



## WISHA Regional Directive 89-3b

**WRD 89-3b****SUBJECT: Grain Handling Facilities - Inspection Guidance and Standards Clarification**

**I. Purpose:** This directive provides guidelines for inspections conducted in grain handling facilities and clarification of Chapter 296-99 WAC.

**II. Background:** The final rule for the OSHA standard for grain handling facilities, 29 CFR 1910.272, was published in Federal Register Volume 52, Number 251 dated December 31, 1987, and became effective March 30, 1988. The WISHA standard for grain handling facilities was adopted identical on November 14, 1988, and became effective on December 14, 1988.

These guidelines were also published in OSHA Instruction CPL 2-1.4B dated August 29, 1988.

The OSHA standard culminates several years of effort in response to the hazards found in grain handling facilities, particularly fires and explosions. The standard addresses both hazards to employees presented by potential fires and explosions and other safety hazards, i.e., bin entry.

Although the standard applies to all grain handling facilities, it is not intended to address all hazards to be found in workplaces of this type. Therefore, the standards contained in Chapter 296-24 WAC for general industry and Chapter 296-56 WAC for marine terminals, as appropriate, will continue to apply to grain handling facilities.

Chapter 296-99 WAC, however, takes precedence inside the grain handling facility over other provisions in Chapter 296-24 WAC and Chapter 296-56 for the specific hazards the grain standard addresses.

**III. Effective Date:** This WISHA Regional Directive will supersede WISHA Regional Directive 89-3A issued November 16, 1990. WRD 89-3B is effective September 1, 1994, and will remain in effect until canceled or superseded.

**IV. Action:** Regional Administrators shall ensure that all inspections of grain handling facilities are conducted in accordance with the guidelines given in this directive.

A. Inspection Personnel.

1. Experienced Personnel Only. Only compliance safety and health officers (CSHOs) who are well trained and experienced in grain handling inspections will normally be assigned to conduct inspections in grain handling facilities. The regional administrator shall ensure that an adequate number of appropriately trained CSHOs are available for such inspections.

2. Availability of Personnel. In places where qualified CSHOs are unavailable or where their number is limited or they are overextended, the regional administrator will contact the compliance manager when the need for an authorized inspection arises, and arrangements will be made to make such personnel available to the region needing them.

3. Expert Services. The regional administrator, in consultation with the assistant attorney general and the compliance manager, shall decide as soon as practicable whether or not expert services from outside the agency (such as expert witnesses or an independent investigator) will be needed to support a grain handling case properly. If so, such services shall be involved at the earliest date practical.

B. CSHO Safety and Health. CSHOs shall take appropriate precautionary measures for the particular hazards presented in grain handling facilities.

1. Personal Protective Equipment (PPE). In addition to normal personal protective equipment, CSHOs conducting inspections in grain handling facilities shall wear natural fiber (i.e., cotton), non-spark-producing clothing. It is highly recommended that CSHOs be provided with appropriate flame-retardant clothing.

2. Manlifts.

- a. Care shall be taken that manlifts and other means of access to upper levels of a facility are used by CSHOs only when this can be done safely.

- b. The CSHOs shall be familiar with the requirements of WAC 296-24-900 through -90009, Manlifts; Chapter 296-82 WAC Safety Standards for Existing Belt Manlifts, Chapter 296-84 WAC Hand Power Manlifts; WAC 296-24-765 through -76523, Fixed Industrial Stairs; WAC 296-24-780 through -81013, Ladders; and shall conduct an in-depth safety evaluation of manlifts, ladders, stairways, etc., in the facility before using them to gain access to upper levels. If they are determined to be unsafe or not in compliance, and no alternative safe means are provided, the CSHO shall stop the inspection, follow normal enforcement procedures to achieve compliance, and return to finish the remainder of the inspection after abatement of the hazards have been verified.

c. Extreme caution shall be used on belt manlifts. Belt manlifts, even when totally in compliance with WISHA standards WAC 296-24-900 through 90009, pose a potential fall hazard to CSHOs. CSHOs shall utilize alternate routes, when available, when they feel their safety is in question. When using a manlift, CSHOs shall not carry clipboards or other equipment except when it is secured in a bag or container that leaves the hand free.

d. CSHOs who are not familiar with the particular type of manlifts used at the facility being inspected shall request specific hazard training and/or instruction from an appropriately knowledgeable employer representative.

C. Standard Clarifications. The following clarifications of specific provisions of Chapter 296-99 WAC are provided to assist CSHOs in conducting inspections at grain handling facilities.

1. WAC 296-99-010(1) and WAC 296-99-015(1), Scope and Application.

a. The majority of facilities covered by the standard are in Standard Industrial Classifications (SICs):

(1) 2041, Flour and Other Grain Mill Products;

(2) 2044, Rice Milling;

(3) 2048, Prepared Feeds and Feed Ingredients for Animals and Fowls, Not Elsewhere Classified;

(4) 4221, Farm Product Warehousing and Storage; and

(5) 5153, Grain.

b. Facilities in the following SICs are generally not covered by the standard:

(1) 2043, Cereal Breakfast Foods;

(2) 2045, Blended and Prepared Flour;

(3) 2047, Dog, Cat, and Other Pet Food; and

(4) 2051, Bread and Other Bakery Products, Except Cookies and

## Crackers.

c. Covered workplaces may also be found in other SICs (such as those listed in C.I.b above) where they are not the primary business. If a facility has a grain elevator onsite which receives, handles, stores, and ships (including transfer to another part of the facility) a bulk raw agricultural commodity, the standard applies to the grain elevator. An example of this type of facility is a grain elevator used in support of a brewery. (The important factor is that a bulk raw agricultural commodity enters the facility, is handled and stored, and then leaves the facility in the same form: a bulk, raw agricultural commodity.)

d. The standard does not apply to seed plants which handle and prepare seed for planting of future crops; on-farm storage, feed lots, or alfalfa storage; or processing operations which do not encompass the use of grain products such as a feed mill.

e. If the CSHO is uncertain as to what constitutes raw agricultural commodities, or the explosibility index of agricultural dusts, references include the Bureau of Mines report and the National Academy of Sciences' "Classification of Combustible Dust in Accordance with NEC." (See Appendix A, References, of this directive.)

2. Emergency Action Plan. WAC 296-24-567(1)(a) and WAC 296-24-567(2)(a), employee emergency action plans and fire prevention plans, requires the emergency action plan to be in writing, and a copy shall be available in the workplace.

3. WAC 296-99-030, Training.

a. The standard does not require that training records be kept to verify that employees have been adequately trained. Therefore, the CSHO shall substantiate the adequacy of training by interviewing a sample of employees.

b. Employers are to have commenced training of employees by the effective date of the standard, December 14, 1988. For special tasks, such as bin entry, training of employees shall have taken place before they are required to perform the work.

c. In addition to the training information and references listed in Appendix A.3. and Appendix C of the standard, see also Appendix A, References, of

this directive.

4. WAC 296-99-035, Hot Work Permit.

- a. If a permit is issued, the employer representative need not be at the specific "hot work" site during the entire time the work is performed. It is reasonable to expect that the employer should monitor frequently--at least each shift--to ensure that permit requirements are being followed.
- b. If the employer elects to have a representative present in lieu of a written permit, the employer must still follow the same requirements as if a permit were issued in accordance with WAC 296-24-695. The representative must, in this situation, be present for the entire duration of the job.
- c. The term "flame producing" used in the definition of "hot work" in WAC 296-99-020(4) includes ignition sources (sparks, arcs) produced by operation of electrical tools and grinding or drilling. Hot work permits are, therefore, necessary for these types of operations as well.

5. WAC 296-99-040, Entry into Bins, Silos, and Tanks.

- a. The life line shall be of such length that it would not allow the employees to sink any further than waist deep in the grain.
- b. For unique operations within flat storage buildings or tanks where the diameter is greater than the height:
  - (1) Employers could use an alternative protection system, e.g., static line restraint devices or the equivalent.
  - (2) In addition, where life lines are not feasible, the employer may have a standard operating procedure based on a written job hazard analysis which ensures that no employee enters the space while there is the possibility of either pockets in the grain or adherence of grain to the walls or sides of the building.
- d. If the employer or representative elects to remain present during the entire operation, all provisions of WAC 296-99-040 must still be complied with.
- e. When the CSHO can verify that fumigants have been applied, the

employer's program for testing of the atmospheres for toxicity shall be reviewed.

f. The CSHO shall also check the testing equipment used by the employer to verify that it has been properly calibrated and maintained.

g. Aeration fans do not constitute adequate forced air ventilation when the bin has grain above the aeration fan.

h. The CSHO shall evaluate the type of rescue equipment available to determine its adequacy for each particular situation, i.e., types and configuration of bins, which may be somewhat different at each facility. The employer may have to establish that the equipment is suitable to perform the task for the particular facility.

#### 6. WAC 296-99-045, Contractors.

a. The intent of the phrase "shall inform" is that an employer will have to provide specific instruction and training to contractors on the safety rules of the facility, including applicable provisions of the emergency action plan. Simply providing a copy of the safety program, for example, would not ensure that the contractor or the employer has taken adequate precaution to prevent exposure to potential hazards.

b. A "contractor" is anyone actually performing work on or inside the facility who is not an employee of the employer. This normally would not include service or inspection-related persons, e.g., vendors, delivery personnel, or insurance representatives, unless they pose or could create a hazard to facility employees while performing their duties.

#### 7. WAC 296-99-050, Housekeeping-General. The standard does not give employers leeway for establishing a token housekeeping plan; rather, it requires the employer to adopt housekeeping practices determined best to reduce accumulations of grain dust.

a. WAC 296-99-050(1) is applicable to grain elevators and those mills specified in WAC 296-99-015(1), Application.

b. WAC 296-99-050(2) applies to grain elevators and not to processing or mill operation.

c. In order to substantiate violations of the employer's housekeeping

programs, CSHOs shall carefully prepare the evidence by documenting the specific procedures the employer utilizes to keep dust accumulations at a minimum. Such documentation must address at least the following:

(1) Manual dust removal procedures, including frequency and extent.

(2) If installed, type and design characteristics of the dust collection system, including the location of the pickup points, i.e., boot or head of leg, belt load transfer areas, trippers on bin floors, scale bins, distributors or turn heads, or any other transfer points where dust emission could occur.

(3) Condition and effectiveness of the system, including documentation of maintenance and repair on closed conveyance systems, i.e., leaking spouts, worn-out gaskets, flanges, and other similar emission sources.

(4) Representative measurements and photos shall be taken to document apparent violations of the general housekeeping provisions of the standard. (See Chapter 296-99 WAC, Appendix A.) It may be necessary to take several measurements at specific locations within the general area. The locations shall be identified on a plant sketch.

NOTE: Because of spark-producing potential, flash bulbs and electronic flashes shall not be used under any circumstances in grain handling facilities.

(5) Areas of particular concern beyond the priority areas are the grain transfer points such as galleries, bin floors, and tunnels.

(6) Representative samples of dust shall be taken in areas where apparent violations of the general housekeeping provision exist to verify organic dust percentage, moisture content, and particle size. Sample quantities will not normally have to exceed one-half pint at each location.

(7) When the employer elects to utilize additives to control the dust rather than collection and other control methods, the CSHO shall document the types used, specific application points and application rate, and shall verify the effectiveness of the method through appropriate sampling and measurement.

8. WAC 296-99-050(2)(b), Housekeeping--Priority Areas. The standard establishes a 1/8-inch action level for housekeeping regarding grain dust accumulations in priority areas. This provision requires cleanup wherever 1/8-inch accumulates in any part of a priority area, regardless of total amount.

a. WAC 296-99-050(2)(b) Housekeeping - Priority Areas, This subdivision establishes a 1/8 inch action level for implementing the written housekeeping plan for dust removal in priority areas prescribed in WAC 296-99-050(1) and WAC 296-99-090(7)(b)(ii)(I) and subjects employers to citation in instances where dust accumulations exceeded 1/8 inch in priority areas. WAC 296-99-050(2)(b) was adopted identical to 29 CFR 1910.272(i)(2)(ii).

b. A representative number of measurements, photos, and samples shall be taken of all floor areas within a priority area to document a violation of the hazardous dust level; they shall be noted on a plant sketch.

Note: Because of spark-producing potential, flash bulbs and electronic flashes will not be used under any circumstances in grain handling facilities.

c. The CSHO shall use professional judgment to assess the extent of hazard presented by a given identified accumulation of grain dust. Small amounts of dust accumulation in isolated spots of the floor would not normally be classified as a serious violation of the requirement. Additionally, all other surfaces within the priority areas that have accumulations of dust shall be identified and documented as a potential violation of the overall housekeeping program specified by WAC 296-99-050 (1).

d. A priority area shall not be considered to include sections that are separated by walls, partitions, etc.; e.g., control rooms or offices with positive-pressure and self-closing doors.

9. WAC 296-99-050(3), Blowdown Operations.

a. Equipment may be operated during blowdown operations if the following conditions exist:

(1) The equipment is dust-tight and dust ignition-proof; or the equipment is intrinsically safe, i.e., insufficient heat or thermal

energy to ignite combustible dust; and

(2) The bearings are effectively monitored; and

(3) An effective preventive maintenance program has been implemented.

b. Isolation techniques, shrouding, etc., shall be encouraged and can be acceptable to minimize dust suspension and dispersal of accumulated dust.

10. WAC 296-99-050(4), Grain and Product Spills. Prompt attention to product spills, especially in flour mill operations, is critical. These spills shall be cleaned up immediately after identification. Grain spills do not present the same hazard as product spills and should be cleaned up as soon as possible after identification and as addressed by the standard's requirements.

11. WAC 296-99-055, Grate Openings. Employers shall be encouraged to utilize magnets and openings as small as possible in the receiving grate to minimize the hazard potential.

a. In special circumstances where commodities (such as corn cobs) cannot pass through the specified-sized grate openings (maximum width of 2.5 inches or 6.35 cm.), grates with larger openings may be used to accommodate the commodity if magnets are used at the receiving pit.

b. Where applicable, CSHOs shall evaluate the compliance of grate openings with WAC 296-24-750 through -75003.

12. WAC 296-99-060, Filter Collectors. An excellent reference for both the CSHO and the employer to evaluate and aid in abatement of problems with filter collectors is the National Academy of Science publication "Pneumatic Dust Control in Grain Elevators." (See Appendix A of this directive, References.)

13. WAC 296-99-065, Preventive Maintenance.

a. The standard does not require a specific frequency for preventive maintenance. The employer is permitted flexibility in determining the appropriate interval for maintenance provided that the effectiveness of the program can be demonstrated.

b. The CSHO shall particularly document and analyze the program and its effectiveness based on the time period. The program must be adequate for the peak period, such as during the harvest season. Particular attention should, therefore, be focused on the

harvest season. If the inspection is being conducted at a time other than the harvest season, the CSHO shall conduct an evaluation of programs. e.g., by interviewing sufficient key employees, to determine conditions and adequacy of preventive maintenance.

c. Manufacturers' recommendations for equipment can assist CSHOs in determining the adequacy of maintenance frequency criteria.

d. Bearings not associated with inside bucket elevators, i.e., those located on gallery and tunnel belts and mechanical equipment, must have inspections and proper lubrication as required by WAC 296-99-065(1)(b).

#### 14. WAC 296-99-075(1), Emergency Escape.

a. Employers will need to provide at least one emergency escape from the head house or any floor between the head house and ground level, in accordance with WAC 296-24-550 through -56701. Controlled descent devices and escape ladders are suitable means of escape from these areas. Manlifts (belts, caged, manual) are not considered an adequate means of escape; however, a fixed ladder in a manlift is acceptable.

b. If controlled descent devices are used, they shall be adequate to accommodate employees or occupants from a given area of the facility. All employees shall be trained in their use and provided with interface equipment such as a body harness and line sufficient to reach the ground or other safe level.

15. WAC 296-99-080(1)(b), Continuous-flow Bulk Raw Grain in Dryers. The CSHO can rely on the manufacturer's recommendations for maximum operating temperature of the drying section to determine or evaluate what is considered "excessive" temperature.

16. WAC 296-99-085, Inside Bucket Elevators. Elevator legs in mills will still have to comply with the requirements in WAC 296-99-065(1) for preventive maintenance even though they are not covered by WAC 296-99-085. (See WAC 296-99-015, Application.)

17. WAC 296-99-085(2). When an employer has written certification that will identify information pertaining to the belt, it will be considered to be in compliance.

18. WAC 296-99-085(4)(b). If any portion of the bearing (including inner dust seal) is making contact with the interior leg casing, the bearing will be considered partially inside the leg.

19. WAC 296-99-085(5). The most reliable and accurate monitor is the type where the sensor is mounted in the leg casing and actually monitors the fasteners (bolts) on the buckets or cups. The target disc type that measures shaft/pulley rotation is acceptable; however, a

significant speed variation could exist between the belt and the tail pulley, resulting in a very unreliable percentage indication. If the latter system is used, the employer should ensure that proper belt tension is maintained to ensure accuracy.

20. WAC 296-99-085(6). The preamble of the standard indicates that hydraulic boot takeups can be used in lieu of a belt alignment monitor. This is primarily designed to ensure proper belt tension; however, if there are features of the device that ensure proper alignment, it will be accepted.

21. WAC 296-99-085(7).

a. Permanent Storage Capacity. In determining the permanent storage capacity of an employer's workplace, the CSHO should consider the total storage for the entire complex. This storage would not necessarily have to be serviced by the same house or leg. It can comprise separate facilities that are a part of the same complex, e.g., an old wooden house with a new concrete facility across the road where employees of the same manager work at both locations. Those facilities or complexes where there are separate houses beyond a given geographical area, i.e., further apart than a square block, would not be considered in the total quantity. Temporary storage such as grain piled outside would also not be counted.

b. Daily Visual Inspection. The employer will have to verify, by actual visual observation, the methodology being used to ascertain proper belt speed and alignment. The employer will also have this as a part of training and the preventive maintenance program, and it will be properly documented.

22. WAC 296-99-085(8)(b). The employer will have to certify that concentrations are, in fact, below 25 percent of the Lower Explosive Limit (LEL). The employer may use instruments, tests, or surveys, or data developed on legs that are identical in size, configuration, speed, etc., to meet the intent of the requirement.

D. Effective Dates of Requirements. Most requirements of the standard had an effective date of December 14, 1988; that is, the employer was required to be in compliance as of that date.

1. There are several requirements, however, for which later effective dates apply:

a. March 30, 1989, for WAC 296-99-060, Filter collectors;

b. April 1, 1991, for WAC 296-99-080, Continuous-flow bulk raw grain dryers; and

c. April 1, 1991, for WAC 296-99-085(3), 296-99-085(4), 296-99-085(5) and 296-99-085(6), Inside bucket elevators.

2. Where an inspection is conducted in the interim, and an employer is found not yet to have complied with a requirement that will be effective at a later date, the area director shall send a letter to the employer:

- a. Advising of the requirement, the effective date, and the hazard(s) the requirement addresses;
- b. Encouraging prompt compliance with the requirement; and
- c. Offering any appropriate advice or assistance toward achieving compliance.

#### E. Additional Documentation to Support Violations--Construction and

Functional Details. The CSHO shall obtain the following information to support violations:

1. Type and age of facility.
2. Type of construction including:
  - a. A sketch of the workhouse showing names of floors from basement to roof;
  - b. Type of fire protection/fire alarm system;
  - c. Evacuation plan, with location of emergency exits including fixed ladders;
  - d. Explosion venting capability;
  - e. Dust removal plan, method of housekeeping, and type of dust removal (collection) system, together with location and type of dust collection bins or tanks;
  - f. Type of fumigation system and any other significant factors.
3. Plant size and capacity, type and volume of grains handled, product description including a process flow chart.
4. Type of grain receiving, handling and shipping procedures and equipment; number and location of elevator legs with a description of belt type and size, bucket design, belt speed, etc.; grain drying facilities, location, type of fuel, safety devices, etc.

F. Minimum Documentation Necessary for Electrical Hazards. Electrical installations and equipment in grain handling facilities are covered under WAC 296-24-95613.

1. WAC 296-24-95613 is a performance-oriented standard which permits the employer to follow any of three options: equipment, wiring methods, and installations of equipment in hazardous (classified) locations must be either intrinsically safe, or approved for the hazardous (classified) location.

a. 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 Class II hazards, that it is at least as safe as equipment following the guidelines contained in the National Electrical Code (NEC).

b. Acceptable evidence might be test data, approved equipment markings, or proof of conformity with the requirements of the edition of the NEC in effect at the time that the equipment was installed, together with proof that the equipment has not been subsequently changed.

2. Classification of an area as Class II, Division 1, will require documentation of the possibility that minimum explosive concentrations of dust might occur under normal operating conditions. Such concentrations, normally, could occur within the bucket elevator enclosure, within scales, and in the upper garner. They may occur at both ends of a horizontal conveyor or at any point between the two ends, and where specific dust collection or control methods are not used.

3. Classification of a grain handling facility or any area within it will normally, at the very least, be Class II, Division 2, as defined at WAC 296-24-95601(25)(b).

4. Some locations within a facility such as rooms or offices that are provided with positive pressure ventilation and self-closing doors, and are so constructed that the room will not allow grain dust to enter during normal operating conditions, could be considered as nonhazardous locations.

5. Any electrical citation issued must be adequately documented in the case file. Such documentation must address the following matters to the degree possible:

a. Type and quantity of accumulated grain dust, the amount likely to be in suspension, the conditions likely to give rise to such suspensions and their extent; the length of time over which such dust deposits have been accumulating together with any evidence of charring of layered dust; the ignition temperature of the dust and the humidity conditions within the facility at the time of the

inspection, if known (local atmospheric data may be obtained from the National Weather Service); evidence supporting the possibility that dust deposits or suspensions could be ignited. (See also IV.G.3. of this directive regarding laboratory support.)

b. Location and type of potential electrical ignition sources; type and condition of electrical equipment located in the area; evidence that electrical equipment is not safe for the location.

c. Likelihood of mechanical failure or electrical malfunctions or abnormal operation of machinery or equipment; combinations of factors which could result in explosive conditions.

d. Degree of confinement at the location.

#### G. Laboratory Support--Dust Sample Collection.

1. The division's Analytical Laboratory has the capability to analyze bulk grain samples for:

a. Particle size.

b. Combustible fraction of sample and percent combustible dust.

c. Minimum explosive concentration.

2. Dust sample collection and preparation for laboratory analysis shall be performed in the following manner:

a. Collect approximately one-half pint (0.25 liter) of dust in a wide-mouth plastic container with a tight-fitting screw cap. Do not use plastic bags.

b. Seal each container with a WISHA sample seal. Package the container(s) securely, using packing materials to cushion them during shipment.

c. Follow normal WISHA chain-of-custody procedures for all aspects of sample handling.

d. Indicate on (the Bulk Sample Data Sheet) that grain dust tests (the analysis described in F.1. above) are being requested.

3. If it is necessary to have grain dust analyzed for minimum explosive concentration, then a 1.0 liter sample will be necessary. The smaller sample (0.25 liter or one-half pint) noted above is sufficient to determine particle size, combustibility, and moisture content, but not for the tests needed to find the minimum explosive concentration.

## Appendix A

### References

The primary list of references relating to grain handling facilities is contained in Appendix C of Chapter 296-99 WAC. The following sources, some of which have been mentioned in this directive, may prove useful in assessing compliance with the standard.

1. Bureau of Mines Report of Investigation--5753. See preamble to the standard, 52 FR 49601, for description.
2. Classification of Combustible Dust in Accordance with NEC. National Academy of Sciences, Washington, D.C. Available from National Technical Information Service, Springfield, Virginia 22151.
3. Prevention of Grain Elevator and Mill Explosions. National Academy of Sciences, Washington, D.C. Available from National Technical Information Service, Springfield, Virginia 22151.
4. Pneumatic Dust Control in Grain Elevators. National Academy of Sciences, Washington, D.C. Available from National Technical Information Service, Springfield, Virginia 22151.
5. The Country Elevator Safety and Health Guidebook. Part of the "Grain Industry Safety and Health Center--Training Series," published under USDOL Grant No. E9F5B271. Grain Elevator and Processing Society, P.O. 15026, Commerce Station, Minneapolis, Minnesota 55415-0026.