation is the hazard; do not issue a separate violation for a failure to use a particular abatement method. Heat and ignition sources should also be documented.

The following are some conditions for which a safe place violation may be issued:

- Problems related to dust collectors, e.g., dust collection equipment is not continuously operated; and dust collection equipment located inside the building without proper explosion protection systems, such as explosion venting or explosion suppression systems and dust collectors returning air back inside the building.
- Ductwork-related problems, e.g., the ductwork is not grounded and ductwork is not constructed of metal.
- Improperly designed deflagration venting (venting to areas where employees are likely to be exposed to explosion/deflagration hazards).
- Processing and material handling equipment, such as, mixers, blenders, pulverizers, mills, dryers, ovens, filters, dust collectors, pneumatic conveyors, and screw conveyors, not protected by deflagration suppression systems.
- Equipment connected by pipes and ducts not protected by deflagration isolation systems, such as flame arresters, flame front diverters, spark detection, spark extinguishing equipment, and rotary valves.

E. Personal Protective Equipment (PPE) Violations. Citations under WAC 296-800-160 (the general requirement to provide and assure the use of

protective equipment, including *protective clothing*) may be issued if an employee exposure to potential burn injuries can be documented. For example, if employees are not wearing protective clothing, such as flame resistant clothing, in areas of the plant (e.g., bagging areas) where employees may be exposed to potential combustible dust flash fire hazards, then citations may be issued. Another example where citations may be issued, would be a situation where employees (not wearing flame-resistant clothing) cleaning out a piece of equipment containing combustible dust may be exposed to a flash fire propagated through the cleanout door. A citation may be issued whether or not an accident precipitated the inspection.

Document whether a reasonable person familiar with the circumstances would recognize hazards from combustible dust. NFPA standards may be used for this documentation. Also, document whether there are feasible types of personal protective equipment to deal with these hazards. Recognized industry practice requires flame-resistant clothing when employees may be exposed to flash fire hazards. National Fire Protection Association (NFPA) 2113, *Standard on Selection, Care, Use and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire* is a national consensus standard which applies to, among others, chemical, refining, and terminal facilities with flash fire hazards. Among other provisions, NFPA 2113 has requirements for when flame-resistant clothing must be used by industrial personnel exposed to flash fire hazards. See Chapter 4 of NFPA 2113 for a discussion on selection of flame-resistant clothing.

- F. Process Safety Management.** If the dust in question appears on the list of Highly Hazardous Chemicals, Toxics, and Reactives (Appendix A to chapter 296-67 WAC) and is present in quantities greater than or equal to the listed threshold quantity, the PSM standard will apply. Violations under chapter 296-67 WAC shall be cited for PSM violations.
- G. Electrical Violations.** If the location meets the criteria for Class II, and if the location where the dust was present falls under any of the Class II location definitions, then WAC 296-24-95711 will apply. See the Class II definition in WAC 296-24-990.

Equipment, wiring methods, and installations of equipment in hazardous (classified) locations shall be: 1) intrinsically safe, 2) approved for the hazardous (classified) location, or 3) safe for the hazardous (classified) location. The meaning of these terms is detailed in WAC 296-24-95613(2).

If the employer chooses the third option of providing equipment that is "safe for the hazardous location," then the employer must demonstrate that the equipment is of a type and design that will provide protection from the hazards involved. Compliance with the guidelines contained in the National Electrical Code (NEC) constitutes one means, but not the only means, of demonstrating that the electrical equipment is safe for the hazardous location.

Citations and consultation reports issued for electrical violations must be adequately documented in the case file or consultation report. Such documentation must include the location and type of potential electrical ignition sources, the type and condition of electrical equipment located in the area, and information indicating that the equipment is not approved or safe for the location. (See NEC and NFPA 499 for more details.)

- H. Powered Industrial Trucks.** If powered industrial trucks without the appropriate designation are used in hazardous (classified) locations, citations shall be issued under WAC 296-863-50005.
- I. Welding, cutting, and brazing.** For violations involving welding, cutting, and brazing operations in explosive atmospheres, including mixtures of flammable dusts with air, cite the appropriate standard. For example, WAC 296-24-69503(6)(c) would be cited for cutting and welding in an explosive atmosphere (including combustible dust).
- J. Hazard communication violations.** The hazard communication standard, WAC 296-901, requires all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, material safety data sheets, and information and training. The "hazardous chemicals" definition encompasses physical hazards, which includes flammable solids. Employers who do not follow the requirements of this standard shall be cited with respect to chemicals that in the course of normal conditions of use could become combustible dusts.

Chapter 296-901-14014 WAC, *Safety Data sheets*, requires chemical manufacturers, distributors, and importers to develop or obtain a material safety data sheet for each hazardous chemical they produce or import.

Evaluate whether there is compliance by examining a sample of SDSs. If SDSs are not updated when new information becomes available, they are deficient.

- K. Egress violations.** Where violations of WAC 296-800-310, Exit Routes and Employee Alarm Systems are found, issue citations for them.

- L. Fire protection violations.** Citations for violations of chapter 296-811 WAC (fire brigades) and WAC 296-800-300 (portable fire extinguishers) shall be issued where violations of these standards are found. Chapter 296-811 WAC only applies in the context of this directive if the employer has a fire brigade or industrial fire department. The fire extinguisher provisions of WAC 296-800-300 do not apply where the employer requires the evacuation of employees in the event of fire and has an emergency action plan and a fire prevention plan meeting the requirements of WAC 296-24-567.
- M. Bakery equipment violations.** Issue citations for violations of WAC 296-806-42584 for fire and explosion hazards in sugar and spice pulverizers. WAC 296-806-42582 addresses dust hazards in sifters and WAC 296-806-42544 covers flour dust in dump bins and blenders.
- N. Sawmill violations.** Issue citations for violations of WAC 296-78-71019 in connection with defects in the design, construction, and maintenance of blower collecting and exhaust systems.
- O. Combustible dust that creates a health hazard.** If dust poses a health hazard to employees as an airborne contaminant, cite under chapter 296-841 WAC, Airborne Contaminants.

VIII. **Review and Expiration Date**

This Directive will be reviewed within two years from the issue date, for consistency with current DOSH operations, and will remain in effect as long as DOSH maintains a Severe Violator Enforcement Program.

IX. **Review and Cancellation**

DOSH will review this Directive for applicability within two years from the issue date, and it will remain effective until superseded or canceled.



Approved: _____

Craig Blackwood, L&I Assistant Director
Division of Occupational Safety and Health