INTRODUCTION

Employee safety and health considerations aside for a moment, the consequences of regulatory non-compliance have become increasingly severe, and now, in addition to significant civil penalties, criminal sanctions have been added to OSHA’s enforcement arsenal.

The challenge of regulatory compliance can be achieved only if the grain industry operations people have a good, basic understanding of the compliance requirements. Beyond reciting the standard, 29CFR 1910.272, this manual provides an interpretation of the standard and offers specific suggestions to guide the reader through the compliance criteria in language and format that I trust is user friendly.

Be advised that no compliance manual can encompass all of the various dynamics of a given area of risk. This manual is only a helper; a human loss prevention helper that, if properly used, will compliment and support the other areas of your safety and health program.
(a) **Scope**

**STANDARD:** This section contains requirements for the control of grain dust fires and explosions, and certain other safety hazards associated with grain handling facilities. It applies in addition to other relevant provisions of Part 1910 (or Part 1917 at marine terminals),

**INTERPRETATION:** Section (a) tells us that the primary purpose of the standard is to control grain dust fires and explosions and certain other safety hazards. Indeed, of the fourteen compliance sections, (d) through (q), ten are directly related to fire and explosion prevention. Other safety hazards includes identified job hazards; confined space entry; and the handling of flammable and toxic substances. Also covered are certain provisions of 1910 or 1917 at marine terminals.

(b) **Application**

(1) **STANDARD:** Paragraphs (a) through (n) of this section apply to grain elevators, feed mills, flour mills, rice mills, dust pelletizing plants, dry corn mills, soybean flaking operations, and the dry grinding operations of soycake.

**INTERPRETATION:** Paragraph (b)(1) requires no interpretation and should be taken as read.

(2) **STANDARD:** Paragraphs (o), (p), and (q) of this section apply only to grain elevators.

**INTERPRETATION:** The three sections that apply ONLY to grain elevators are Section (o) Emergency escape, Section (p) Continuous-flow bulk raw grain dryers, and Section (q) Inside bucket elevators. To put it another way, the operators of a feed mill, for example, do not have to concern themselves with the compliance requirements of sections (o), (p), and (q).

(c) **Definitions**

**STANDARD:** “Choked leg” means a condition of material buildup in the bucket elevator that results in the
stoppage of material flow and bucket movement. A bucket elevator is not considered choked that has the up-leg partially or fully loaded and has the boot and discharge cleared allowing bucket movement.

“Flat storage structure” means a grain storage building or structure that will not empty completely by gravity, has an unrestricted ground level opening for entry, and must be entered to reclaim the residual grain using powered equipment or manual means.

“Fugitive grain dust” means combustible dust particles, emitted from the stock handling system, of such size as will pass through a U.S. Standard 40 mesh sieve (425 microns or less).

“Grain elevator” means a facility engaged in the receipt, handling, storage, and shipment of bulk raw agricultural commodities such as corn, wheat, oats, barley, sunflower seeds, and soybeans.

“Hot work” means work involving electric or gas welding, cutting, brazing, or similar flame producing operations.

“Inside bucket elevator” means a bucket elevator that has the boot and more than 20% of the total leg height (above grade or ground level) inside the grain elevator structure. Bucket elevators with leg casings that are inside (and pass through the roofs) of rail or truck dump sheds with the remainder of the leg outside of the grain elevator structure, are not considered inside bucket elevators.

“Jogging” means repeated starting and stopping of drive motors in an attempt to clear chocked legs.

“Lagging” means a covering on drive pulleys used to increase the coefficient of friction between the pulley and the belt.

“Permit” means the written certification by the employer authorizing employees to perform identified work operations subject to specified precautions.

**INTERPRETATION:** Choked leg: The definition requires no interpretation and should be taken as read.

**Flat storage structure:** This is an important definition in
that only grain storage units that meet the OSHA definition fall under the jurisdiction of Section (h)

**Entry into flat storage structures:** All other confined space entries (with the exception of permit-required confined spaces) fall under Section (g) Entry into grain storage structures.

**Fugitive grain dust:** This definition clarifies what OSHA means in Section (j) Housekeeping, paragraphs (1), (2), (2)(ii), and (4). The importance of the distinction between fugitive grain dust and other grain dust is apparent when one understands that any grain dust found during the course of a compliance inspection that will not pass through a 40 mesh sieve cannot serve as a basis for a violation of the 1/8 inch housekeeping criteria.

**Grain elevator:** Any grain elevator facility that does not meet the OSHA definition does not fall under the jurisdiction of 1910.272.

**Hot work:** This definition requires no interpretation and should be taken as read.

**Inside bucket elevator:** The purpose of this definition centers on the term “inside” and the parameters that OSHA uses to determine what they mean by inside. To begin with, OSHA defines only one type of bucket elevator, i.e., an “inside bucket elevator”. Therefore, by default, all legs that do not meet that definition are considered outside legs and are not covered by the standard. The preamble to the standard in part states that “OSHA did not intend this standard cover any bucket elevator which is outside the grain elevator structure. The agency believes that locating bucket elevators outside the grain elevator structure is one of the most positive steps that can be taken to lessen the impact of an explosion should one occur in the bucket elevator”. All of that aside, all that is needed is to establish the inside height of a leg from roof to grade or ground level and if that measurement represents more than 20% of the total leg height it is, by definition, an “inside bucket elevator”.

**Jogging:** This definition requires no interpretation and should be taken as read.

**Lagging:** This definition requires no interpretation and
should be taken as read.

**Permit:** This definition requires no interpretation and should be taken as read.

**STANDARD:** The employer shall develop and implement an emergency action plan meeting the requirements contained in 1910.38(a).

**INTERPRETATION:** Section (d) is the first of the fourteen compliance sections (d) through (q), and also the first to reference another standard for compliance. 1910.38(a) specifies the seven elements that are required for an acceptable plan. A copy of 1910.38(a) is provided in Appendix A.

Do not think solely of fires and explosions in connection with an emergency action plan. Consider the needs of each facility in terms of emergency action plans for flood, confined space emergency rescue, bomb threat, and certainly, any facility in the mid-west tornado belt should have an emergency plan for that possibility.

**Note:** For those employers with ten or less employees, 1910.38(a) does not require a written plan. You must, however, count all personnel at the facility to determine the total number of employees, and that includes office personnel, truck drivers, and part-time or seasonal personnel.

**Training**

1. **STANDARD:** The employer shall provide training to employees at least annually and when changes in job assignment will expose them to new hazards. Current employees, and new employees prior to starting work, shall be trained in at least the following:

   - (i) General safety precautions associated with the facility, including recognition and preventive measures for the hazards related to dust accumulations and common ignition sources such as smoking; and,

   - (ii) Specific procedures and safety practices applicable to their job task including but not limited to, cleaning procedures for grinding equipment, clearing procedures for choked legs, housekeeping procedures, hot work procedures, preventive maintenance procedures, and lockout/tagout procedures.
(2) Employees assigned special task, such as bin entry and handling of flammable or toxic substances, shall be provided training to perform these task safely. Note to paragraph (e)(2). Training for an employee who enters grain handling structures includes training about engulfment and mechanical hazards and how to avoid them.

INTERPRETATION: In paragraph (e)(1), OSHA mandates two specific training requirements; i.e., that employee training be conducted at least on a yearly basis; and, when an employee is moved from one job assignment to another, the employee is given the training necessary to perform the assignment in a safe manner. Say, for example, that an employee working at the receiving pit is transferred to the maintenance department. In that scenario, the transferred employee must receive training in such maintenance skills as lockout-tagout, welding and cutting, shop work, and preventative maintenance assignments, among others.

In paragraph (e)(1)(i), OSHA requires that employees be trained in the “general safety precautions associated with the facility”. That means the safety precautions that are site specific at a particular operating location. Examples of such local rules and precautions might be where eye protection is required, or the areas where restricted smoking is enforced.

Paragraph (e)(1)(ii) requires no interpretation and should be taken as read.

Paragraph (e)(2) requires no interpretation and should be taken as read.

Note to paragraph (e)(2) supports Section (g) Entry into grain handling structures and requires the employer to provide training to confined space entrants regarding engulfment and mechanical hazards and the procedures and precautions to be employed to avoid them.

Note: Good training promotes safe work habits. Although OJT (on the job training) has an important place in employee training programs, it should be used primarily as a hands-on clarification of the training provided in structured programs like those provided by the GEAPS organization and Grain Journal. With such programs you do not have to be a professional trainer to be effective...
because the professionalism that identifies all good trainers is already there.

(f) **Hot Work Permit**

1) **STANDARD:** The employer shall issue a permit for all hot work, with the following restrictions:

   (i) Where the employer or the employer's representative (who would otherwise authorize the permit) is present while the hot work is being performed;

   (ii) In welding shops authorized by the employer;

   (iii) In hot work areas authorized by the employer which are located outside the grain handling structure.

2) The permit shall certify that the requirements contained in S1910.252(d) have been implemented prior to beginning the hot work operations. The permit shall be kept on file until completion of hot work operations.

**INTERPRETATION:** There seems to be no question that “hot work” has earned its reputation as a major league ignition source. Section (f), Hot work permit, is the OSHA response to that hazard,

Paragraph (1) requires no interpretation and should be taken as read.

Paragraph (1)(i) states that the employer is not required to issue a hot work permit if the employer or his representative is on hand while the job is being performed; the rationale being that the employer or his representative is the equivalent of a written permit with no increase in risk. Keep in mind however, that the written permit is nothing more or less than a checklist to ensure that anything that could cause a problem has not been overlooked. Furthermore, OSHA, in the appendix to the standard, supports that view stating that “The implementation of a permit system for hot work is intended to assure that employers maintain control over operations involving hot work and to assure that employers are aware of and utilize appropriate safeguards when conducting those activities.” I view the written permit as the most desirable control, and people being people, it seems reasonable to assume that in the absence of a written permit something could, indeed, be overlooked.
In any event, the choice is the employer’s, and if he or his representative is present during the hot work operations a written permit is not mandatory.

Paragraph (ii) spells out the second exception and tells us that a written permit is not required when hot work is confined to a welding shop area. One assumes, of course, that the welding shop is one where a flammable or explosive condition is not present or could develop.

Paragraph (iii) spells out the last exception stating that the written permit is not required if the hot work is done in an area somewhere outside the grain elevator structure. Again, one assumes that local management would not authorize such an area if there was any possibility that a flammable or explosive condition is present or could develop.

As per paragraph (2), the permit must certify that the requirements of 29CFR 1910.252(a) of the General Industry Standards have been implemented prior to the beginning of hot work. (See Appendix B). The key word here is “prior”. Paragraph (2) informs us that the written permit may be discarded after the hot work has been completed. The final language of paragraph (2) notwithstanding, there are at least three reasons why written permits should be kept a little longer. For example, permits can be a useful litigation document, they can be of assistance in accident investigation, and they serve very well as a basis for the training of new employees in the permit procedure.

One further comment is appropriate before we leave this section: It is important to understand that by authorizing hot work to be done, the authorizing person is, in effect, authorizing a potential ignition source! That being the case, the only thing that makes that authorization acceptable is the hot work permit system, the sole purpose of which is to ensure that the affected work area is free of any flammable or explosive material or that such material is protected or isolated in such a manner as to preclude a fire or explosion. Any condition short of that represents an unacceptable risk.

STANDARD: This paragraph applies to employee entry into bins, silos, tanks, and other grain storage structures. Exception: Entry into unrestricted ground level openings

(g) Entry into Grain Storage Structures
into flat storage structures in which there are no toxicity, flammability, oxygen-deficiency, or other atmospheric hazards is covered by paragraph (H) of this section. For the purpose of this paragraph (g), the term “grain” includes raw and processed grain and grain products in facilities within the scope of paragraph (b)(1) of this section.

**INTERPRETATION:** Section (g) covers ONLY entry into bins, silos, and tanks and does not apply to flat storage structures. Nor does Section (g) apply to entry into those confined spaces covered by the Permit-required confined space standard, 29CFR1910.147, which includes such areas as hopper cars, scales, garnerers, boilers, enclosed boot pits, and some below grade tunnels. Entry into flat storage structures is covered by the next section, Section (h) under the following criteria:

- Entry is made through unrestricted ground level openings; and
- There are no atmospheric hazards (toxicity, flammability, or oxygen-deficiency, etc.) of any kind in the flat storage structure.

**Special Note:** There are four basic hazards associated with entry into bins, silos, tanks, and flat storage structures:

- Mechanical or electrical hazards - such as a reclaim conveyor that is not locked-out and tagged, or a bin drop light that is not designed for a confined space environment;
- A toxic atmosphere - such as a hazardous chemical, like phostoxin, within the space;
- Oxygen deficiency - anything less than 19.5% oxygen. The air may be diluted or displaced by asphyxiating levels of gases or vapors, or where the oxygen may have been consumed by chemicals or biological reactions, such as mold; and
- Bridged grain, or grain that represents a potential engulfment hazard.

A clear and complete understanding of the four confined space hazards listed above by any person authorizing entry and any personnel making entry is absolutely essential.

(1) **STANDARD:** The following actions shall be taken before employees enter bins, silos, or tanks:
(i) The employer shall issue a permit for entering bins, silos, and tanks unless the employer or the employer’s representative (who would otherwise authorize the permit) is present during the entire operation. The permit shall certify that the precautions contained in this paragraph (1910.272(g)) have been implemented prior to employees entering bins, silos or tanks. The permit shall be kept on file until completion of the entry operations. (See Appendix C).

INTERPRETATION: Paragraph (i) mandates that the employer issue an entry permit unless the employer or his representative, i.e., a person who has the employer’s authority to issue a permit, is on hand (present) during the entire course of the entry: same deal as the hot work permit in Section (f). Both the employer or his representative must be fully conversant with 1910.272 Section (g), and how the written entry permit system is supposed to function. Furthermore, the random selection of an individual to issue a permit, as a matter of convenience, is unsafe and does not meet the intent of the standard. Because of the hazardous nature of confined space entry, it is appropriate here to repeat the advice offered in Section (f) Hot work permit: The written permit is a management control to ensure that a particular entry situation has been checked out before entry takes place, and the best way to do that is with a compliance checklist, which is exactly what an entry permit is!

In any event, my advice is to use the written permit whether or not the employer or anyone else is present at the entry site. Paragraph (i), however, gives the employer the option.

Paragraph (i) continues and mandates that the entry permit must certify that all of the requirements contained in Section (g) Entry into grain storage structures have been put into effect (implemented) prior (before) entry takes place. As with the hot work permit, this permit may be discarded when the job is finished. As before, I recommend that you keep them a little longer.

(ii) STANDARD: All mechanical, electrical, hydraulic, and pneumatic equipment which presents a danger to employees inside grain storage structures shall be deenergized and shall be disconnected, locked-out and tagged, blocked off, or otherwise prevented from operating
by other equally effective means or methods.

**INTERPRETATION:** Paragraph (ii) concerns itself with any equipment in the space that presents a danger to entrants. Notice that the standard does not say equipment that COULD present a danger, or that MAY present a danger, but says “presents” a danger; leaving the assessment of danger to the employer’s judgement.

(iii) **STANDARD:** The atmosphere within a bin, silo, or tank shall be tested for the presence of combustible gases, vapors, and toxic agents when the employer has reason to believe they may be present. Additionally, the atmosphere within a bin, silo, or tank shall be tested for oxygen content unless there is continuous natural air movement or continuous forced-air ventilation before and during the period employees are inside. If the oxygen level is less than 19.5%, or if combustible gas or vapor is detected in excess of 10% of the lower flammable limit, or if toxic agents are present in excess of the ceiling values listed in Subpart Z of Part 1910, or if toxic agents are present in concentrations that will cause health effects which prevent employees from effecting self-rescue or communication to obtain assistance, the following provisions apply.

**INTERPRETATION:** If there is any reason to suspect that the atmosphere within a bin, silo, or tank may be contaminated, the air in the space must be tested. Of course, the reverse is true in that if there is no reason to be concerned about a contaminated environment in the space, then atmospheric testing is not mandatory. If, for example, the bin, silo, or tank in question had recently been fumigated, or if there is evidence of grain decomposition, one or both of those conditions would present a legitimate possibility of contamination and, therefore, the atmosphere must be tested before entry takes place. The next consideration is oxygen content. If there is a continuous flow of fresh air by way of forced ventilation, or a process of natural ventilation, the bin, silo, or tank does not have to be tested for oxygen content. In the absence of both forced and/or natural ventilation, however, the space to be entered must be tested for oxygen deficiency before entry.

**Important Note:** When ventilating any confined space, two factors must be taken into consideration: (1) The volume of forced air must be sufficient to adequately ventilate the space in question; and (2) to naturally ventilate, both the
top bin port and the bottom port must be opened prior to entry, to produce flue effect. If for any reason BOTH bin ports cannot be opened, the criteria for natural ventilation cannot be met.

The importance of confined space ventilation cannot be overstated. Needless to say, the longer a confined space is ventilated prior to entry the risk of oxygen deficiency and/or atmospheric contamination is decreased accordingly.

Paragraph (iii) continues stating that if any of the four conditions listed below are present in the bin, silo, or tank to be entered then the entry requirements contained in paragraphs (A) through (B) (6) apply:

- An oxygen level less than 19.5%.
- A combustible gas or vapor in excess of 10% of the lower flammable limit (LFL). By way of explanation, flammable limits are those concentrations of a gas or vapor in air below or above which propagation of a flame does not occur on contact with a source of ignition. The lower limit is the minimum concentration below which the vapor-air is too “lean” to burn or explode. The upper limit is the maximum concentration above which the vapor-air mixture is too “rich” to burn or explode. Needless to say, the gas or vapor in question must first be identified before the LFL can be determined.
- Toxic agents that are present in levels that are sufficient to impair the confined space entrant to such a degree that he would be unable to evacuate the confined space under his own power or be unable to signal or call for assistance.

Note: The following list is provided to assist the employer in obtaining the information necessary to meet the requirements of paragraph (iii), page 11:

- Material Safety Data Sheet.
- NIOSH Pocket Guide to Chemical Hazards.
- National Institute for Occupational Safety & Health 4674 Columbia Pkwy.
  Cincinnati, Oh. 45226
1-800-35-NIOSH.
• Fundamentals of Industrial Hygiene Appendix B-1: Threshold Limit Values and Permissible Exposure Limits; and Appendix C: Chemical Hazards.
National Safety Council
444 N. Michigan Ave.
Chicago, IL 60611-3991
• Any OSHA office.
• Any Certified Industrial Hygienist.

(A) **STANDARD:** Ventilation shall be provided until the unsafe condition or conditions are eliminated, and the ventilation shall be continued as long as there is a possibility of recurrence of the unsafe condition while the bin, silo, or tank is occupied by employees.

**INTERPRETATION:** Assuming an oxygen deficiency or some kind of atmospheric contamination, paragraph (A) requires that the space be ventilated until the unsafe condition(s) are eliminated, and further, that the ventilation be continued if there is a possibility that the unsafe condition could reoccur. Say, for example, that entry is made into a bin that contains decomposed grain and an oxygen deficiency has been identified. Under that scenario, the volume of ventilation must be sufficient to eliminate the oxygen deficiency and ventilation must be continued as long as the bin is occupied because of the possibility that the decomposed grain will continue to generate enough CO2 (carbon dioxide) to pose a hazard to the bin occupant.

(B) **STANDARD:** If toxicity or oxygen deficiency cannot be eliminated by ventilation, employees entering the bin, silo, or tank shall wear an appropriate respirator. Respirator use shall be in accordance with the requirements of 1910.134.

**INTERPRETATION:** In the event that ventilation (forced or natural) will not eliminate an oxygen deficiency or atmospheric contamination, if forced air or natural ventilation cannot be applied, anyone entering the bin, silo, or tank must wear a respirator specifically selected for its ability to protect the wearer from the identified atmospheric hazard(s). Furthermore, all of the compliance requirements of 29CFR 1910.134 Respiratory Protection Program apply.

(iv) **STANDARD:** “Walking down grain” and similar
practices where an employee walks on grain to make it flow within or out from a grain storage structure, or where an employee is on moving grain, is prohibited.

**INTERPRETATION:** In the past, the practice of “walking down grain” was business as usual. No longer. In paragraph (iv), OSHA specifically prohibits that practice, in addition to an entrant even being on “moving grain”.

(2) **STANDARD:** Whenever an employee enters a grain storage structure from a level at or above the level of stored grain or grain products, or whenever an employee walks or stands on or in stored grain of a depth which poses an engulfment hazard, the employer shall equip the employee with a body harness with lifeline, or a boatswain’s chair that meets the requirements of subpart D of this part. The lifeline shall be so positioned, and of sufficient length to prevent the employee from sinking further than waist-deep in the grain.

**Exception:** Where the employee can demonstrate that the protection required by this paragraph is not feasible or creates a greater hazard, the employer shall provide an alternative means of protection which is demonstrated to prevent the employee from sinking further than waist-deep in the grain.

Note to (g)(2) **STANDARD:** When the employee is standing or walking on a surface which the employer demonstrates is free from engulfment hazards, the lifeline or alternative means may be disconnected or removed.

**INTERPRETATION:** Paragraph (g)(2) details the two entry scenarios wherein the standard requires an entrant to wear a body harness with lifeline or equip the entrant with a boatswain’s chair:

(1) Whenever entry is made at or above the level of stored grain; or

(2) Whenever an entrant walks on or in grain which poses an engulfment hazard. Notice that the standard does not say entry from the top, but entry “at or above the level of stored grain”. To further protect an entrant from engulfment, (g)(2) requires that when a lifeline is employed it must be so positioned and of a length that will prevent an entrant from sinking further than waist-deep in the grain. That may sound easy enough, but the
fact is that to position and anchor a lifeline in such a manner is one thing, but to do it in a way that allows the entrant enough mobility to perform the job at hand will take a well trained individual at the observer end of the line.

The exception to (g)(2) requires the employer to provide an alternative means of protection should the lifeline/body harness or boatswain’s chair not be feasible or creates a greater hazard for an entrant. Furthermore, the alternative means of protection must accomplish the same end; i.e., it will prevent an entrant from sinking further that waist deep in the grain. OSHA, in the preamble to the standard states that, as an example, alternative protection could be accomplished by clearing a space on the floor of the tank where an employee could stand and work without being exposed to either an engulfment hazard or a mechanical hazard. The preamble then goes on to say that even in situations where the employer can show that lifelines, etc. are not feasible or creates a greater hazard, the employer, regardless of the entry situation, still has the responsibility for protecting entrants from engulfment. Note to (g)(2) relieves the employer of the use of a lifeline or other protective measures if there is no identifiable risk of engulfment. The prudent employer, however, will assure himself that such is the case before any protective devices are removed or disconnected.

(3) **STANDARD:** An observer, equipped to provide assistance, shall be stationed outside the bin, silo, or tank being entered by an employee. Communications, (visual, voice, or signal line) shall be maintained between the observer and employee entering the bin, silo, or tank.

**INTERPRETATION:** Paragraph (3) requires the following:
- An observer, stationed outside the bin, silo, or tank being entered;
Note that the standard specifically states that the observer shall be stationed “outside” the space; the rational being that the observer will not be affected by any conditions inside the space that could impair his ability to assist the entrant should that need arise.
- The observer must be equipped to provide assistance; and
- The observer and the entrant must maintain communications with each other by way of visual observation, by voice communication, or by signal line.
Note that the standard does not dictate which method shall be used; that decision being left to the employer. Keep in mind that in most bin, silo, or tank entry situations, all three methods could be used simultaneously, thereby increasing the level of safety for the entrant.

(4) **STANDARD:** The employer shall provide equipment for rescue operations which is specifically suited for the bin, silo, or tank being entered.

**INTERPRETATION:** In paragraph (4), OSHA makes no attempt to foresee or to dictate what equipment might be needed for the rescue of an entrant. The burden of that decision is left to the employer and OSHA expects the employer to analyze each entry scenario and “provide” the rescue equipment that responds to those emergency entry situations that can be reasonably foreseen.

(5) **STANDARD:** The employee acting as observer shall be trained in rescue procedures, including notification methods for obtaining additional assistance.

**INTERPRETATION:** If there is one area of confined space entry where inadequate planning and training could have fatal consequences, this is it. Good preparation for employee rescue is one of the hallmarks of a top-notch confined space entry program.

Three considerations immediately arise when a confined space rescue plan is addressed:

(1) What type of emergencies should be included in the plan?
(2) What equipment may be needed?
(3) What are the rescue procedures to be followed should an emergency occur?

At the least, your plan should include the following:

- Procedures to obtain assistance from both in-plant and from outside emergency personnel, such as the fire department or paramedic unit. The response time for out-of-plant assistance is critical and should be taken into account accordingly.
- Training in the use of respirators.
- Training in procedures to rescue an injured entrant who may or may not be able to function.
- Training in procedures to rescue an entrant that has been overcome or is unconscious. One normally thinks of
a contaminated atmosphere or an oxygen deficiency in this context, but there can be other causes, such as heat exhaustion or perhaps a heart attach. In any event, it is well to understand that you will get little or no self-help from a seriously impaired entrant and your rescue plans should include procedures to deal with that contingency.

• Training in procedures to rescue an entrant that has been trapped or buried in grain.
• First aid and CPR training.

Keep in mind that your rescue team will be only as good as the training they receive!

Source of help:
Loss Prevention Safety & Health Guidebook
Data Sheet H.3
Grain Elevator & Processing Society
P.O. Box 15026, Commerce Station
Minneapolis, An. 55415

(6) **STANDARD:** Employees shall not enter bins, silos, or tanks underneath a bridging condition, or where a buildup of grain products on the sides could fall and bury them.

**INTERPRETATION:** Paragraph (6) requires no interpretation and should be taken as read.

**STANDARD:** For the purpose of this paragraph (h), the term “grain” means raw and processed grain and grain products in facilities within the scope of paragraph (b)(1) of this section.

**INTERPRETATION:** Section (h) deals solely with entry into flat storage structures. This introductory paragraph requires no comment and should be taken as read.

(1) **STANDARD:** Each employee who stands or walks on or in stored grain, where the depth of the grain poses an engulfment hazard, shall be equipped with a lifeline or alternative means which the employer demonstrates will prevent the employee from sinking further than waist-deep into the grain.

**INTERPRETATION:** Here again, as in paragraph (g)(2), the standard requires a lifeline or some other means of protection whenever an entrant walks or stands on grain that is deep enough to pose an engulfment hazard, and further, the lifeline has to be employed in a manner that will prevent the entrant from sinking further than waist-
deep into the grain. All well and good, except the compliance language here makes no mention of either an entry observer or body harness. The point here is how does one effectively protect an entrant from engulfment without a body harness and without an observer to keep an eye on him in addition to the necessity of anchoring the lifeline so that the entrant, indeed, will not sink further than waist-deep if things get out of hand.

Notice also that paragraph (1) states that a lifeline is required “where the depth of grain poses an engulfment hazard”. Nowhere in the standard or in the preamble to the standard does OSHA attempt to predict how deep the grain must be to pose an engulfment problem, thus leaving the employer no choice but to make a cautious assessment of the engulfment risk himself.

The compliance language of paragraph (h)(1) notwithstanding, the employer must not lose sight of what OSHA considers a satisfactory end result: i.e., that an entrant working in a flat storage structure will not get engulfed in grain, and whatever equipment, personnel, or procedures it takes to obtain that end must be utilized.

(1) **STANDARD:** When the employee is standing or walking on a surface which the employer demonstrates is free from engulfment hazards, the lifeline or alternative means may be disconnected or removed.

**INTERPRETATION:** The language of Note to paragraph (h)(1) is exactly that of Note to paragraph (g)(2). Please review the interpretation comments to paragraphs (g)(2) and Note to paragraph (g)(2) above.

(2)(i) **STANDARD:** Whenever an employee walks or stands on or in stored grain or grain products of a depth which poses an engulfment hazard, all equipment which presents a danger to that employee (such as an auger or other grain transport equipment) shall be deenergized, and shall be disconnected, locked-out and tagged, blocked off, or otherwise prevented from operating by other equally effective means or methods.

**INTERPRETATION:** Paragraph (2)(i) concerns itself with equipment (such as a reclaim auger) that could be a danger to entrants and offers four specific examples of how to isolate such equipment:

(1) Deenergization;
(2) Disconnection;
(3) Lockout/tagout; and
(4) Blocking.
The standard goes on to say that any “equally effective means or methods” that accomplishes equipment isolation is acceptable. OSHA’s intent, of course, is clear; i.e., whatever equipment is present that could cause injury to an entrant or precipitate engulfment must be rendered harmless.

(ii) **STANDARD:** “Walking down grain” and similar practices where an employee walks on grain to make it flow within or out from a grain storage structure, or where an employee is on moving grain, are prohibited.

**INTERPRETATION:** Paragraph (ii) requires no comment and should be taken as read.

(3) **STANDARD:** No employee shall be permitted to be either underneath a bridging condition, or in any other location where an accumulation of grain on the sides or elsewhere could fall and engulf that employee.

**INTERPRETATION:** Paragraph (3) requires no comment and should be taken as read.

(i) **Contractors**

(1) **STANDARD:** The employer shall inform contractors performing work at the grain handling facility of known potential fire and explosion hazards related to the contractor’s work and work area. The employer shall also inform contractors of the applicable safety rules of the facility.

**INTERPRETATION:** Paragraph (1) mandates that BEFORE outside contractors begin work the employer must inform them of the explosive nature of grain dust and/or any other fire and explosion hazard(s) at the facility that may relate to the work they are to perform. Of equal importance is the role of ignition in dust explosion prevention and a discussion of such ignition possibilities as smoking, hot work, and electrical hazards should be included.

In the appendix to the standard, OSHA makes no bones about the special concern they have with regard to the work performed by outside contractors stating that “The purpose of a permit is to assure that the employer is aware of the hot work being performed (particularly when performed by contractors) and that appropriate safety
precautions have been taken prior to beginning the work”.
The standard further requires that contractors be informed of the local safety rules and regulations as they apply to the contractors activities at the facility. Examples of local rules and regulations could include such areas as restricted smoking, safe manlift procedures, Division 1 and Division 2 electrical locations, where hazardous chemicals are stored, and the facility hot work permit system. In this context we are not talking about so-called industry compliance requirements, but the safety rules, regulations, and procedures that are site specific apply only to the local situation.

(2) **STANDARD:** The employer shall explain the applicable provisions of the emergency action plan to contractors.

**INTERPRETATION:** Paragraph (2) requires that contractors be informed of those portions of the facility emergency action plan that applies to the work they will be performing and the area(s) of the facility they will occupy. At a minimum, the contractor should be appraised of the following:
- Description of the emergency evacuation signal;
- Primary and secondary routes of evacuation;
- Any special procedures to be followed; and
- Location of the head-count/recovery area.

(1) **STANDARD:** The employer shall develop and implement a written housekeeping program that establishes the frequency and method(s) determined best to reduce dust accumulations of fugitive grain dust on ledges, floors, equipment, and other exposed surfaces. (See appendix D).

**INTERPRETATION:** Perhaps the best way to begin the commentary on the housekeeping section of 1910.272 is to quote from the preamble to the standard wherein OSHA states “that all grain handling facilities should implement a housekeeping program because of its recognized importance in controlling dust”. OSHA also concluded that it is important that the housekeeping program be in writing because it establishes the planned actions that the employer expects to be taken in relation to dust control; it provides a measure of compliance with respect to those planned actions; and, it appraises employees of
their duties and responsibilities for controlling dust in the grain handling facility.
The format of the written program is up to the employer, but it must encompass at least the following three areas:
• Areas to be cleaned;
• Cleaning frequency; and,
• The method of cleanup.

“Areas to be cleaned” means any area in the facility where dust could accumulate, such as bin floors, basements, distributor floors, work floors, the head house, etc. and the written program must address those areas in order to ensure that they are not overlooked or neglected. Be advised that ships, barges, and rail loadout and receiving areas that are located outside the facility do not have to be included in the written program, nor do truck dumps that are open on two or more sides. Truck dumps NOT having two or more open sides must be included in the written program.

(2) **STANDARD:** In addition, the housekeeping program for grain elevators shall address fugitive grain dust accumulations at priority housekeeping areas.

(i) Priority housekeeping areas shall include at least the following:

(A) Floor areas within 35 feet (10.7m) of inside bucket elevators;
(B) Floors of enclosed areas containing grinding equipment;
(C) Floors of enclosed areas containing grain dryers located inside the facility.

**INTERPRETATION:** OSHA has identified “at least” three priority housekeeping areas that they consider critical and those areas are spelled out in paragraphs (A),(B), and (C) above. Do not be misled by the term “floor areas”. OSHA does not intend that to mean only the walking surfaces. “Floor areas” in this context means the confines of an entire room or level in the facility; i.e., the grinder room, as in paragraph (B), or the dryer room, as in paragraph (C). In the case of paragraph (A), it means any place within a 35 foot radius of an inside bucket elevator where accumulated grain dust exceeds 1/8 inch, be it the walls, overhead, equipment, or walking surfaces.

(ii) **STANDARD:** The employer shall immediately remove
any fugitive grain dust accumulations whenever they exceed 1/8 inch (32cm) at priority housekeeping areas, pursuant to the housekeeping program, or shall demonstrate and assure, through the development and implementation of the housekeeping program, that equivalent protection is provided.

**INTERPRETATION:** There seems to be no question that paragraph (ii) is the most controversial requirement of this standard. The interesting part is that OSHA was able, in court, to maintain their position even in the face of scientific data and their own admission that 1/8 inch of grain dust is not safe in terms of explosion propagation. In the preamble to the standard, OSHA states that the 1/8 inch rule is by no means “a safe level” for grain dust, but it is considered by OSHA to be a reasonable action level “which meets the constraints of feasibility”. Be that as it may, the standard says that if dust in any priority housekeeping area exceeds 1/8 inch someone had better start cleaning it up, unless the employer can demonstrate some type of equivalent protection. The preamble to the standard offers some examples of equivalent protection stating that “OSHA recognizes that any housekeeping program which allows dust accumulations of greater than 1/8 inch cannot provide “equivalent safety” unless additional steps are taken to reduce the combustibility of the accumulated dust. For example, it may be possible to treat the grain stream with oil additives which inhibit the combustibility of any dust which is emitted from the grain handling system. The record indicates that such additives are already available and in use for various types of grain and that they can be highly effective in reducing the amount of dust generated and reducing the combustibility of that dust. It may also be possible to “wet down” the areas of dust accumulations using either an oil or water based solution in a manner similar to that used in controlling the combustibility of coal dust in mining operations. The standard allows for the use of such means of controlling the combustibility of grain dust, or any other means which may be developed in the future, if the employer can demonstrate that it will provide protection equivalent to the removal of grain dust accumulations whenever such accumulations exceed 1/8 inch”.

(3) **STANDARD:** The use of compressed air to blow dust from ledges, walls, and other areas shall only be permitted when all machinery that presents an ignition
source in the area is shut-down, and all other known potential ignition sources in the area are removed or controlled.

**INTERPRETATION:** Paragraph (3) permits the use of compressed air to facilitate clean-up, but only after certain precautions pertaining to ignition source control have been taken. The requirements are clearly stated and should be taken as read.

(4) **STANDARD:** Grain and product spills shall not be considered fugitive grain dust accumulations. However, the housekeeping program shall address the procedures for removing such spills from the work area.

**INTERPRETATION:** It is important to understand that “grain and product spills” are not considered the same as “fugitive grain dust” as defined in Section (c), Definitions. In OSHA Instruction CPL2-1.4B, OSHA states that grain spills should be “cleaned up as soon as possible after identification”. That language is considerably more at ease than the wording in paragraph (ii) which states that grain dust accumulations exceeding 1/8 inch in priority housekeeping areas MUST BE CLEANED UP IMMEDIATELY. Although considered a lower housekeeping priority than grain dust, the method(s) and frequency of removing grain and product spills must be spelled out in the written housekeeping plan. Furthermore, OSHA rates product spills in flour milling operations as critical and, again, in OSHA Instruction CPL2-1.4B the agency directs that such product spills be given “prompt attention”.

In a final word on the subject; OSHA takes a dim view of poor facility housekeeping and in many cases considers such a condition ample reason to cite as a willful violation of the standard which carries a maximum penalty $70,000.00.

(k) **Grate Openings**

**STANDARD:** Receiving-pit openings, such as truck or railcar receiving-pits, shall be covered by grates. The width of openings in the grates shall be a maximum of 2 1/2 inches (6.35cm).

**INTERPRETATION:** The intent of this section is that large foreign objects be prevented from entering the facility by way of the inbound grain stream. Be advised the 2 1/2 inch criteria in for one dimension only.
(1) **STANDARD:** All fabric dust filter collectors which are a part of a pneumatic dust collection system shall be equipped with a monitoring device that will indicate a pressure drop across the surface of the filter.

**INTERPRETATION:** Paragraph (1) of Section (l) requires some type of device that will monitor pressure across the face of a filter dust collector. The purpose of the device, of course, is to ensure continuous and effective performance of the equipment. Listed below are several such devices that will comply, and installation must be as per the manufacturer’s recommendations:

- Photohelic gauge;
- Magnehelic gauge;
- Manometer;
- A zero motion switch for detecting a failure of motion by the rotary discharge valve on the dust hopper; and
- A level indicator installed in the hopper to detect a dust buildup that could cause the filter to plug up.

Again, consistent with the manufacturer’s recommendations, management should establish a target level reading on the instrument or device, or develop some means to determine when servicing is needed. Both the servicing indicator and the frequency of inspection by operations personnel should be documented in the facility maintenance program.

(2) **STANDARD:** Filter collectors installed after March 30, 1988 shall be:

(i) Located outside the facility; or
(ii) Located in an area inside the facility protected by an explosion suppression system; or
(iii) Located in an area inside the facility that is separated from other areas of the facility by construction having at least a one hour fire-resistance rating, and which is adjacent to an exterior wall and vented to the outside.

The vent and ductwork shall be designed to resist rupture due to deflagration.

**INTERPRETATION:** OSHA grandfathered existing internal dust collection filters, and in this section specifies of three alternative locations for filter collectors installed after March 30, 1988. The requirements are clearly stated and should be taken as read.

(m) **Preventive Maintenance**

(1) **STANDARD:** The employer shall implement preventive maintenance procedures consisting of:
(i) Regularly scheduled inspections of at least the mechanical and safety control equipment associated with dryers, grain stream processing equipment, dust collection equipment including filter collectors, and bucket elevators;

**INTERPRETATION:** In this section, OSHA sets forth the requirements for a program of preventive maintenance that includes inspection and lubrication, equipment repair or removal, maintenance documentation, and a lockout/tagout program.

Paragraph (i) mandates scheduled inspections of the target equipment that one conventionally associates with the control of dust explosions; i.e., dust collection equipment, bucket elevators, etc. Notice the standard says “at least”, which means that the various equipment listed in paragraph (i) is not necessarily all inclusive. To put it another way, the facility PM program should address any and all mechanical and safety control equipment that could reasonably be associated with the prevention of fires and explosions.

(ii) **STANDARD:** Lubrication and other appropriate maintenance in accordance with manufacturers’ recommendations, or as determined necessary by prior operating records.

**INTERPRETATION:** One can see by a reading of paragraph (ii) that OSHA does not attempt to establish the frequency with which preventive maintenance shall be performed. Maintenance scheduling is left to the employer, but it must be consistent with the manufacturers’ recommendations or as indicated by the prior operating history of the equipment. Of paramount importance is that **PREVENTIVE MAINTENANCE BE ON A FREQUENCY THAT IS EXPECTED TO ALLOW FOR PROMPT IDENTIFICATION AND CORRECTION OF ANY MALFUNCTION OR FAILURE OF THE SUBJECT EQUIPMENT.**

Another OSHA concern in the area of PM is that the maintenance schedule will not fall prey to other operational priorities. That concern in expressed in OSHA Instruction CPL2-1.4B which states that “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 being conducted at a time other than the harvest season, the CSHO shall conduct an evaluation of programs (e.g., by
interviewing key employees) to determine conditions and adequacy of preventive maintenance”.

(2) **STANDARD:** The employer shall promptly correct dust collection systems which are malfunctioning or which are operating below designed efficiency. Additionally, the employer shall promptly correct, or remove from service, overheated bearings and slipping or misaligned belts associated with inside bucket elevators.

**INTERPRETATION:** The key word in paragraph (2) is “promptly”. The standard does not allow the employer the option of nursing a hot bearing through the day in order that the facility will not lose valuable loading or receiving time. The intent is that as soon as a malfunction has been identified it should be “promptly” repaired or the equipment removed from service regardless of the operational consequences.

(3) **STANDARD:** A certification record shall be maintained of each inspection, performed in accordance with this paragraph (m), containing the date of the inspection, the name of the person who performed the inspection and the serial number, or other identifier, of the equipment specified in paragraph (m)(l)(i) of this section that was inspected.

**INTERPRETATION:** Compliance with paragraph (3) merely requires something in the nature of a log or work order system that indicates that maintenance is to be performed on some specified date and that, at a minimum, it addresses all of the equipment that is spelled out in paragraph (m)(l)(i) above. Be sure that the format used is set up to include the date of inspection, the inspector’s name, and some type of equipment identifier.

(4) **STANDARD:** The employer shall implement procedures for the use of tags and locks which will prevent the inadvertent application of energy or motion to equipment being repaired, serviced, or adjusted, which could result in employee injury. Such locks and tags shall be removed in accordance with established procedures only by the employee installing them, or if unavailable, by his or her supervisor.

**INTERPRETATION:** 29CFR 1910.147 The Control of Hazardous Energy (Lockout/Tagout) became effective
after 1910.272 was promulgated and, therefore, is not referenced by 1910.272. Be that as it may, 1910.147 is jurisdictional and establishes the specific criteria that employers must meet in developing and implementing a lockout/tagout program.

(n) Grain Stream Processing Equipment

STANDARD: The employer shall equip grain stream processing equipment (such as hammer mills, grinders, and pulverizers) with an effective means of removing ferrous material from the incoming grain stream.

INTERPRETATION: In the preamble to the standard, OSHA states that “Acceptable means for the removal of ferrous materials include the use of permanent or electromagnets. Means used to separate foreign objects and ferrous material should be cleaned regularly and kept in good repair as part of the preventive maintenance program in order to maximize their effectiveness.

(o) Emergency Escape

(1) STANDARD: The employer shall provide at least two means of emergency escape from galleries (bin decks).

INTERPRETATION: Section 11 of the appendix to the standard states that “means of emergency escape may include any available means of egress, (consisting of three components; exit access, exit, and exit discharge as defined in 1910.35), the use of controlled descent devices with landing velocities not to exceed 15 ft./sec. or emergency escape ladders from galleries. The above need a bit of clarification in that such means of in-plant travel as a manlift or a personnel elevator should not be designated as a means of emergency escape because of the possibility of a power failure. However, a manlift escape ladder or a fire-rated stairwell would be adequate for emergency escape. Even though Section (n) does not address the headhouse levels (any level above the bin floor), be advised that at least one means of emergency escape must be provided from all headhouse levels in accordance with the requirements of the General Industry standards, 29CFR 1910, Subpart E, Means of Egress.

(2) STANDARD: The employer shall provide at least one means of emergency escape in tunnels of existing grain elevators. Tunnels in grain elevators constructed after the
(p) Continuous-Flow Bulk Grain Dryers

effective date of this standard shall be provided with at least two means of emergency escape.

**INTERPRETATION:** Paragraph (2) requires no comment and should be taken as read.

(1) **STANDARD:** All direct-heat grain dryers shall be equipped with automatic controls that:

(i) Will shut-off the fuel supply in case of power or flame failure or interruption of air movement through the exhaust fan; and,
(ii) Will stop the grain from being fed into the dryer if excessive temperature occurs in the exhaust of the dryer section.

**INTERPRETATION:** Paragraph (i) presents three compliance requirements directing that grain dryers must have automatic controls that will shut off the fuel supply if one or any combination of the following conditions occur:

- Loss of power;
- Flame failure; or
- Interruption of air movement through the fan.

A power failure can be handled with an electrically interlocked gas safety valve. Anytime there is a loss of power the valve will automatically close, even at high pressure gas. For flame failure, a flame sensor, either electronic or heat sensitive, or an optical flame sensing system interlocked with the gas solenoid valve will suffice. Air movement can be sensed by a pressure switch, sail switch, or a vacuum switch. Of course, these devices must be wired-in to cut off power to the solenoid or main gas safety valve. Paragraph (ii) states that if the exhaust air temperature exceeds the exhaust temperature limit setting, something automatic has to happen that will stop the grain from going into the dryer. A heat sensitive device that will respond when excessive temperature occurs would be adequate. This temperature sensing device must “tell” the grain infeed equipment to stop sending grain to the dryer. Such infeed equipment could include some type of diverter operation on the infeed spout above the dryer or an automatic shut-down of the flow equipment feeding the wet leg. In my view, it would not be advisable to completely empty the dryer infeed spout because in the event of a dryer explosion an empty infeed spout could act as path for flame propagation up
and into the facility.

(2) STANDARD: Direct-heat grain dryers installed after March 30, 1988, shall be:
(i) Located outside the grain elevator; or
(ii) Located in an area inside the grain elevator protected by a fire or explosion suppression system; or
(iii) Located in an area inside the grain elevator which is separated from other areas of the facility by construction having at least a one hour fire-resistance rating.

INTERPRETATION: Grain dryers installed prior to 3/30/88 are grandfathered, but only as it relates to their physical location in the facility. OSHAs’ first preference for dryers installed after 3/30/88 is outside the facility. In any event, dryers installed inside and after 3/30/88 must either be equipped with a fire and explosion suppression system or have the appropriate one hour fire-resistant construction rating in the area where it is located. A variety of suppression agents are available, including liquids, liquidfied gases, or powders. If you opt for the fire-resistant structure, be sure that it is engineered to meet the compliance’ criteria of the standard.

(q) Inside Bucket Elevators

(1) STANDARD: Bucket elevators shall not be jogged to free a choked leg.

INTERPRETATION: Attempting to clear a choked leg by the so-called “jogging” method is asking for trouble and it should never, under any circumstances, be done. Every grain handling facility with bucket elevators should have written procedures for clearing a choked leg and further, employees who are well trained in implementing the procedures.

Note: The OSHA definitions of “jogging” and “choked leg” are spelled out in Section (c), Definitions.

(2) STANDARD: All belts and lagging purchased after March 30, 1988 shall be conductive. Such belts shall have a surface electrical resistance not to exceed 300 megohms.

INTERPRETATION: When purchasing new belting, be sure to include a stipulation in your purchase order to the manufacturer that the belt you are buying meets the compliance criteria of paragraph (2).
(3) **STANDARD:** All bucket elevators shall be equipped with a means of access to the head pulley section to allow inspection of the head pulley, lagging, belt, and discharge throat of the elevator head. The boot section shall also be provided with a means of access for clean-out of the boot and for inspection of the boot, pulley, and belt.

**INTERPRETATION:** In Webster’s New World Dictionary the definition of inspection is “to look carefully; examine critically, especially in order to detect flaws”. The point is made because the intent of paragraph (3) is that the “means of access” to the head pulley section and the boot section will provide the inspecting personnel with a clear and unobstructed view of the subject parts so they can, in fact, look carefully and examine critically. Any means of access that accomplishes that end is acceptable.

(4) **STANDARD:** The employer shall:
(i) Mount bearings externally to the leg casing; or
(ii) Provide vibration monitoring, temperature monitoring, or other means to monitor the condition of those bearings mounted outside or partially inside the leg casing.

**INTERPRETATION:** The proper installation and scheduled maintenance of elevator leg bearings is a critical element in any effective dust explosion prevention program. OSHA’s first preference of the location of leg bearings is outboard (external to the leg casing). Bearings not mounted outboard must be provided with some means to monitor their condition, as stated in paragraph (ii). OSHA’s position on bearings mounted partially inside the leg casing is set forth in OSHA Instruction CPL2-1.4B: “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”. There is a wide variety of bearing monitoring devices and systems on the market and if you have inboard bearings, I suggest you shop around to familiarize yourself with what is available to be sure you get the equipment that best suits your particular needs.

(5) **STANDARD:** The employer shall equip bucket elevators with a motion detection device which will shut-down the bucket elevator when the belt speed is reduced by no more than 20% of the normal operating speed.

**INTERPRETATION:** Motion sensing devices are
required on inside legs solely to detect belt slowdown and to induce leg shut-down if the belt speed is reduced by anything in excess of 20 percent. The potential problem here is the relationship between the speed of the leg belt and the speed of the drive mechanism. The ideal situation, of course, is when they are the same. The speed of the head pulley (drive mechanism) being constant, the danger occurs if the belt starts to slow down. What happens next is obvious; frictional heat develops and, depending upon the speed differential between the leg belt and head pulley, develops very quickly. The end result is a belt fire and at worst, an explosion in the leg casing. A good motion sensing device that is properly calibrated and well maintained will stop that from happening. As with bearing monitors, there is a wealth of leg belt speed monitors for sale and it only remains for you to check them out and then select the one that fits your operational situation.

(6) STANDARD: The employer shall:
(i) Equip bucket elevators with a belt alignment monitoring device which will initiate an alarm to employers when the belt is not tracking properly; or
(ii) Provide a means to keep the belt tracking properly, such as a system that provides a constant adjustment of belts.

INTERPRETATION: As explained previously, a leg belt motion sensing device is required to detect belt slowdown. The leg belt alignment monitoring device required here is to maintain proper vertical tracking of the leg belt. The distinction is made to prevent any confusion between the two devices and what role each of them plays. In addition to the many conventional type alignment devices that are available, alternate devices that are acceptable include hydraulic boot take-up systems that provide constant belt alignment, and proximity switches and heat-activated friction-sensing devices.

(7) STANDARD: Paragraphs (q)(5) and (q)(6) of this section do not apply to grain elevators having a permanent storage capacity of less than one million bushels, provided that daily visual inspection is made of bucket movement and tracking of the belt.

INTERPRETATION: OSHAs’ interpretation of “permanent storage capacity” is clearly stated in OSHA Instruction CPL 2-1.4C: “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 part of the same complex, i.e., 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. With regard to “daily visual inspection”, the employer should be prepared to verify the methodology being used to ascertain proper observation. In addition, the employer should ensure that the inspecting personnel are properly trained and the inspection process documented in the facility preventive maintenance program.

(8) **STANDARD:** Paragraphs (q)(4) and (q)(5) of this section do not apply to the following:
(i) Bucket elevators that are equipped with an operational fire and explosion suppression system capable of protecting at least the head and boot section of the bucket elevator; or,

**INTERPRETATION:** Paragraph (i) requires no comment and should be taken as read.

(ii) **STANDARD:** Bucket elevators which are equipped with pneumatic or other dust control systems or methods that keep the dust concentration inside the bucket elevator at least 25% below the lower explosive limit at all times during operations.

**INTERPRETATION:** To comply with paragraph (8)(ii), OSHAs’ position is that the employer will have to certify that dust concentrations in the leg are, in fact, at least 25% below the LEL. In CPL2-1.4C, OSHA states that the employer “may use instruments, test, surveys, or data developed on legs that are identical in size, configuration, speed, etc., to meet the intent of the requirement”.

The problem here is one of measurement and, as of this writing, I am unaware of any instrument, device, or what have you, that is capable of accurately and continuously measuring dust concentrations inside bucket elevator.
Appendix A

1910.38 Employee Emergency Plans And Fire Prevention Plans

a) Emergency action plan - (1) Scope and application. This paragraph (a) applies to all emergency action plans required by a particular OSHA standard. The emergency action plan shall be in writing (except as provided in the last sentence of paragraph (a)(5)(iii) of this section) and shall cover those designated actions employers and employees must take to ensure employee safety from fire and other emergencies.

(2) Elements. The following elements, at a minimum, shall be included in the plan:

(i) Emergency escape procedures and emergency escape route assignments;
(ii) Procedures to be followed by employees who remain to operate critical plant operations before they evacuate;
(iii) Procedures to account for all employees after emergency evacuation has been completed;
(iv) Rescue and medical duties for those employees who are to perform them;
(v) The preferred means of reporting fires and other emergencies; and
(vi) Names of regular job titles of persons or departments who can be contacted for further information or explanation of duties under the plan.

(3) Alarm system. (i) The employer shall establish an employee alarm system which complies with 1910.165.

(b) Alarm system. (1) The employer shall establish an employee alarm system which complies with 1910.165.

(a) Scope and application. (1) This section applies to all emergency employee alarms installed to meet a particular OSHA standard. This section does not apply to those discharge or supervisory alarms on fire suppression, alarm or detection systems unless they are intended to be employee alarm systems.

(2) The requirements in this section that pertain to maintenance, testing and inspection shall apply to all local fire alarm signaling systems used for alerting employees regardless of the other functions of the system. All pre-charge employee alarms installed to meet a particular OSHA standard shall meet the requirements of paragraphs (b)(1) through (4), (c), and (d)(1) of this section.

(b) General requirements. (1) The employee alarm system shall provide warning for necessary emergency action as called for in the emergency action plan, or for reaction time for safe escape of employees from the workplace or the immediate work area, or both.

(2) The employee alarm shall be capable of being perceived above ambient noise or light levels by all employees in the affected portions of the workplace. Tactile devices may be used to alert those employees who would not otherwise be able to recognize the audible or visual alarm.

(3) The employee alarm shall be distinctive and recognizable as a signal to evacuate the work are or to perform actions designated under the emergency action plan.

(4) The employer shall explain to each employee the preferred means of reporting
emergencies, such as manual pull box alarms, public address systems, radio or telephones. The employer shall post emergency telephone numbers near telephones, or employee notice boards, and other conspicuous locations when telephone serve as a means of reporting emergencies. Where a communication system also serves as the employee alarm system, all emergency messages shall have priority over all non-emergency messages.

(5) The employer shall establish procedures for sounding emergency alarms in the workplace. For those employers with 10 or fewer employees in a particular workplace, direct voice communication is an acceptable procedure for sounding the alarm provided all employees can hear the alarm. Such workplaces need not have a back-up system.

(c) Installation and restoration. (1) The employer shall assure that all devices, components, combinations of devices or systems constructed and installed to comply with this standard are approved. Steam whistles, air horns, strobe lights, or similar lighting devices, or tactile devices meeting the requirements of this section are considered to meet this requirement for approval.

(2) The employer shall assure that all employee alarm systems are restored to normal operating condition as promptly as possible after each test or alarm. Spare alarm devices and components subject to wear or destruction shall be available in sufficient quantities and locations for prompt restoration of the system.

(d) Maintenance and testing. (1) The employer shall assure that all employee alarm systems are maintained in operating condition except when undergoing repairs or maintenance.

(2) The employer shall assure that a test of the reliability and adequacy of non-supervised employee alarm systems is made every two months. A different actuation device shall be used in each test of a multi-actuation device system so that no individual device is used for two consecutive tests.

(3) The employer shall maintain or replace power supplies as often as is necessary to assure a fully operational condition. Back-up means of alarm, such as employee runners or telephones, shall be provided when systems are out of service.

(4) The employer shall assure that employee alarm circuitry installed after January 1, 1981, which is capable of being supervised and that it will provide positive notification to assigned personnel whenever a deficiency exists in the system. The employer shall assure that all supervised employee alarm systems are tested at least annually for reliability and adequately.

(5) The employer shall assure that the servicing, maintenance and testing of employee alarms are done by persons trained in the designed operation and functions necessary for reliable and safe operation of the system.

(e) Manual operation. The employer shall assure that manually operated actuation devices for use in conjunction with employee alarms are unobstructed, conspicuous, and readily accessible.
(a) Fire prevention and protection -

(1) Basic precautions. For elaboration of these basic precautions and of the special precautions of paragraph (a)(2) of this section as well as a delineation of the fire protection and prevention responsibilities of welders and cutters, their supervisors (including outside contractors) and those in management on whose property cutting and welding is to be performed, see Standard for Fire Prevention in Use of Cutting and Welding Processes, NFPA Standard 51B, 1962. The basic precautions for fire prevention in welding or cutting work are:

(i) Fire hazards. If the object to be welded or cut cannot readily be moved, all movable fire hazards in the vicinity shall be taken to a safe place.

(ii) Guards. If the object to be welded or cut cannot be moved and if all the fire hazards cannot be removed, then guards shall be used to confine the heat, sparks, and slag, and to protect the immovable fire hazards.

(iii) Restrictions. If the requirements stated in paragraphs (a)(1)(i) and (a)(1)(ii) of this section cannot be followed then welding and cutting shall not be performed.

(2) Special precautions. When the nature of the work to be performed falls within the scope of paragraph (a)(1)(ii) of this section certain additional precautions may be necessary.

(i) Combustible material. Wherever there are floor openings or cracks in the flooring that cannot be closed, precautions shall be taken so that no readily combustible materials on the floor below will be exposed to sparks which might drop through the floor. The same precautions shall be observed with regard to cracks or holes in walls, open doorways and open or broken windows.

(ii) Fire extinguishers. Suitable fire extinguishing equipment shall be maintained in a state of readiness for instant use. Such equipment may consist of pails of water, buckets of sand, hose or portable extinguishers depending upon the nature and quantity of the combustible material exposed.

(iii) Fire watch. (A) Fire watchers shall be required whenever welding or cutting is performed in locations where other than a minor fire might develop, or any of the following conditions exist:

(1) Appreciable combustible material, in building construction or contents, closer than 35 feet (10.7 m) to the point of operation.

(2) Appreciable combustibles are more than 35 feet (10.7 m) away but are easily ignited by sparks.

(3) Wall or floor openings within a 35-foot (10.7 m) radius expose combustible material in adjacent areas including concealed spaces in walls or floors.

(4) Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.

(b) Fire watchers shall have fire extinguishing equipment readily available
and be trained in its use. They shall be familiar with facilities for sounding an alarm in the event of a fire. They shall watch for fires in all exposed areas, try to extinguish them only when obviously within the capacity of the equipment available, or otherwise sound the alarm. A fire watch shall be maintained for at least a half hour after completion of welding or cutting operations to detect and extinguish possible smoldering fires.

(iv) Authorization. Before cutting or welding is permitted, the area shall be inspected by the individual responsible for authorizing cutting and welding operations. He shall designate precautions to be followed in granting authorization to proceed preferably in the form of a written permit.

(v) Floors. Where combustible materials such as paper clippings, wood shavings, or textile fibers are on the floor, the floor shall be swept clean for a radius of 35 feet (10.7 m). Combustible floors shall be kept wet, covered with damp sand, or protected by fire-resistant shields. Where floors have been wet down, personnel operating arc welding or cutting equipment shall be protected from possible shock.

(vi) Prohibited areas. Cutting or welding shall not be permitted in the following situations:

(A) In areas not authorized by management.
(B) In sprinklered buildings while such protection is impaired.
(C) In the presence of explosive atmospheres (mixtures of flammable gases, vapors, liquids or dusts with air), or explosive atmospheres that may develop inside uncleaned or improperly prepared tanks or equipment which have previously contained such materials, or that may develop in areas with an accumulation of combustible dusts.

(D) In areas near the storage of large quantities of exposed, readily ignitable materials such as bulk sulfur, baled paper, or cotton.

(viii) Relocation of combustibles. Where practicable, all combustibles shall be relocated at least 35 feet (10.7 m) from the work site. Where relocation is impracticable, combustibles shall be protected with flame-proofed covers or otherwise shielded with metal or asbestos guards or curtains.

(viii) Ducts. Ducts and conveyor systems that might carry sparks to distant combustibles shall be suitably protected or shut down.

(ix) Noncombustible walls. If welding is to be done on a metal wall, partition, ceiling or roof, precautions shall be taken to prevent ignition of combustibles on the other side, due to conduction or radiation, preferably by relocating combustibles. Where combustibles are not relocated, a fire watch on the opposite side from the work shall be provided.

(x) Combustible walls. Where cutting or welding is done near walls, partitions, ceiling or roof of combustible construction, fire-resistant shields or guards shall be provided to prevent ignition.

(xi) Combustible cover. Welding shall not be attempted on a metal partition, wall, ceiling or roof having a combustible covering nor on walls or partitions of combustible sandwich-type panel construction.

(xii) Pipes. Cutting or welding on pipes or other metal in contact with combustible walls, partitions, ceilings or roofs shall not be undertaken if the work is close enough to cause ignition by conduction.

(xiii) Management. Management shall recognize its responsibility for the safe usage of cutting and welding equipment on its property and;
(A) Based on fire potentials of plant facilities, establish areas for cutting and welding, and establish procedures for cutting and welding, in other areas.

(B) Designate an individual responsible for authorizing cutting and welding operations in areas not specially designed for such processed.

(C) Insist that cutters or welders and their supervisors are suitably trained in the safe operation of their equipment and the safe use of the process.

(D) Advise all contractors about flammable materials or hazardous conditions of which they may not be aware.

(xiv) Supervisor. The Supervisor:

(A) Shall be responsible for the safe handling of the cutting or welding equipment and the safe use of the cutting or welding process.

(B) Shall determine the combustible materials and hazardous areas present or likely to be present in the work location.

(C) Shall protect combustibles from ignition by the following:

(1) Have the work moved to a location free from dangerous combustibles.

(2) If the work cannot be moved, have the combustibles moved to a safe distance from the work or have the combustibles properly shielded against ignition.

(3) See that cutting and welding are so scheduled that plant operations that might expose combustibles to ignite are not started during cutting or welding.

(D) Shall secure authorize for the cutting or welding operations from the designated management representative.

(E) Shall determine that the cutter or welder secures his approval that conditions are safe before going ahead.

(F) Shall determine that fire protection and extinguishing equipment are properly located at the site.

(G) Where fire watches are required, he shall see that they are available at the site.

(xv) Fire presentation precautions. Cutting or welding shall be permitted only in areas that are or have been made fire safe. When work cannot be moved practically, as in most construction work, the area shall be made safe by removing combustibles or protecting combustibles from ignition sources.

(3) Welding or cutting containers - (i) Used containers. By welding, cutting or other hot work shall be performed on used drums, barrels, tanks or other containers until they have been cleaned so thoroughly as to make absolutely certain that there are no flammable materials present or any substances such as greases, tars, acids, or other materials which when subjected to heat, might produce flammable or toxic vapors. Any pipe lines or connections to the drum or vessel shall be disconnected or blanked.

(ii) Venting and purging. All hollow places, cavities or containers shall be vented to permit the escape of air or gases before preheating, cutting or welding. Purging with inert gas is recommended.

(4) Confined spaces - (i) Accidental contact. When arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur and the machine be disconnected from the power source.
(ii) Torch valve. In order to eliminate the possibility of gas escaping through leaks or improperly closed valves, when gas welding or cutting, the torch valves shall be closed and the gas supply to the torch positively shut off at some point outside the confined area whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight. Where practicable, the torch and hose shall also be removed from the confined space.
Appendix C

Sample Entry Permit for Grain Storage Structures

Is entry necessary? Yes____No____

Entry location ________________________________  Entry Date ________________

Reason for entry ______________________________

Special Precautions

● Have employees been instructed that “walking down grain” and similar practices are prohibited?
  Yes____No____NA____

● Have employees been instructed that entry underneath a bridging condition or in any other location where an accumulation of grain on the sides or elsewhere could fall and bury them is prohibited?
  Yes____No____NA____

Entry Procedures

(1) Hazardous mechanical, electrical, hydraulic and pneumatic equipment de-energized?
  Yes____No____NA____

(2) Hazardous mechanical, electrical, hydraulic and pneumatic equipment either removed or isolated by disconnection, lockout/tagout, blocking off, or other means of equipment isolation?
  Yes____No____NA____

(3) Atmosphere tested for combustible gases, vapors and toxic agents?
  Yes____No____NA____

(4) Atmosphere tested for oxygen content?
  (Oxygen content must be 19.5 or above).
  Yes____No____NA____
Appendix C
(continued)

(5) Natural air ventilation and/or forced air ventilation provided before and during entry.  
Yes____No____NA____

(6) Respiratory protection equipment required?  
Yes____No____NA____

(7) Body harness and lifeline, or boatswain’s chair provided and used for:  
Entry at a level above the level of stored grain: or  
Yes____No____NA____  
Whenever an employee walks or stands on or in stored grain that is deep enough to pose an engulfment hazard?  
Yes____No____NA____

(8) Is the lifeline so positioned and strong enough so as to prevent the employee from sinking further than waist-deep in the grain?  
Yes____No____Na____

(9) Observer stationed outside and equipped to provide assistance:  
Yes____No____NA____  
Approved lighting.  
Yes____No____NA____  
Ladder(s).  
Yes____No____NA____  
Emergency respirator(s).  
Yes____No____NA____  
Hoist and lifeline.  
Yes____No____NA____  
First aid supplies.  
Yes____No____NA____  
Communications equipment.  
Yes____No____NA____  
Observer certified in first aid and CPR.  
Yes____No____NA____  
Other______________________________  
Yes____No____NA____
Appendix C
(continued)

(10) Communications maintained between observer and entrant:

Voice. Yes____No____NA____
Visual. Yes____No____NA____
Signal line. Yes____No____NA____
Other____________________________________ Yes____No____NA____

(11) Observer trained in emergency rescue procedures. Yes____No____NA____

(12) Procedures to obtain additional assistance established. Yes____No____NA____

Procedures for Entry Into Flat Storage Structures

- **Note:** The following procedures apply only to entry into flat storage structures in which there are no toxicity, flammability, oxygen-deficiency or other atmospheric hazards.

(1) Employees equipped with a lifeline or an alternative means of protective? Yes____No____NA____

(2) All equipment (such as a grain auger) de-energized and either disconnected, locked out and tagged, blocked-off or otherwise prevented from operating? Yes____No____NA____

Conditions are considered acceptable for this entry and entry is authorized.

Entry Supervisor
Appendix D

Sample Housekeeping Program

Date _______________________

Company Name ______________________________

Address ______________________________________

Re: Company Housekeeping Program

To: All responsible employees:
Any situation that delays or prevents the responsible employee(s) from adhering to
the housekeeping schedule below must be reported to the appropriate supervisor as
soon as possible.

WAREHOUSE
Area designation: non-priority.
Cleaning frequency: Bi-weekly.
Responsible employee(s): Dockman and forklift driver.

HEADHOUSE
Area designation: Priority-due to presence of inside bucket elevators.
Cleaning frequency: Three times weekly. Area may require an extra cleanup
during the heavy harvest period.
Cleaning method: Portable vacuum system.
Responsible employee: Shift sweeper.

DISTRIBUTOR FLOOR
Area designation: Priority-due to presence of inside bucket elevators.
Cleaning frequency: Once per shift. May need one additional cleanup during the
heavy harvest period.
Cleaning method: Portable vacuum system.
Responsible employee: Shift sweeper.

BIN FLOOR
Area designation: Priority within 35 feet of both house legs. Non-priority else-
where.
Cleaning frequency: Once per shift within 35 feet of both house legs. Dust accum-
ulations at the end of both gallery belts will need cleanup at least twice daily.
Cleaning method: Manual and portable vacuum system.
**Responsible employee:** Bin floor operator.

**WORK FLOOR**

*Area designation:* Priority within 35 feet of both house legs. Non-priority elsewhere.

*Cleaning frequency:* Once per shift when shipping or receiving. Bi-weekly otherwise.

*Responsible employees:* Work floor operator and shift sweeper.

**BASEMENT**

*Area designation:* Priority within 35 feet of both house legs. Non-priority elsewhere.


*Responsible employees:* Basement operator and shift sweeper.

**MANLIFT WELL**

*Area designation:* Non-priority.

*Cleaning frequency:* Three times yearly.

*Cleaning method:* Blowdown.

*Responsible employees:* Downtime crew.

**Note:** The shift sweeper will assist in the cleanup of large grain spills. One additional sweeper will be employed during the heavy harvest period.

*Special precaution:* Compressed air may only be used for blowdown during downtime.