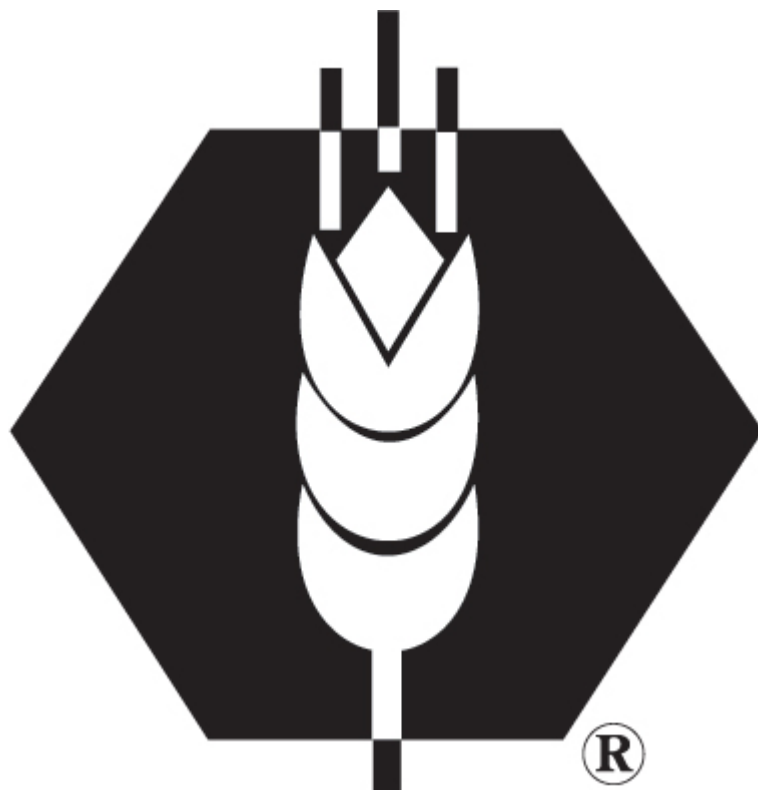


National Grain and Feed Association

# Safety and Health Compliance Manual



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# Safety Regulatory Compliance Program



aintaining a safe, clean and orderly workplace is important to employee well-being and enhances operational productivity.

This chapter identifies procedures used at this facility to comply with important **safety standards** issued by the Occupational Safety and Health Administration.

The OSHA standards covered are:

- OSHA’s grain handling facility standard [29 C.F.R 1910.272]
- OSHA’s permit-required confined space entry standard [29 C.F.R 1910.146]
- OSHA’s personal protective equipment standard [29 C.F.R 1900]

This company’s health procedures and methods for complying with OSHA standards that pertain to employee health are found in Chapter III, ***“Health Regulatory Compliance.”***

These procedures are designed to ensure that this company is in compliance with the aforementioned OSHA standards.

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# Housekeeping

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## Preamble and Purpose

It is the policy of this company to provide a safe and healthy workplace. Proper housekeeping is important to safe operations. This written housekeeping plan is established to formalize our company's policies on the procedures to be followed to regularly inspect for housekeeping conditions and to take action to correct conditions considered deficient as soon as practical. This written plan also is intended to meet the requirements of OSHA's grain handling facilities standard [1910.272(i)] by reducing grain dust accumulations and controlling airborne grain dust to the degree practical.

This written housekeeping program addresses the frequency and method(s) that will be used to clean:

1. throughout the grain handling facility
2. the "priority housekeeping areas" for the grain elevator portion of the grain handling facility

This written housekeeping program has been structured to:

- A. Establish the "frequency and method(s) determined best to reduce accumulations of fugitive grain dust on ledges, floors, equipment and other exposed surfaces" **throughout this facility**
- B. Require that action be initiated in **grain elevators** to clean up and remove grain dust whenever it exceeds 1/8th-inch on the floor areas in "priority housekeeping areas." The "priority housekeeping areas" where this 1/8th-inch action level applies are:
  - Floor areas within a 35-foot radius of "inside" bucket elevators. Inside bucket elevators are defined under the OSHA standard as bucket elevators having the boot and more than 20 percent of the total leg height (above grade or ground level) located inside the grain elevator structure
  - Floors of enclosed areas containing grain dryers located inside the grain elevator facility (*if any*)
  - Floors of enclosed areas of the grain elevator containing "grinding equipment" (*if any*)

This written program establishes specific housekeeping policies and procedures to be followed at this facility. These procedures include:

- the frequency of conducting walk-through inspections of this facility
- the frequency of cleaning that is to occur
- the housekeeping method(s) that is (are) to be utilized

The manager of this facility or his or her designee is responsible for assigning the employee(s) who is (are) to perform specific housekeeping duties under this program. Further, the manager or his or her designee is responsible for directing that housekeeping activities be initiated when needed.

## Grain Elevator Housekeeping Policy

Recognizing that grain dust, if confined and in proper concentration, can serve as a potential fuel source for a fire and/or explosion, it is the policy of this company to maintain a clean and safe work environment. To accomplish this policy objective, this housekeeping program specifies: 1) the procedures to be followed when conducting walk-through inspections to detect grain dust accumulations on floors, ledges, equipment and other exposed surfaces within the facility; and 2) the frequency, and method(s) best suited to reduce such dust accumulations in this facility.

The following areas are classified as **priority housekeeping areas**. They are to be inspected and cleaned based upon the schedule specified in the housekeeping program. **In any event, grain dust is to be cleaned up and removed whenever it exceeds 1/8th-inch on the floors of priority housekeeping areas.**

1. **The areas listed hereafter that are within a 35-foot radius of the inside bucket elevator of the grain elevator:** *(Bucket elevators having the boot and more than 20 percent of the total leg height above grade or ground level located inside the facility. Areas enclosed in separate solid walls so as to isolate the area from the bucket elevator are excluded, e.g., hydraulic or air compression room, motor control center, etc. If no inside legs are located in the grain elevator portion of the facility, item #1 does not apply.)*
  - a. Inside leg boot areas within a 35-foot radius of inside leg(s)
  - b. Basement and tunnel areas within a 35-foot radius of inside leg(s)
  - c. Inside ground floor areas within a 35-foot radius of inside leg(s)
  - d. Bin deck or gallery areas within a 35-foot radius of inside leg(s)
  - e. Distributor floor areas within a 35-foot radius of inside leg(s)
  - f. Grain cleaner floor areas within a 35-foot radius of inside leg(s)
  - g. Scale floor areas within a 35-foot radius of inside leg(s)
  - h. Areas of head section of leg within a 35-foot radius of inside leg(s)
  - i. \_\_\_\_\_
  - j. \_\_\_\_\_
  - k. \_\_\_\_\_
  - l. \_\_\_\_\_
  - m. \_\_\_\_\_

n. \_\_\_\_\_

2. **The enclosed floor areas listed hereafter are areas where grain dryers are located inside the grain elevator portion of this facility:**

(If no grain dryer is located inside the facility, place an N/A in the space below.)

- a. \_\_\_\_\_  
b. \_\_\_\_\_  
c. \_\_\_\_\_  
d. \_\_\_\_\_

3. **The enclosed floor areas listed below where grinding equipment is located inside the grain elevator portion of the facility:**

(If no equipment is located within the grain elevator portion of the facility, place an N/A below)

- a. \_\_\_\_\_  
b. \_\_\_\_\_  
c. \_\_\_\_\_  
d. \_\_\_\_\_

4. In addition, the following areas also are designated as priority housekeeping areas for purposes of this plan:

**Important Notice:** While this section is beyond the scope and is not required under the OSHA standard, some facilities may choose to designate other areas as “priority housekeeping areas.” But be aware that if an area is listed, it must be treated the same as an OSHA priority area for housekeeping purposes; i.e., the 1/8th-inch grain dust action level will apply.

- a. \_\_\_\_\_  
b. \_\_\_\_\_  
c. \_\_\_\_\_  
d. \_\_\_\_\_

# Housekeeping Program

The written housekeeping program consists of three components:

1. Inspection frequency
2. Cleaning frequency
3. Authorized housekeeping methods

## Inspection Frequency

Walk-through inspections of this facility will be conducted to check for grain dust accumulations on floors, ledges, equipment and other exposed surfaces. The **“Housekeeping Inspection Log”** is to be used by the employee(s) performing this function.

### Priority Housekeeping Areas -- Grain Elevators Only

A walk-through inspection of the "priority housekeeping areas" designated on page 12 of this program will be conducted: \_\_\_\_\_

*(Specify daily or some other time frame, taking into consideration varying activity levels, e.g. harvest versus non-harvest inspection frequencies.)*

***In these priority housekeeping areas, grain dust is to be cleaned up and removed whenever it exceeds 1/8th-inch within the areas specified.***

Areas of this facility that will be inspected in this time interval if grain is being handled are as follows:  
*(Areas need not be inspected if no activity or operations have taken place to change conditions since the last inspection.)*

1. Inside leg boot pit areas within a 35-foot radius of inside leg(s)
2. Basement and tunnel areas within a 35-foot radius of inside elevator leg(s)
3. Inside ground floor areas within a 35-foot radius of inside leg(s)
4. Bin deck or gallery areas within a 35-foot radius of inside leg(s)
5. Distributor floor areas within a 35-foot radius of inside leg(s)
6. Grain cleaner floor areas within a 35-foot radius of inside leg(s)
7. Areas of head section of leg within a 35-foot radius of inside leg(s)
8. Scale floor areas within a 35-foot radius of inside leg(s)

9. Enclosed areas of grain dryers located inside the facility (if applicable)
10. Enclosed areas of the grain elevator where grinding equipment is located (if applicable)
11. \_\_\_\_\_
12. \_\_\_\_\_
13. \_\_\_\_\_

### Non-Priority Housekeeping Areas

**This section designates which areas of this facility are “non-priority housekeeping areas.” Walk-through inspections are to be conducted in the time intervals specified. (*Specify daily or some other time frame. Take into consideration varying activity levels, e.g. harvest versus non-harvest inspection frequencies.*)**

Non-Priority Housekeeping Area	Inspection Frequency
Basement or Tunnel and other Boot Pit Areas ( <i>not within 35-foot radius of inside leg</i> )	_____
Boiler Room ( <i>including floors, walls, boilers, water softener</i> )	_____
Ground Floor	_____
Bin Deck or Gallery ( <i>including enclosed gantries or conveyor runways</i> )	_____
Top Floor	_____
Distributor Floor ( <i>not within 35-foot radius of inside leg</i> )	_____
Grain Cleaner Floor ( <i>not within 35-foot radius of inside leg</i> )	_____
Hammer Mill Room ( <i>if applicable</i> )	_____
Pellet Mill ( <i>if applicable</i> )	_____
Feed Control Room ( <i>if applicable</i> )	_____
Micro ingredient Area ( <i>including floors; walls; equipment</i> ) ( <i>if applicable</i> )	_____
Feed Bin Tops ( <i>if applicable</i> )	_____
Scale Floor ( <i>not within 35-foot radius of inside leg</i> )	_____
Overhead surfaces, ledges, equipment and horizontal faces where dust can accumulate	_____
Reclaim Tunnel	_____
Receiving Tunnel	_____
Truck Receiving Area	_____
Rail Receiving Area	_____



Load-Out Areas

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### Cleaning Frequency

At this facility, the \_\_\_\_\_ (*specify name or title of “manager,” “superintendent” or his or her designate*) is to direct that housekeeping be initiated whenever it is deemed necessary. The areas of the facility will be cleaned, at a minimum, based upon the following schedule:

- **Priority Housekeeping Areas:** Whenever grain dust accumulations exceed 1/8th-inch in the “priority housekeeping areas” listed in the Housekeeping Policy section on page II-3 of this document, cleanup shall begin immediately utilizing the method(s) specified in component 3 (pages II-9) of this written program
- **Non-Priority Housekeeping Areas:** Cleanup of grain dust accumulating on ledges, floors, equipment and other exposed surfaces not located in priority housekeeping areas will occur based upon the following schedule:

Non-Priority Housekeeping Area

Frequency of Cleaning  
(specify daily, weekly, as needed)

Basement or Tunnel  
(*not within 35-foot radius of inside leg*)

---

Ground Floor

---

Bin Deck or Gallery  
(*not within 35-foot radius of inside leg*)

---

Top Floor

---

Distributor Floor  
(*not within 35-foot radius of inside leg*)

---

Grain Cleaner Floor

---

Scale Floor  
(not within 35-foot radius of inside leg)

Overhead and horizontal surfaces and ledges  
where dust can accumulate

Reclaim Tunnel

Receiving Tunnel

Truck Receiving

Rail Receiving

Load-Out Areas

*\*Frequencies should be established based upon experience, facility operations and commodity handled.*

- **Dust Control Systems:** All grain dust control systems, including any oil additive system used to control grain dust emissions, are to be checked for proper operation on a \_\_\_\_\_ (specify daily, weekly, etc.) basis.
- **Dust Emissions and Leaks:** All spouts and equipment leaks are to be reported promptly and repairs initiated at the first available opportunity. This includes instances of missing blast gates, dust emissions from the discharge side of filters, leaking or plugged ductwork and other obvious problems

If a failure of any part of the grain dust control system results in an accumulation of grain dust in any inside areas of the facility, cleanup of the area and repairs are to begin immediately to correct potentially unsafe conditions.

- **Housekeeping Inspection Log:** The ***“Housekeeping Inspection Log”*** sheets will be used by those performing housekeeping walk-through inspections to indicate the dates and areas examined and to denote any relevant remarks. After the walk-through inspection is completed, the ***“Housekeeping Inspection Form”*** is to be returned to the manager of the facility for necessary action and filing.

## Authorized Housekeeping Methods

At this facility, the following housekeeping method(s) are authorized:

- Cleaning of floor areas, ledges, walls and equipment is to be done by using the following housekeeping methods (*circle which applies*):
  1. **Sweeping:** Brooms and/or brushes can be used for manual housekeeping. Long-handled brushes and brooms should be utilized for reaching overhead, vertical or horizontal surfaces, as well as other areas where access is difficult.
  2. **Vacuums:** A central or portable vacuum system, when available and suitable for the location, may be used to clean floors and other surfaces where dust accumulates. (Vacuum units generally should **not** be used to pick up grain or product spills or piles.)
  3. **Shovels:** Lightweight shovels can be used to clean up grain dust or product spills when necessary.
  4. **Wash Down:** Water (including the use of a high-pressure washer) may be used on certain floor areas when water will not create a grain quality problem (e.g., tunnels).

- Additives (oil) are/are not (circle which applies) used as a grain dust control method at this facility. If used, list locations where additives are applied:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

- **Compressed air** also may be used for cleaning grain dust from hard-to-reach locations at this facility. However, the use of compressed air is not to be used for major cleaning without direct written authorization received in advance from the manager or his or her designee at this facility. Prior to beginning a major blow-down operation, a “**Compressed Air Permit**” is to be filled out and returned to the manager or superintendent of this facility for signature

Before using compressed air, all potential ignition sources either are to be turned off or controlled. Ignition sources may be eliminated by shutting down machinery. Ignition sources may be controlled if bearings are monitored closely during minor clean-up operations and the equipment either is dust-tight or intrinsically safe

If compressed air is used, employees should wear protective eyewear. Dust masks or respirators also may be necessary while performing this function. The air pressure is to be limited to 30 pounds per square inch at the nozzle when dead ended.

# Housekeeping Inspection Log

*(Return this log to the Manager upon completion of the housekeeping walk-through inspection.)*

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(Name of Company or Facility)

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(Name of Employee Conducting Walk-Through Inspection)

When the walk-through inspection was done \_\_\_\_\_  
(Date) (Time)

## Priority Housekeeping Areas

**1. Floor areas within 35-foot radius of inside-located bucket elevator leg(s).**

*[Specify location(s) of inside bucket elevator legs within facility]:*

Location	Acceptable (check appropriate space)	Needs cleaning	Remarks
Inside Leg Boot Pit Floor	_____	_____	_____
Basement and Tunnel	_____	_____	_____
Inside Ground Floor Areas	_____	_____	_____
Bin Deck or Gallery Floor	_____	_____	_____
Distributor Floor	_____	_____	_____
Grain Cleaner Floor	_____	_____	_____
Head Section of Leg Drive	_____	_____	_____
Scale Floor	_____	_____	_____

2. **Enclosed floor areas around inside-located grain dryers.**

*[Specify location(s) within the facility where inside grain]*

Location	Acceptable (check appropriate space)	Needs cleaning	Remarks

3. **Floors of enclosed areas containing “grinding equipment” within the grain elevator facility.**

*[Specify location(s) within the grain elevator facility where grinding equipment is present]*

Location	Acceptable (check appropriate space)	Needs cleaning	Remarks

## Non-Priority Housekeeping Areas

Location	Acceptable (check appropriate space)	Needs cleaning	Remarks
Basement or Tunnel and other Boot Pit Areas (not within 35-ft radius of inside leg)			
Boiler Room (including floors, walls, boilers, water softener)			
Ground Floor			
Bin Deck Gallery (including enclosed gantries or conveyor runways)			
Top Floor			
Distributor Floor (not within 35-ft radius of inside leg)			
Grain Cleaner Floor (not within 35-ft radius of inside leg)			
Hammer Mill Room (if applicable)			
Pellet Mill (if applicable)			
Feed Control Room (if applicable)			
Micro-ingredient Area (including enclosed gantries or conveyor runways)			
Feed Bin Tops (if applicable)			
Grain Control & Sampling Inspection Rooms			
Scale Floor (not within 35-ft radius of inside leg)			
Overhead surfaces, ledges, equipment and horizontal faces where dust can accumulate			
Reclaim Tunnel			
Receiving Tunnel			
Truck Receiving Area			
Rail Receiving Area			
Load-Out Areas			

# Compressed Air Permit

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(Name of Company or Facility)

The use of compressed air to blow down the following areas (subject to the conditions and restrictions specified in the written housekeeping program for this facility) is authorized on \_\_\_\_\_:  
(specify date)

## Areas Where Blow-Down Operations are to Occur

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

Before using compressed air, all potential ignition sources either are to be turned off or controlled (tagged and locked). Ignition sources may be eliminated by shutting down machinery. Ignition sources may be controlled if bearings are monitored closely, an effective planned maintenance program is in effect and the equipment either is dust-tight or intrinsically safe. Limit air pressure to 30 p.s.i. at the nozzle when dead ended.

Employees must wear protective eyewear. Dust masks or respirators are / are not required (*circle one*) while performing this function.

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(Signature of Elevator Manager or Superintendent)

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(date)

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(Title)

# Employee Training

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Providing proper training to employees on safety procedures that are to be followed at this facility is essential to maintaining a safe workplace.

The procedures used at this facility comply with the requirements of the Occupational Safety and Health Administration's Grain Handling Standard.

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## Training Procedures

The following employee safety training procedures are to be followed:

1. **Frequency of Safety Training:** Safety training is to be provided to employees at least annually or whenever an employee changes job assignments that may expose the employee to new workplace hazards. New employees are to be provided safety training on hazards associated with their job tasks prior to starting work.
2. **Type of Safety Training:** Employees are to be provided the following types of safety training:
  - **General safety procedures in effect at this facility.** Training is to include how to recognize hazards related to grain dust accumulations and common ignition sources, as well as preventive measures for averting these risks. Employees also are to be informed of areas within our plant where smoking is prohibited
  - **Specific procedures and safety practices pertaining to the employee's job task.** Training is to include: cleaning procedures for grinding equipment; procedures for clearing choked legs (jogging of legs is strictly prohibited); housekeeping procedures; hot work (welding and cutting) procedures; preventive maintenance; and lock-out and tagging procedures for equipment
  - **Specific procedures for employees performing special job tasks.** Safety training is to be provided to employees who are assigned special job tasks, such as entering grain bins or handling flammable or toxic substances



# Emergency Action Plan

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This company's emergency action plan spells out employees' specific assignments if a fire, explosion or emergency occurs.

The procedures used at this facility comply with the requirements of the Occupational Safety and Health Administration's general industry standard and grain handling safety standard.

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## Emergency Action Procedure

The following emergency action plan is in effect at this facility:

1. **Telephone Lists:** The following telephone lists are to be maintained:
  - a. **Emergency Services Telephone List:** A list containing telephone numbers for emergency services -- including the fire department, rescue squads and utilities -- is to be maintained and kept current. The list is to be kept in the location(s) listed below. *(e.g., with plant layout drawings; in Feed Quality Assurance Program Notebook; and/or near telephones in the facility and/or office, etc.)*  
*[Note: Emergency Services Telephone List form attached.]*
  - b. **Employee Emergency Telephone List:** A list containing all employee names, home telephone numbers, and the name and telephone number of the person to contact in the event of an emergency. The list is to be kept in the following location(s) listed below. *[e.g., in office, etc.]*  
*[Note: Employee Emergency Telephone List form attached.]*
2. **Visitors' Log:** A daily log is to be kept of people present at the facility, including farmers; customers; visitors; outside service personnel; repair or supply personnel; and government officials. Record on the log arrival and departure time each visitor. *[Note: Visitor's Log form attached.]*

3. **Employee Alarm System:** At this facility, the type of alarm system used to alert employees about an emergency is listed below [e.g., *standard fire alarm; visual alarm (flashing light); public address system; air horn; steam whistle*].

Also listed below is the preferred method employees are to use to report an emergency to management.

**[Note to Management on OSHA Requirements for Alarm Systems:** Employers with 10 or fewer employees at a facility are permitted by OSHA to use direct voice communication as an acceptable alarm system, provided all employees can hear it. OSHA requires that mechanical alarms not supervised by employees be tested every two months. If alarm systems are supervised by employees, testing is to be done annually. OSHA requires manually operated alarms to be “unobstructed, conspicuous and readily accessible.” OSHA requires that employers ensure that alarm systems are kept in operating condition.

OSHA also requires employers to explain to each employee the preferred method of reporting emergencies, such as manual pull box alarms, public address systems, radio, telephone, etc.]

- Type of Alarm System(s) Used
- Preferred Method for Reporting Emergency (e.g., pull box alarm, public address system, radio, telephone, etc.)

4. **Personnel Responsible for Critical Plant Operations:** If an emergency occurs, the following employees are assigned to perform the following critical plant operations before they evacuate.

- I. Person: \_\_\_\_\_  
Task: \_\_\_\_\_
- II. Person: \_\_\_\_\_  
Task: \_\_\_\_\_

5. **Escape Routes:** Emergency escape routes (egress) are established for all working areas and are to be communicated to all employees and other personnel who may be in the facility.

Emergency exit routes are to be well-marked within the plant. Priority is to be given to removing people from the facility as quickly and safely as possible. Exits not to be used during an emergency are to be designated.

Emergency egress routes are to be maintained. Check periodically to make sure signs are visible, doors are unlocked and routes are clear.

6. **Evacuation Procedures:** The following evacuation and escape routes are to be used if an emergency warrants evacuation of the plant:

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If evacuation of the plant is required, employees are to gather at the following location for a head count:

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*[Note to Management on OSHA Requirements for Evacuation Procedures: OSHA requires that escape routes from the facility be designated. Although not required, OSHA advises that floor plans or workplace maps of the facility designating escape routes be included in the emergency action plan. There are two basic types of maps:*

- *Site plans which show the exterior layout and designated buildings, the feed mill, storage bins, dryers, loading and receiving areas, roads, etc*
- *Floor plans which show the interior layout of the facility*

Layout drawings should indicate: 1) primary and alternate egress routes; 2) areas where employees and visitors should gather if an emergency occurs; 3) location(s) of hazardous and flammable materials, such as major electrical equipment, pesticides, gasoline, diesel fuel, propane and ammonia; 4) location of normal work stations and exits; 5) arrival routes, entrances, and probable parking locations for fire trucks, ambulances and other emergency equipment; 6) location(s) of the facility's firefighting equipment; 7) alternate sources of water (such as rivers, ponds and bays, if available) from which tankers can be filled; 8) structural characteristics of the facility (such as bin and floor openings, elevators, manshift shafts, low overhead clearances and ladder safety cages) that may hinder the carrying of breathing apparatus or safety equipment; 9) potential access problems and alternate routes; and 10) drawings or schematics of gas, water and electrical lines, including switches, valves and connector locations.

[A sample site plan and floor plan for a grain elevator/feed mill operation are attached.]

7. **Employee Training:** Employees are to be trained about the components of the emergency action plan, as well as their specific assignments and responsibilities in the event of an emergency. Training is to occur:
- when the emergency action plan is first developed and implemented
  - whenever an employee's responsibilities or designated actions under the plan change

- whenever the plan is changed

Training should cover the following topics:

- Recognition of hazardous conditions
- Fire detection, investigation and reporting
- Location of alarm or communication devices and alarm sound recognition
- Location and types of firefighting equipment, as well as conditions under which they should be used
- Use of self-contained breathing apparatus, first aid kits and other safety and escape equipment
- Emergency egress routes and assembly areas
- Assignment of individual responsibilities

Instruction is to include hands-on training with fire extinguishers and available self-contained breathing apparatus. (Note: The local fire department may provide guidance and assistance for these sessions.) Evacuation drills should be conducted at least annually and include a practice run by responding firefighters and emergency services.

8. **Emergency Action Plan Duties:** The duties involved in implementing the emergency action plan, as well as the employees to whom such duties are assigned, are listed below.

**[Important:** Employees are to use common sense when attempting to carry out their assigned emergency action duties so as not to endanger themselves or others. It is better to report a task undone than to be injured or endanger your co-workers in the process.]

Duty	Name of Employee Assigned
Sound the general or evacuation alarm	
Obtain and carry copy of Emergency Action Plan	
Disconnect electricity and fuel supplies to equipment and facility (if safe to do so)	
Notify Fire and Rescue Agencies	
Fight Fires (If small and containable)	
Clear entrance routes and open gates for arriving fire department and emergency equipment	
Meet the arriving fire department, rescue and emergency equipment at property entrance	
Proceed to designated command post to work with on-scene fire commander in coordinating firefighting and rescue operations (Note: This duty should be performed by senior manager or his/her designated representative)	
Obtain first aid personnel	
Start water supply pump (if necessary)	
Remove equipment and vehicles from area (if safe to do so)	
Do head count of all persons and visitors at facility	
Supervise employees at emergency evacuation area	
Meet and respond to questions from media and/or government agencies (senior manager preferable)	

Attachment 1:

## Employee Emergency Telephone List

Employee Name	Home Telephone Number	Cell Phone Number	Name of Person to contact in emergency	Emergency Contact's Phone Number

## Attachment 2:

### Sample Emergency Telephone List

Agency	Phone Number	Contact Person
Manager	_____	_____
Assistant Manager	_____	_____
Superintendent	_____	_____
Other	_____	_____
<b>Fire Department</b>	_____	_____
<b>Rescue Squad/Medical Personnel</b>		
Ambulance	_____	_____
Physician	_____	_____
Hospital	_____	_____
Trauma	_____	_____
<b>Police</b>		
Sheriff	_____	_____
Security	_____	_____
<b>Chemical</b>		
American Crop Protection Assoc.	_____	_____
Chemical Transportation Emergency Center (CHEMTREC)	_____	_____
Toxic Substances Control Hotline #	_____	_____
Poison Control Center	_____	_____
<b>Utilities</b>		
Gas	_____	_____
Water	_____	_____
Electricity	_____	_____
<b>Specialty Contractors</b>		
Inert Gas Supplies	_____	_____
Mobile Crane	_____	_____
Demolition	_____	_____
Electrical	_____	_____
Evacuation Equipment	_____	_____
Structural Engineer	_____	_____
<b>Insurance</b>	_____	_____

**Red Cross  
Salvage Demolition  
Coast Guard**

_____	_____
_____	_____
_____	_____

## Visitor Log

Visitors Name	Company	Telephone #	Purpose	Time In	Time Out
(print name)					
(signature)					
(print name)					
(signature)					
(print name)					
(signature)					
(print name)					
(signature)					
(print name)					
(signature)					
(print name)					
(signature)					
(print name)					
(signature)					



# Hot Work

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This company's "hot work" procedures are designed to prevent such activities as welding, cutting, brazing or other flame-producing operations from becoming an ignition source for a fire or explosion.

The procedures used at this facility comply with the requirements of the Occupational Safety and Health Administration's grain handling facilities standard.

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## Hot Work Procedures

1. **Hot Work Permits:** A hot work permit is to be issued before welding, cutting or other flame-producing operations begin unless:
  - The manager or his or her representative is present while the hot work is being performed
  - The hot work is performed in a welding area designated by the manager
  - The hot work is done in "hot work areas" located outside the feed mill or grain handling structure that have been designated by the manager for that purpose
  - The hot work permit is to be kept on file until the welding, cutting or brazing operations are completed
2. **Safety Precautions before Hot Work Begins:** The following safety precautions apply before, during and after hot work operations are performed:
  - The manager or his/her designated representative will inspect the area where the hot work is to occur
  - hot work permit is to be issued noting the precautions to be followed. (**Note:** *Hot work permits are to be issued unless one of the three exceptions noted in procedure 1 exists.*)
  - If contractors are performing the hot work, they are to be advised about flammable materials or hazardous conditions that may exist
  - Combustibles and other fire hazards have been removed or otherwise protected to confine heat, sparks and slag that may result from the hot work operation. Combustible materials on floors are to be swept clean within a 35-foot radius of the hot work

operation. Cutting or welding is not to be done in areas where explosive atmospheres exist

- All equipment, motors, bearings (etc.) that could be an ignition source have been shut off and locked out or tagged. Conveyors and ducts that might carry sparks to distant combustibles also are to be suitably protected or shut down during hot work operations. Locks and tags are to be removed only by the employee who installed them or by the employee's immediate supervisor
- A fire extinguisher or other extinguishing device is to be readily available at the site where the hot work is performed
- A fire watch is to be established during the hot work operation and for at least 20 minutes thereafter. *[Note: It is advisable to do a visual walk-through of the area where the hot work was performed for up to four hours afterward to ensure no problems develop.]*

## Hot Work Permit

(This permit for welding, cutting or other flame-producing operations inside the feed mill or grain handling facility is to be filled out completely before hot work begins. Consideration has been given to removing the hot work operation outside the facility, but has been determined to be impractical or infeasible.) **[Upon completion of hot work, return permit to manager's office.]**

Location Where Hot Work Is To Be Done: \_\_\_\_\_

When Hot Work Is To Be Done: Date: \_\_\_\_\_ Time: \_\_\_\_\_

Permit Requested By: \_\_\_\_\_

Description of Type of Hot Work to be Completed: \_\_\_\_\_

Permit Expires: Date: \_\_\_\_\_ Time: \_\_\_\_\_

### Permit Checklist

1. Management or its authorized representative has inspected the area where hot work is to be performed
2. Advise contractor performing hot work of hazards that may be encountered
3. Shut down the mill or grain handling facility and all handling equipment in work area (conveyors, motors, legs, pumps, etc.)
4. Sweep or clean grain dust and other combustible or flammable materials from a 35-foot radius of the hot work area
5. Shield or cover all exposed combustible or flammable materials from a 35-foot radius of the hot work area to protect from heat and sparks
6. Wet down or cover floors, walls and surrounding areas where hot work is to be done. Tightly cover and seal spouts, ducts, floor, wall openings
7. Provide fire extinguisher and/or water supply at hot work site
8. Automatic sprinklers operational (if provided)
9. Welding and cutting equipment checked and in safe operating condition before use
10. Personal protection equipment provided to those performing hot work
11. Fire watch established in hot work area for at least 30 minutes after welding and cutting finished. *(Periodic walk-throughs of work area for up to four hours advised.)*
12. Surfaces cooled before grain handling equipment and plant operations restarted

YES	N/A	NO

Special Precautions (if any): \_\_\_\_\_

Permit Approval: \_\_\_\_\_

(Signature of Manager/Superintendent in Charge)

# Confined Space Entry

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This company's procedures for entering confined spaces (including grain storage structures) are designed to prevent accidents, such as engulfment in grain, which can occur if employees enter a confined space without first taking proper precautions or wearing proper personal protective equipment.

The procedures used at this facility comply with the requirements of the Occupational Safety and Health Administration's grain handling facilities standard and general industry permit-required confined space standard.

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## Procedures for Entering Grain Storage Structures

The following procedures apply when entering grain storage structures, such as bins, silos and tanks, at this facility:

1. **Written Confined Space Entry Permit:** A written confined space entry permit/checklist is to be issued before an employee enters a bin, silo or tank"
  - **Exception:** A permit is **not** required if the manager or his/her designated representative (*who otherwise would authorize issuance of the permit*) is present during the entire entry operation
  - The permit is to be kept on file until the entry operation is completed
  - A sample confined space entry permit is found on page 31
2. **Entry Procedures:** The following safety procedures are to be followed before; during and after confined space entry operations are performed:
  - **Equipment Shut-Off:** All mechanical, electrical, hydraulic and pneumatic equipment that presents a danger to employees inside the bin is to be disconnected, locked out and tagged, blocked-off or made inoperable by some other equally effective means
  - **Atmospheric Testing:** Management is to determine if the atmosphere inside a bin, silo or tank is to be tested for the presence of combustible gases, vapors or toxic agents

The atmosphere within a bin, silo or tank is to be tested for oxygen content unless there is continuous natural air movement or continuous forced-air ventilation before and during the time employees are inside the confined space. If the atmosphere is found to be toxic or deficient

in oxygen -- and if this condition cannot be eliminated through the use of ventilation -- employees entering the structure are to wear appropriate respirators

- **Personal Protective Equipment:** When entering the bins, tanks and other grain storage structures at or above the level of the stored grain or grain products, or walking or standing on or in stored grain of a depth that poses an engulfment hazard, the employee is to wear: a body harness with lifeline. The lifeline shall be so positioned and of sufficient length to prevent the employee from sinking farther than waist-deep in the grain. *[Note: When the employee is standing or walking on a surface which is free from engulfment hazards (such as the concrete or steel bottom), the lifeline or boatswain chair can be disconnected or removed]; or employees are forbidden to walk or work on grain surfaces intended to support them until it has been verified that:*
  - engulfment hazards -- such as a bridging condition, air pockets or void space below the surface of the grain -- do not exist
  - the grain is not sufficient to present an engulfment hazard in the specific bin, silo or tank.

Probe tests sufficient to detect any air pockets or void spaces may be one way to assess the stability of the grain surface. However, the employee must be protected from engulfment while conducting such tests. Grain depth also may be analyzed using documentation to show that there are no recent draw-off problems, moisture problems from open hatches, leaking roofs, etc., and that any previous problems have been corrected. In addition, lockout and tagout must be in effect to prevent the operation of any grain or grain product conveying equipment while the employee is supported on the grain.

When employees are assigned to move caked, plugged or bridged grain, such as to a center draw off, the employee must be in a boatswain chair with a lifeline suspended from the top. The boatswain chair must be supported by slings attached to a suspended rope, and designed to accommodate one person in a sitting position.

When cleaning bottoms of bins, or for other purposes, employees are permitted to walk on the grain without a lifeline and harness when the depth of the grain will not result in an engulfment hazard.

**Training:** Employees assigned to enter a confined space are to be trained on specific procedures to be used and safety practices to be observed. Training should include:

- The hazards of working in a confined space containing grain or grain products
- the proper use of respirators, retrieval devices and communications
- rescue procedures to be used and how to obtain additional assistance when needed

- the proper use of oxygen and toxic agent monitors and/or procedures to provide adequate ventilation during confined space entry operations
- engulfment and mechanical hazards and how to avoid them

**Hazard Avoidance:** Under no circumstance is an employee to enter a grain storage structure below bridged grain or where a grain buildup on the sidewalls could become dislodged and create an engulfment hazard

**Rescue Equipment:** Rescue equipment suited for the confined space being entered is to be available during the entry operation

**Observer to be Stationed:** An observer is to be stationed outside the confined space during entry. The observer is to be equipped for, and trained in, rescue procedures. The observer is to be told how to notify and obtain additional assistance or emergency personnel should that be necessary. The observer is to maintain communication with the person entering the confined space, either through visual or voice contact, or through the use of a signal line.

3. **Alert Outside Emergency Agencies:** Inform anyone who may perform rescue operations of the hazards they may encounter. That includes local town, city and county fire and rescue personnel. Local medical personnel should be provided appropriate material safety data sheets on hazards to which persons entering confined spaces may be exposed
4. **Walking Down Grain:** Walking down grain or similar practices to make grain flow within or out of a grain storage structure or when an employee is on moving grain are **strictly prohibited**

## Procedures for Entering Other Confined Spaces

Management has analyzed this facility and determined the following additional confined spaces exist that may require the issuance of a written permit before entry occurs:

1. Hopper-bottom rail cars
2. Garners and scales
3. Truck dump pits
4. Fuel storage tanks
5. Grain dust storage tanks
6. \_\_\_\_\_
7. \_\_\_\_\_

1. **Written Confined Space Entry Permit:** A written confined space entry permit is to be issued before an employee enters one of the aforementioned confined spaces **if it:**
  - **Contains or has the potential to contain an atmosphere that cannot be controlled through forced air ventilation.** Hazardous atmospheres include: 1) a flammable gas, vapor or mist; 2) airborne combustible grain dust that results in conditions in which the dust obscures vision at a distance of five feet or less; 3) oxygen-deficient conditions (e.g., the air in the space contains oxygen in amounts less than 19.5 percent or greater than 23.5 percent; or 4) any other atmospheric condition that poses an immediate danger to the life or health of an employee
  - **contains a material that has the potential to engulf the employee** (e.g., grain, a liquid or other substance) and cause death by suffocation or strangulation
  - **contains an internal configuration - such as inwardly converging walls or a floor that slopes downward and tapers to a small cross- section -- that could trap or suffocate an employee**
  - **contains any other recognized serious safety or health hazard**

The written confined space entry permit is to:

- indicate that pre-entry preparations have been completed
  - specify the confined space that is to be entered
  - state the purpose of the entry
  - state the date and duration of the entry procedure
  - list the name(s) of the employee(s) authorized to enter the confined space, as well as the name(s) of the attendant(s) and entry supervisor
  - list the expected hazards the employer will encounter
  - List any other pertinent information
  - Be signed by a company official supervising the entry operation
  - be posted at the entrance to the confined space or otherwise made available to all persons authorized to enter the space
2. **Retain Permits:** The permit is in effect only for the time it takes to complete the assigned task. **Permits for confined spaces other than bins, silos and tanks are to be retained for at least one year. Any problems encountered during the confined space entry operation should be noted on the permit**
  3. **Alert Outside Emergency Agencies:** Inform anyone who may perform rescue operations of the hazards they may encounter. That includes local town, city and county fire and rescue personnel. Local medical personnel should be provided appropriate material safety data sheets on hazards to which persons entering confined spaces may be exposed

4. **Review Confined Space Entry Procedures Annually:** Confined space entry procedures are to be reviewed annually to determine their effectiveness and to see if any changes are needed

## Training Requirements

Before confined space entry operations begin, the following training is to be provided to:

1. the person(s) entering the space
  2. the employee(s) assigned to be attendants
  3. the employee(s) supervising the entry
  4. the employee(s) (if any) assigned to perform rescue and emergency services
1. **Employee(s) Authorized to Enter Confined Space:** Training is to include information on:
    - the hazards to be encountered in the confined space
    - how to recognize signs or symptoms of exposure and how to understand the consequences of exposure to hazards
    - how to use any needed equipment
    - how to communicate with attendants, as necessary
    - how to alert attendants when a warning symptom or other hazardous condition exists
    - how to exit as quickly as possible whenever ordered or alerted to do so
  2. **Employee(s) Assigned to Serve as Attendant(s):** Training is to include information on:
    - the hazards present in the confined space
    - the behavioral effects of potential exposures
    - the attendant's specific responsibilities.

The attendant(s)' responsibilities include:

- maintaining continuous contact with employee(s) performing entry procedures
- remaining outside the confined space until relieved
- communicating with and monitoring the status of the confined space entry with the employee
- ordering the employee to exit and summoning rescuers if necessary
- preventing unauthorized entry into the confined space
- performing non-entry rescues, if required



- summoning rescue and other emergency services if the employee(s) entering the confined space need assistance to escape

The attendant(s) is prohibited from performing other duties that interfere with their primary duty to monitor and protect the safety of the employee(s) entering the confined space.

3. **Person(s) Supervising Confined Space Entry:** Training is to include information on:

- the hazards present in the confined space
- the supervisor's specific responsibilities

The supervisor's responsibilities include:

- Verifying that all tests have been conducted and all procedures and equipment are in place before signing the entry permit
- terminating entry and canceling permits
- Verifying that all rescue services are available and that the methods for summoning them are operable
- removing unauthorized individuals who enter the permit-required confined space
- Determining whether acceptable conditions specified in the permit remain in effect during changes in work shifts or entry supervisors

4. **Person(s) Assigned to Perform Rescue/Emergency Services:** If employees are assigned to perform rescue and emergency services, they are to receive training (including first aid and CPR), personal protective equipment and equipment necessary to perform rescues from the confined space. If these duties are assigned, training is to include simulated rescue operations conducted at least every 12 months, in which removal of dummies, mannequins or actual persons takes place

If persons other than this company's employees will perform rescue operations, they are to be informed of the hazards they may encounter, and provided access to all permit spaces for planning and training.

To facilitate rescues without having to resort to entering the confined space, the employee actually performing the work task inside the confined space is required to wear a chest or full body harness with a retrieval line attached to a mechanical device or fixed point outside the confined space, **unless** this equipment would increase the overall risk of entry or would not contribute to the rescue

Medical personnel are to receive the appropriate material safety data sheet or other information kept at the worksite related to the hazards to which authorized entrants may be exposed.



# Contractor Notification

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From time to time, outside contractors are used at this plant to perform various job tasks and repairs. This company's procedures concerning contractor notification are designed to minimize the risk of accident to the contractor's work force while working at our plant.

The contractor notification procedures used at this facility comply with the requirements of the Occupational Safety and Health Administration's grain handling safety standard and general industry standard.

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## Procedures for Contract Notification

When an outside contractor is hired to perform work at this plant, the following procedures apply:

1. **Pre-advise Contractor about Safety Rule Briefing:** The outside contractor is to be advised that their work force will be briefed on this plant's safety procedures and policies upon arrival and before work begins
2. **Meet Contractor Upon Arrival:** The outside contractor's foreman or the person supervising its work force is to be met upon arrival at the plant
3. **Have Contractor Sign-In Names of Work Force:** Have the contractor sign-in the names of its work force on the visitor's log or on a comparable sheet so that these persons can be accounted for in the event of an emergency
4. **Inform Contractor of Potential Fire and Explosion Hazards:** The outside contractor's work force is to be briefed by the plant manager or his/her representative about potential fire and explosion hazards that may be encountered in the type of work being done by the contractor or in the area of the plant in which the contractor is working
5. **Inform Contractor of Facility Safety Rules:** The outside contractor's work force is to be briefed by the plant manager or his/her representative about the safety rules in effect at this facility for the area or type of work being done by the contractor, including no-smoking areas and the emergency action plan procedures. *(See Chapter II, Critical Control Point 3.)* Inform the contractor about emergency escape routes and assembly areas, where persons are to gather for a head count in the event of an emergency

# Preventative Maintenance

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Preventive maintenance refers to the regular inspection, lubrication, maintenance and repair of equipment to keep the facility running efficiently and safely.

This chapter identifies preventive maintenance procedures used at this facility. These procedures reflect the requirements of the Occupational Safety and Health Administration's grain handling facilities standard, which applies to grain elevators, feed mills and processing plants.

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## Preventive Maintenance Procedures

The following preventive maintenance procedures are in effect at this facility:

1. **Regular, Scheduled Inspections:** Regular, scheduled inspections are to be conducted of the mechanical and safety control equipment associated with the feed mill (*e.g., hammer mill and associated equipment*), grain dryers, grain stream processing equipment, grain dust collection equipment (*including filter collectors*) and bucket elevators. The types of mechanical and safety control equipment include the following:
  - Bucket elevator leg head and boot bearings
  - Conveyor belts and associated monitors
  - Grain dryer safety equipment, such as fuel control monitors and exhaust temperature monitors
  - Grain dust control filter collectors and pressure- drop monitors
  - Milling equipment, such as the hammer mill, feed mixer, roller mill and pellet mill
2. **Lubrication and Other Appropriate Maintenance:** Equipment is to be lubricated in accordance with manufacturers' recommendations, or as determined necessary by prior operating records
3. **Written Records:** A written record is to be maintained of the preventive maintenance schedule, the date on which the service was done and the serial number or other identifier of the equipment being serviced. The preventive maintenance record is to be initialed by the employee doing the service
4. **Correcting Problems:** Malfunctioning or defective equipment is to be repaired promptly. This includes, but is not limited to:

- **grain dust collection systems** that are malfunctioning or operating below design efficiency
  - **overheated bearings or slipping or misaligned belts** on bucket elevator legs or conveying equipment
5. **Safety Procedures for Preventive Maintenance:** The following safety procedures are to be used when performing preventive maintenance on equipment:
- **Employee Training:** employees assigned the task of inspecting or performing preventive maintenance are to be trained on how to detect and repair problems with the equipment.
  - **Lockout/Tagout Procedures:** Use lock-out and tag-out procedures to disable equipment that is being repaired, serviced or adjusted if employee injury could result by accidental reactivation of the equipment. Locks and tags are to be removed only by the employee who installed them or by the employee's immediate supervisor

# Control of Hazardous Energy Lockout/Tagout Procedures

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[**Note:** The following sample lockout procedure is provided to assist employers in developing their procedures so they meet the requirements of OSHA's Control of Hazardous Energy (Lockout/Tagout) Standard. When the energy-isolating devices are not lockable, tagout may be used, provided the employer complies with the provisions of the standard that require additional training and more rigorous periodic inspections. When tagout is used and the energy isolating devices are lockable, the employer is required to provide: 1) full employee protection; 2) additional training; and 3) more rigorous periodic inspections. **Please note that OSHA's Grain Handling Facilities Standard requires the use of lockout and tagout of equipment that poses a hazard to employees working in grain or flat storage areas. Refer that section for proper entry procedures.]**

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(Name of Company)

Purpose: This procedure establishes the requirements for the lockout of energy-isolating devices whenever maintenance or servicing is done on the machines or equipment listed below. These procedures are designed to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance if there is a chance that the equipment could unexpectedly be reenergized or started, exposing the employee to possible injury.

Application: These procedures apply to the lockout of the following equipment (identify the equipment or machine to which this particular procedure applies):

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Sequence of Lockout: Employees performing maintenance or service on the equipment listed previously are required to use the following lockout procedures. All other employees, upon observing a machine or piece of equipment that is locked out are not to attempt to start, energize, or use that machine or equipment.

1. Notify the following employees who operate the machine or piece of equipment and other personnel at the facility that service or maintenance is required on that machine or piece of equipment and that it must be shut down and locked out to perform the servicing or maintenance.

Names (or job descriptions) of employees to be notified and how to notify them (this list should include equipment or machine operators and other personnel whose jobs are affected by the machine or equipment being locked out, such as shipping or receiving personnel, sales, etc.):

Name:	Notification Procedure
_____	_____
_____	_____
_____	_____

2. Review the following description of the type and magnitude of the energy that the machine(s) or equipment utilizes (e.g., mechanical, hydraulic, etc.; pressure, voltage, rpm, etc.); the hazards of this energy (e.g., rotating, reciprocating, electrical, etc.); and proper methods to control this hazardous energy (lockout control circuit, block the machine or equipment in the open position, disconnect and lock in the open position, etc.):

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3. Shut down the machine(s) or equipment using the following stopping procedures (e.g., depress stop button, open switch, close valve, etc.):

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4. Deactivate the energy-isolating device(s) (list the type and location of energy-isolating devices below) so that the machine or equipment is isolated from the energy source(s):

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5. Lock out and tag the energy isolating device(s) with assigned individual locks and tag(s).
6. Stored or residual energy (such as might exist in a capacitor, springs, elevated machine members, rotating flywheels, hydraulic systems, pneumatic or steam systems) must be dissipated or restrained by the following methods (grounding, repositioning, blocking, bleeding down, etc.):

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7. Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate.

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**Important: Be sure to return operating control(s) to neutral or “off” position after verifying the isolation of the equipment**

8. The machine is now locked out.

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**Restoring the Machine or Equipment to Service:** When servicing or maintenance is completed and the equipment or machine is ready to return to normal operating condition, the following steps must be taken:

1. Check the machine(s) or equipment and the immediate area around the machine to ensure that nonessential items have been removed and the machine(s) or equipment are operating intact
2. Check the work area to ensure that all employees have been safely positioned or removed from the area
3. Verify that the controls are in neutral
4. Remove the lockout devices and reenergize the machine(s) or equipment. Safely remove any forms of blocking
5. Notify all affected employees (see previous list) that the servicing or maintenance is completed and the machine(s) or equipment is back in service



# OSHA Grain Handling Standard Letters of Interpretation

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- ❖ February 16, 2012 -Sweep Augers
- ❖ May 16, 2012 -Sweep Augers
- ❖ September 29, 2012 -Miscellaneous (sweep augers, engulfment, etc)
- ❖ February 8, 2005 -Bin Entry/Confined Space Entry
- ❖ March 27, 1998 -FR Clothing
- ❖ October 15, 1998 -Combustible Dust
- ❖ October 20, 1998 -Combustible Dust
- ❖ June 3, 1993 -Applicability of Peanut Mills
- ❖ April 1, 1991 -Explosion Suppression
- ❖ April 3, 1991 -Grain Dryer Temperature Sensors
- ❖ July 29, 1991 -Applicability to Seed Handling Facilities
- ❖ October 8, 1991 -Applicability to Oats Processing
- ❖ October 31, 1991 -Bearings
- ❖ November 15, 1990 -Grain Bin Rescue
- ❖ October 18, 1996 -Fall Protection on Rolling Stock

**Standard Number: 1910.272; 1910.272(g)(1)(ii)**

**OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>.**

**February 16, 2012**

The Honorable Kristi Noem

U.S. House of Representatives  
Washington, DC 20515

Dear Representative Noem:

Thank you for your November 7, 2011, letter from you and your colleagues regarding the operation of sweep augers inside grain storage structures. Your letter raised concerns about a letter of interpretation that the Occupational Safety and Health Administration (OSHA) sent to Mr. Rick Smithpeter on December 24, 2009. Specifically, you assert that although the letter to Mr. Smithpeter states that an employee cannot work inside a bin while an unguarded sweep auger is operating, OSHA did not offer alternatives for removing grain while an unguarded sweep auger is operating, and the Agency failed to define the term "unguarded sweep auger." Your letter asks for an update on actions the Agency has taken since the December 24, 2009, letter to clarify its position on sweep augers, and requests that OSHA seek input from industry on practical solutions for this issue. Your letter also stated that "... a number of citations have been issued to grain handling facilities for operating 'unguarded' sweep augers."

A sweep auger is a horizontal auger used to push grain remaining at the bottom of a storage bin toward the bin's discharge sump opening. It rotates around the discharge opening to "sweep" the grain toward that opening. Although the screw portion of an auger is often at least partially covered by some type of guard, as you recognize, a guard cannot cover the entire screw assembly portion of a sweep auger, or the auger would not be able to properly function. Therefore, it is accurate to describe a sweep auger (even if it is partially covered by some type of guard) as an "unguarded ... auger."

OSHA's grain handling standard, 29 CFR 1910.272, does not prevent employers from using a sweep auger inside a grain storage bin. Section 1910.272(g)(1)(ii) of the standard provides that, before a worker enters a grain bin, "all mechanical, electrical, hydraulic, and pneumatic equipment which presents a danger" to the workers be "deenergized, and ... disconnected, locked-out and tagged, blocked-off or prevented from operating by other equally effective means." Thus, if an employer can demonstrate that a worker in a grain storage structure is not exposed to hazards presented by the equipment, the standard does not require the equipment to be deenergized before a worker enters the bin. With regard to your statement about the number of citations that have been issued to grain handling facilities for operating "unguarded" sweep augers, these citations were not issued because OSHA objects to the use of these augers. They were issued because grain handling facilities allowed workers to enter grain bins containing energized sweep augers (whether partially guarded or unguarded) and exposed the workers to the dangers posed by those augers.

On May 16, 2011 OSHA issued a memorandum to its Regional Administrators entitled "Clarification of the Applicability of 29 CFR 1910.272(g) or (h) During Grain Storage Structure Entry Operations" (copy enclosed). This memorandum provides guidance on the applicability of requirements in OSHA's grain handling standard, and clarifies that paragraph (g) requirements apply to all entries into grain storage structures except entry into flat storage structures with unrestricted ground level entry "in which there are no toxicity, flammability, oxygen-deficiency or other atmospheric hazards... "

With respect to your recommendation to meet with stakeholders to discuss their concerns about standards addressing sweep augers, I want to assure you that OSHA officials have met with senior staff from the National Grain Feed Association (NGFA) on several occasions. Two of the most recent and notable meetings took place in Washington, D.C. at OSHA's National Office on June 16 and July 19, 2011. Among other things, these meetings included discussions about alternatives to sweep augers for removing grain from a mostly empty storage facility, including methods such as the use of a vacuum system, a sweep auger with higher horse power, or a remotely operated tractor. Also, OSHA field staff have discussed and addressed the concerns of several local/state grain and feed associations regarding sweep augers on numerous occasions. All of these meetings and discussions have been particularly important given the troubling number of 51 worker grain entrapments in 2010 (data from 2010 is the latest available). Sadly, this alarming trend does not seem to have come to an end.

We hope the information we provided in this response addresses your inquiry. Also, for your reference, OSHA responded to an inquiry from Senator Charles E. Grassley who raised concerns similar to those in your letter on May 16, 2011 (copy enclosed). Thank you for your continued interest in occupational safety and health. If we can be of further assistance, please have your staff contact Laura de la Torre in the Office of Congressional and Intergovernmental Affairs at (202) 693-4600.

Sincerely,  
David Michaels, PhD, MP

**Standard Number: 1910.272; 1910.272(g)(1)(ii); 1910.272(g)(6)**

**OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>.**

**May 16, 2011**

The Honorable Charles E. Grassley

United States Senate  
Washington, D.C. 20510

Dear Senator Grassley:

Thank you for your August 12, 2010, letter to the Occupational Safety and Health Administration (OSHA) on behalf of your constituent, Mr. Alan J. Smith, regarding the use of sweep augers in grain storage bins. Mr. Smith asked for definitions of "guarded and non-guarded" sweep augers, referring to a December 24, 2009, OSHA letter of interpretation (copy enclosed). That letter of interpretation addressed an inquiry about a specific scenario involving a sweep auger, which OSHA's correspondent described as an "unguarded screw auger."

A sweep auger is a horizontal auger used to push grain remaining at the bottom of a storage bin toward the bin's discharge sump opening. It rotates around the discharge opening to "sweep" the grain toward that opening. Although the screw portion of the auger is often at least partially covered by some type of guard, the entire assembly consisting of the screw and the guard rotate around the bin. In addition, a guard cannot cover the entire screw assembly portion of a sweep auger, or the auger would not be able to function. Therefore, it is correct to describe a sweep auger as an "unguarded ... auger."

Mr. Smith's letter seeks guidance on when workers may be inside a grain storage bin while a sweep auger is operating. OSHA's grain handling standard, 29 CFR 1910.272, contains specific requirements that must be met before workers may enter most grain storage bins. This includes the requirement that "all mechanical, electrical, hydraulic, and pneumatic equipment which presents a danger" to the workers be "deenergized and ... disconnected, locked-out and tagged, blocked-off or prevented from

operating by other equally effective means." 29 CFR 1910.272(g)(l)(ii) (emphasis supplied). Although Mr. Smith's letter refers to "non-automated" sweep augers, OSHA believes the vast majority of sweep augers, if not all of them, are powered by electrical or other energy covered by this standard.

There is no question that sweep augers present a danger to workers who are present while the augers are operating. Indeed, OSHA is aware of many fatalities, amputations, and other serious injuries resulting from workers entering grain storage structures to conduct maintenance or adjustments on sweep augers, even when those augers are equipped with guards. Most often, these occur when a worker's clothing, shoestring, or body parts become entangled in the rotating screw of the auger. The hazard is heightened because workers performing these operations are also susceptible to slip/trip hazards from uneven or moving grain.

Workers who enter grain storage structures to ensure that the machinery will resume moving forward have also been injured when they pushed the sweep with their feet or hands, or picked up a running auger. Other workers have been caught and injured by suddenly-starting, fast moving sweep augers operating in storage structures with near empty grain levels. In some cases, an auger may sweep the worker into the discharge sump, resulting in a grain entrapment. At least 26 workers were killed in grain entrapments last year, and the number of entrapments is increasing, according to researchers at Purdue University. There were more grain entrapments in 2010 than in any year since the researchers started collecting data on entrapments in 1978.

OSHA does not agree that its grain handling standard means that employers are unable to use sweep augers, as Mr. Smith suggests. If an employer can demonstrate that a worker in a storage structure is not exposed to hazards presented by the equipment, the standard does not require the equipment to be deenergized. For example, a worker would not be exposed to engulfment or entanglement hazards by standing on a guarded platform or catwalk that is sufficiently far away from areas where grain is being drawn from storage. See 61 Federal Register 9581, March 8, 1996 (copy enclosed).

In addition, there are alternatives to sending workers into a grain storage structure to conduct maintenance or adjustments to an energized sweep auger. For instance, an employer may choose to use a sweep auger with a higher horsepower, or use remotely operated tractors that can push a sweep auger through the grain.

Nor is a sweep auger the only means of removing grain from a mostly empty storage facility. Removal can also be accomplished through the use of a vacuum system, or workers can manually shovel and/or sweep remaining grain from a bin once the equipment is deenergized and locked out. Please keep in mind, however, that if the means of removing grain requires a worker to enter the grain storage structure, all hazards, including all engulfment hazards, must be controlled. See 29 CFR 1910.272(g)(6) and the enclosed OSHA Fact Sheet.

Additionally, if an employer has a different way of protecting workers, it may request a variance from a standard, or portion of the standard, authorized by section 6(b)(6)(A) of the OSH Act. Iowa operates its own occupational safety and health program under a plan approved and monitored by Federal OSHA and administered by the Iowa Division of Labor Services (DLS). Under this plan, Iowa's DLS promulgates and enforces, under authority of State law, occupational safety and health standards that are at least as effective as those of Federal OSHA, and is obligated to enforce its standards as effectively as Federal OSHA does. You may contact Iowa's DLS at the following address for more information about requesting a variance:

Iowa Division of Labor Services  
1000 East Grand Avenue  
Des Moines, Iowa 50319-0209  
PH: (515) 242-5870  
FAX: (515) 281-7995  
<http://www.iowaworkforce.org/labor/iosh/index.html>

The Iowa OSHA office would also be able to answer any questions about the specific citation Mr. Smith's employer received.

For small businesses, OSHA's On-site Consultation Program offers free and confidential advice on health and safety solutions with priority given to high-hazard worksites, including grain handling facilities. Through this program, small and medium-sized employers can obtain free advice on addressing hazards. On-site consultation services exist in every state, and they are independent from OSHA's enforcement efforts. On-site Consultation Program consultants, employed by state agencies or universities, work with employers to identify workplace hazards, provide advice on compliance with OSHA standards, and assist in establishing safety and health management systems. More information is available at [www.osha.gov](http://www.osha.gov) or 1-800-321-6742.

We hope this response is helpful to you and your constituent. Thank you for your continued interest in occupational safety and health. If we can be of further assistance, please have your staff contact Sharon Block in the Office of Congressional and Intergovernmental Affairs at (202) 693-4600.

Sincerely,

David Michaels, PhD, MPH

Enclosures

**Standard Number: 1910.23(a)(5); 1910.272; 1910.272(e)(2); 1910.272(g)(1)(ii); 1910.272(g)(2)**

**OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>.**

**September 29, 2008**

Mr. Rick Smithpeter  
Director of Risk Services  
Cooperative Mutual Insurance Company  
3905 S. 148th Street  
Suite 100  
Omaha, Nebraska 68144

Dear Mr. Smithpeter:

Thank you for your January 23, 2008 letter to the Occupational Safety and Health Administration (OSHA) regarding the grain handling facilities standard at 29 CFR 1910.272. This letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any questions not delineated within your original correspondence. We apologize for the delay in our response. Your paraphrased scenario, questions, and our responses are provided below.

**Question 1:** The note to 29 CFR 1910.272(g)(2) states: "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." Does this imply that if the employer can demonstrate that there are no engulfment hazards, then the employer can allow the employee to remove his/her harness and lifeline?

**Response 1:** Yes. You must note, however, that standing or walking on the grain has been demonstrated to be a source of hazards to workers. To meet the exception provided in the associated note, employers must not allow employees to walk or work on the surface of the grain until the employer has verified that engulfment hazards do not exist as a result of a bridging condition, air pocket or void space below

the surface of the grain or that the depth of grain is not sufficient to present an engulfment hazard in the specific bin, silo or tank. Probe tests sufficient to detect any air pockets or void spaces may be one way to assess the stability of the grain surface. However, if a worker must stay on the grain to conduct such tests, the worker must be protected from engulfment during the tests.

Scenario: The second issue raised in your letter addressed OSHA's standard at 29 CFR 1910.272(g)(1)(ii), which provides:

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.

Also, OSHA's standard at 29 CFR 1910.23(a) (5) provides:

Every pit and trapdoor floor opening, infrequently used, shall be guarded by a floor opening cover of standard strength. While the cover is not in place, the pit or trap shall be constantly attended by someone or shall be protected on exposed sides by removable standard railings.

Sweep augers are installed at the floor level of grain storage structures to help move grain from the periphery of the structure to the central discharge point. You indicated in your letter that sweep augers attach to a center pivot point that is usually located in an open pit or sump that provides access to the recovery conveyor that removes grain and foreign matter from the bin. The open sump can range from 18 inches to 4 feet deep or from 18 inches to 4 feet in length or diameter, although most sumps are square. You also indicate that, by design, sweep augers do not have a grating covering them.

In your letter, you enclosed "Procedures For Employees Working in Grain Storage Areas While Equipment is Operating (Sweep Augers)." The procedures state that employees must stay six feet behind any partially-guarded or unguarded energized equipment in grain storage areas. If employees must work closer than six feet, the employee must implement positive procedures to assure the equipment is de-energized and there will be no chance of unexpected start-up (i.e., lock-out/tag-out). The procedures also state that an observer shall maintain direct visual contact of all employees working in grain storage areas at all times while equipment is operating. The observer shall be located at the doorway of bins being emptied and shall have control of the on/off switch.

**Question 2:** Can employees operate the sweep auger if the sump is not being protected by a grating or other similar protection? Does Section 1910.23(a)(5) mean that, as long as the employer assures that the pit or sump is "constantly attended by someone" while the employee is in the grain bin running the sweep auger, the sweep auger need not have a cover or removable standard railings (which would make it impossible to run)?



**Response 2:** As noted above, OSHA's standard at 29 CFR 1910.272(g)(1)(ii) provides that, before employees enter grain storage structures, equipment which presents a danger to employees must be deenergized, and "disconnected, locked-out and tagged, blocked-off, or otherwise prevented from operating by equally effective means or measures." The standard is not intended to be a prohibition against employees entering grain storage structures while machinery is running. Instead, employees may enter such facilities while machinery is running if the employer can demonstrate that appropriate protection has been provided to prevent employees from being exposed to the hazards/dangers of the moving machinery.

An obvious example of an effective method in protecting employees from the hazards associated with machinery inside grain storage structures would be machine guarding. Another example of an effective method might include a rope positioning system, based on the length of rope tied to an employee and installed inside the storage bin, which would prevent the employee from being exposed to the hazards presented by the moving machinery of a sweep auger. On the other hand, because they may not protect employees from the hazards associated with mechanized sweep augers, use of a boatswain chair would not be considered an "equally effective means or method" under Section 1910.272(g)(1)(ii). Additionally, please keep in mind that regardless of whether an employer does or does not implement "other equally effective means or methods," Section 1910.272(e)(2) requires employers to provide employees entering grain storage structures with training on mechanical hazards and how to avoid them.

The procedures for sweep augers enclosed in your letter would not be considered by OSHA as "other equally effective means or methods" as set forth in 1910.272(g)(1)(ii). First, because of the possibility for uneven or moving grain inside grain storage structures, there is a potential for employees to slip and fall on partially-guarded or unguarded moving machinery parts (such as a sweep auger). Second, because of possible poor visibility (e.g., from poor lighting) inside grain storage facilities, employees may have difficulty estimating distances from, or not seeing at all, moving machinery parts. As such, OSHA does not consider maintaining a distance of six feet from partially-guarded or unguarded energized equipment in grain storage structures as an "otherwise equally effective means or method" provided by the standard. Lastly, the reliance on an observer with control of an on/off switch for energized equipment creates a potential for human error and is not a positive method of protecting employees from exposure to hazards in grain storage structures. As indicated in the example above, an equally effective method might include a rope positioning system, which would physically prevent the employee from entering the area where they could be exposed to the hazards associated by moving machinery of a sweep auger.

Finally, you also enclosed in your letter a September 30, 1996, memorandum from Mr. Thomas H. Seymour, Acting Director, Directorate of Safety Standards Programs, to Sandra J. Taylor, Acting Regional Administrator, OSHA Region V, which addressed 29 CFR 1910.272(g)(1)(ii) with respect to whether employees may enter a bin when machines are running. We were not able to determine the origins of

the memorandum enclosed in your letter. Memorandums of this type are normally issued by OSHA's Directorate of Enforcement Programs (previously Directorate of Compliance Programs in 1996), and are considered to be in "draft" form until signed and issued by the referenced individual. Please note that the contents of this unsigned memorandum do not reflect official OSHA policy.

Thank you for your interest in occupational safety and health. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>. If you need further assistance, please contact the Office of General Industry Enforcement at (202) 693-1850.

Sincerely,

Richard E. Fairfax, Director  
Directorate of Enforcement Programs

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**Standard Number: 1910.146; 1910.146(c)(2); 1910.272; 1910.272(e)(1)(i); 1910.272(g); 1910.272(g)(3); 1910.272(g)(5) .**

**This letter constitutes OSHA's interpretation only of the requirements discussed and may not be applicable to any situation not delineated within the original correspondence.**

**February 8, 2005**

Mr. Ronald R. Demaray  
Regulatory Consultants, Inc.  
140 West 8th Street  
Horton, KS 66439

Dear Mr. Demaray:

Thank you for your April 13, 2004 letter to the Occupational Safety and Health Administration's (OSHA's) Directorate of Enforcement Programs (DEP). Your letter has been referred to DEP's Office of General

Industry Enforcement for an answer to your questions regarding OSHA's Permit-Required Confined Spaces (PRCS) Standard, 29 CFR 1910.146 and Grain Handling Standard, 29 CFR 1910.272. Your questions have been restated below for clarity.

**Question 1:** The Grain Handling Standard does not require grain bins to be identified and posted as permit-required confined spaces. Are grain bins required to be labeled as permit-required confined spaces under 29 CFR 1910.146?

**Reply:** 29 CFR 1910.146(c)(2) requires that employers inform exposed employees, by posting danger signs or by any other equally effective means, of the existence and location of and the danger posed by, permit spaces. An employer who falls within the scope of the grain handling standard may be cited under 29 CFR 1910.272(e)(1)(i) for failing to train employees on general safety precautions, such as recognizing that grain storage structures require special entry precautions. However, in neither standard is labeling the exclusive or specific means of informing employees of the hazards posed by grain bins.

**Question 2:** Does the Grain Handling Standard, 29 CFR 1910.272, supersede the requirements of 29 CFR 1910.146 with regard to entry into grain bins, silos, tanks, and other grain structures?

**Reply:** 29 CFR 1910.272(g) takes precedence over the permit-required confined space standard for the hazards it addresses.

**Question 3:** What documentation is required as proof that the supervisor has no reason to suspect "bad" air quality in a grain bin?

**Reply:** The employer is required to issue a permit for entering bins unless the employer or the employer's representative is present during the entire operation. The permit must certify that the precautions contained in 29 CFR 1910.272(g) have been implemented. Although specific results of air testing are not required to be documented under 29 CFR 1910.272(g), an employer would still be required to maintain employee exposure records in accordance with 29 CFR 1910.1020.

**Question 4:** If employees enter grain bins under the requirements from the Grain Handling Standard, could the employer be cited for violations under the Permit-Required Confined Spaces Standard?

**Reply:** Confined space work that is regulated under 29 CFR 1910.272, such as grain bin entry, is not subject to the provisions of 29 CFR 1910.146 as long as the provisions of 29 CFR 1910.272 protect against all of the hazards within the grain bins.

**Question 5:** Does an employer with a grain elevator operating under the Grain Handling Standard need only to provide rescue equipment?

**Reply:** No, 29 CFR 1910.272(g)(3) clearly states that an observer shall be stationed outside the bin, silo, or tank being entered by an employee. In addition, 29 CFR 1910.272(g)(5) requires that the employee

acting as an observer shall be trained in rescue procedures, including notification methods for obtaining additional assistance.

**Question 6:** If an employer would need to use the local fire department for rescue, would the training required by the fire department need to follow 29 CFR 1910.146?

**Reply:** OSHA does not have enforcement jurisdiction over local government entities such as local fire departments. However, a prudent employer would preplan to assure that any local emergency entity has the equipment, trained personnel, etc., if it were to rely on that outside service to conduct rescue. An employer could look to guidance in Appendix F to 29 CFR 1910.146 -- Rescue Team or Rescue Service Evaluation Criteria (Non-Mandatory) and 29 CFR 1910.272 Appendix A-2 Emergency Action Plan in choosing an appropriate rescue service.

Thank you for your interest in occupational safety and health. We hope you find this information helpful. OSHA requirements are set by statute, standards, and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>. If you have any further questions, please feel free to contact the Office of General Industry Enforcement at (202) 693-1850.

Sincerely,

Richard E. Fairfax, Director  
Directorate of Enforcement Programs

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**Standard Number: 1910.132; 1910.1029(h)(1); 1910.272 App A**

**March 27, 1998**

Mr. Daniel T. Hopper, Jr.  
Occupational Safety and Health Engineer  
4532 39th Street  
Zachary, Louisiana 70791

Dear Mr. Hopper:

Thank you for your letter of January 24, requesting an interpretation from the Occupational Safety and Health Administration (OSHA), regarding the use of fire retardant clothing in various industries, which does not include fire fighting brigades, and electrical distribution. In your letter you asked for a response from OSHA for five specific questions, which are listed below.

**Question #1**

Have there been any directives issued to Area Offices that would mandate the use of Fire Retardant Clothing other than those for fire brigades and electrical distribution workers?

**Answer:**

The answer to your question is no. However, the Grain Handling Facilities Standard, 29 CFR 1910.272 Appendix A, Section 3, Training, states that the types of work clothing should also be considered in the training program at least to caution against using polyester clothing that easily melts and increases the severity of burns, as compared to wool or fire retardant cotton.

The Coke Oven Emissions Standard, 29 CFR 1910.1029(h)(1) states that the employer shall provide and assure the use of appropriate protective clothing and equipment, such as but not limited to: flame resistant jacket, pants, and gloves.

The Personal Protective Equipment Standard, Subpart I 29 CFR 1910.132(d)(1) requires the employer to assess the workplace to determine if hazards are present, or likely to be present, which necessitate the use of personal protective equipment (PPE). If such hazards are present, or likely to be present, the employer shall select, and have each affected employee use, the types of PPE that will protect the affected employee from the hazards identified in the hazard assessment.

**Question #2**

Have there been any studies conducted on the economic impact that may be encountered with the use of Fire Retardant Clothing?

**Answer:**

OSHA has not conducted an economic impact study on the use of Fire Retardant Clothing.

**Question #3**

If the use of these garments are in fact required, should one, as a Designated Competent Person for the Personal Protective Equipment Standard, be concerned with any associated heat and cold stress factors that may be present due to atmospheric conditions?

**Answer:**

The answer to your question is yes. Stress factors such as heat and cold atmospheric conditions are hazards that are covered under our Personal Protective Equipment Standard, Subpart I, 29 CFR 1910.132(a).

**Question #4**

If a company issues fire retardant clothing that is in disrepair knowing that the garments are defective, could they be found in violation of any of the OSHA standards?

**Answer:**

The answer to your question is yes. The Personal Protective Equipment Standard, Subpart I, 29 CFR 1910.132(e) states that defective or damaged personal protective equipment shall not be used.

**Question #5**

Could I, as a Safety and Health Engineer, use a negative hazard assessment to determine the need for fire retardant clothing based on the factors such as past history and present Process Safety Management progressions?

**Answer:**

The answer to your question is yes. 29 CFR 1910.132(d)(1) states the employer shall assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment (PPE). If such hazards are present, or likely to be present, the employer shall: select, and have each effected employee use, the types of PPE that will protect the affected employee from the hazards identified in the hazard assessment.

Thank you for your interest in safety and health. If you have any questions or concerns please contact Russelle McCollough of my staff, at (202) 219-8031.

Sincerely,

John B. Miles, Jr., Director  
Directorate of Compliance Programs

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**Standard Number: 1910.272(j)**

**October 15, 1998**

Mr. Jesse L. McDaniel, CSP  
Team Leader, Risk Management  
Countrymark Cooperative, Inc.  
950 North Meridian Street  
Indianapolis, Indiana 46204-3909

Dear Mr. McDaniel:

This is a follow-up response to the interim letter that was sent to you on August 7, regarding the applicability of the Occupational Safety and Health Administration's (OSHA's) Grain Handling Standard, 29 CFR 1910.272, with respect to Feed Mills.

Your letter indicates that your concerns are focused on the grain dust accumulations with regard to the 1/8 inch grain dust accumulation requirement as it relates specifically to feed mills. You inquired whether the term "grain elevators" was intentional for the 1/8 inch action level, or was the standard supposed to read "grain handling facilities."

Please note that the term grain elevators was intentional and the 1/8 inch action level does not apply to feed mills. Please find an explanation below.

During the rule making process for the Grain Handling Standard, §1910.272, it had come to OSHA's attention that feed mills typically use ingredients that are much less explosive than grain dust. Some of the ingredients are inert substances, such as limestone and bentonite. Other non-explosive and non-combustible ingredients include salt, dicalcium phosphate, monocalcium phosphate and trace minerals. Feed mills also use a large number of non-flammable liquid ingredients such as molasses, mineral oil and water soluble ingredients which further reduce the explosibility or combustibility of the grain and its dust generation potential. The pelleting process commonly used in feed manufacturing necessitates the inclusion of steam or water to the ingredients, further reducing the risk of explosion or fire. Raw bulk grain is only a small part of the total ingredient mix used in a feed mill. Soybean meal, animal by-products such as meat and bone meal, dehydrated alfalfa, corn gluten meal, beet pulp and sugar are just a few of the many ingredients used to produce livestock and poultry feed. All of these ingredients are significantly less explosive and combustible than grain dust.

One of the major differences between grain elevators and feed mills, is that most feed mills probably handle 25-50% grain, whereas grain elevators handle 100% grain. Grain elevators move grain and its component contaminants at speeds in the neighborhood of 40-50,000 bushels an hour where feed mills normally move 5-10,000 bushels per hour. Therefore grain elevators move much larger capacities at a much higher speed, and therefore, tend to generate more dust than feed mills.

It has also been found that mills have a considerably smaller risk of death and injury from explosions than grain elevators. OSHA's statistical findings indicated that to reflect these differences in operation and in the relative risks of fires and explosions, the application of the final standard is somewhat different for mills than it is for grain elevators. In conclusion, the final standard does not impose specific requirements on bucket elevators (process legs in mills); and although mills are required to have a written housekeeping program, the 1/8 inch action level for dust accumulations does not apply to feed mills.

Finally, you also inquired about the current OSHA directive, CPL 2-1.4C. Your letter indicated that the directive addresses inspections of Grain Handling Facilities, and states that SIC Code 2048, Prepared Feeds and Feed Ingredients for Animals and Fowls, Not Elsewhere Classified would be covered, and that it does exempt seed plants. In that same directive, it states that 1910.272(j)(1) is applicable to grain elevators and those mills specified at 29 CFR 1910.272(b)(1), although the standard, 1910.272(j)(2), applies only to grain elevators and not to processing or mill operations. You felt that this was contradictory. You stated, "If the risks and equipment involved are essentially the same, why would one be specifically exempted?" As discussed above, OSHA does not believe that the risks and equipment are essentially the same. Additionally, §1910.272(j)(1) does not contradict §1910.272(j)(2). All grain handling facilities must have a written housekeeping program (§1910.272(j)(1)), but only grain elevators must meet the 1/8 inch action level (§1910.272(j)(2)).

Thank you for your interest in occupational safety and health. If you have questions regarding the preceding, please contact Alcmene Haloftis of my staff at 202-219-8031, ext. 119.

Sincerely,

Richard E. Fairfax, Acting Director  
Directorate of Compliance Programs



**Standard Number: 1910.272**

**October 20, 1988**

Bill Lybrand  
So. Carolina Department of Labor  
P.O. Box 11329  
Columbia, SC 29211

Dear Mr. Lybrand:

In response to your concerns about analytical services necessary to support the new OSHA Grain Handling Standard I am supplying you with the following information:

Fugitive Grain Dust is defined in the new standard as "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)". The standard specifies that fugitive grain dust accumulations of 1/8 inch will trigger the employer to initiate actions to remove these accumulations.

This definition greatly simplifies the analytical work necessary to characterize the dust found in a grain handling facility. To determine the percentage of fugitive dust in a sample obtained from one of these facilities where dust levels exceed 1/8 of an inch, a laboratory would need to perform the following analyses:

**Percent Fugitive Dusts (Lab Tests)**

- 1- The sample will be passed through a Standard 40 mesh sieve. The laboratory would need to make a weight determination to measure the percentage of the material that passes through the sieve.
- 2- An aliquot of the material that passed through the 40 mesh sieve would then need to be ignited in a furnace at 600oC. The combustible fraction of the sample is determined by measuring the difference in weight of the sample aliquot before and after ignition.

These two parameters are then combined mathematically and a value, in percent, is reported as "% Combustible Dust". These analyses are all that are necessary to meet the requirements for the characterization of a sample found in a grain handling facility as "Fugitive Grain Dust" as defined by the standard.

Additional tests may be conducted. They include suspending some of the dust in a 20-liter explosibility test chamber and igniting it with a strong chemical ignitor. By monitoring the pressure developed in the chamber we are able to determine if the sample exploded. This is not a requirement of the standard,

but it is done to provide additional supportive documentation about the explosive nature of the samples.

To answer your question about the containers we recommend for sampling I have enclosed one of the containers that we are currently using for sampling grain dust. This container will hold 8 oz. (~ 250 ml) of material. This will be enough sample to perform the following tests:

1- % 40 mesh - Percent that passes through a 40 mesh sieve (ie particles less than 425 microns in size)

2- % Combustible Dust - Percent Combustible Dust

3- Kst - Normalized Rate of Pressure Rise - This is a parameter associated with explosions that indicates that the dust exploded. (This test is performed only if specifically requested for special purposes.)

I have also included three bottles of sieved dust for reference in regard to particle size. This material was obtained from a pooled grain dust that we have at the laboratory. This material may be useful as a training aid for your staff so they can recognize the size of dust the standard addresses. They are composed of the following sized grain dusts:

1- Coarse dust greater than 40 mesh (425 micron).

2- Dust that is less than 40 mesh but greater than 200 mesh (425 micron and 75 micron). Dust this fine or finer is what we need to meet the criteria of the Grain Handling Standard.

3- Fine dust less than 200 mesh ( 75 microns).

Finally, I have included pages from the 1988 Fisher Scientific supply catalog for sieves, containers and furnaces to give you an idea of their cost. This equipment is readily available from any number of scientific supply distributors besides Fisher so you may check with some other suppliers to get the best price. The 20-liter explosibility testing chamber used for the supplemental tests is not available as an off the shelf item, but can be obtained through specialty suppliers.

I trust that I have provided you with the information that you requested. If I can be of further assistance please feel free to contact me at the laboratory, my phone number is (801 487-0073).

Sincerely,

Steven L. Edwards  
Supervisory Chemist  
USDOL/OSHA SLCAL

**Standard Number: 1910.272**

**June 3, 1993**

Greg W. Richey, CIH, CSP  
Program Consultant  
Galson Corporation  
6601 Kirkville Road E.  
Syracuse, NY 13057

Dear Mr. Richey:

This is a further response to your letter of March 16, and to the additional information you provided during the April 12, telephone conversation with Mr. James C. Dillard, of my staff, in which you requested an interpretation of whether industries involved in the storage, cleaning, sizing, shelling, grading, and packaging of peanuts are covered under the Occupational Safety and Health Administration's (OSHA's) 29 CFR Part 1910, General Industry standards or 29 CFR Part 1928, Agriculture standards. If these industries are covered under the General Industry standards, you requested clarification on whether they are subject to the Grain Handling standard at 1910.272.

Grain elevators onsite which receive, handle, store, and ship (including transfer to another part of the facility) bulk raw agricultural commodities, which may be part of your mills, are covered by the 1910.272 standard. The peanut mills, themselves, are not covered by 1910.272. The 29 CFR 1928 Agricultural standard would not apply to these facilities since they are not engaged in the production of crops or livestock.

If we can be of further assistance, please feel free to contact Mr. James C. Dillard, of my staff, at (202) 219-8031.

Sincerely,

Raymond E. Donnelly, Director  
Office of General Industry Compliance  
Assistance

**Standard Number: 1910.272**

**APR 1 1991**

Mr. Brent S. Ehmke  
Director  
Explosion Protection Group  
Fenwal Safety Systems Inc.  
700 Nickerson Road  
Marlborough, Massachusetts 01752  
Dear Mr. Ehmke:

This is in response to your letter of February 14, requesting a clarification of the Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.272(p)(8)(i).

In your letter you gave a description of one of your products, X-Pac, which you described as an assembly containing a suppression agent and as an explosion suppression system capable of detecting and suppressing a potential explosion.

The OSHA standard at 1910.272(p)(8) states "Paragraphs (p)(4), (p)(5), and (p)(6) do not apply to the following: (i) Bucket elevators which are equipped with an operational fire and explosion suppression system capable of protecting at least the head and boot section of the bucket elevator."

We interpret the above standard to mean that the suppression systems must be functional and capable of detecting and suppressing an imminent explosion.

We want to inform you that our knowledge of your product, X-Pac, is limited to the information you provided in your letter. We have no direct knowledge of your product. Since X-Pac as you described can detect and suppress an explosion in a rapid manner, we consider that your product would meet the intent of the OSHA standard at 1910.272(p)(8)(i), provided it is installed and maintained in a manner prescribed by your company.

As you may know, OSHA does not approve or endorse any product since the products may be misapplied or misused during installation or usage. Therefore, you should not treat this letter as an approval of your product.

Thank you for your interest in safety and health. If we may be of further assistance, please contact us.

Sincerely,

Patricia K. Clark, Director  
Directorate of Compliance Programs

**Standard Number: 1910.272**

**April 3, 1991**

Mr. T. Daniel Lentz

Product Engineer

Beard Industries

R.R. 6, Box 19

Frankfort, Indiana 46041

Dear Mr. Lentz:

This is in response to your letter of February 22, addressed to Mr. Ray Donnelly of my staff, concerning an interpretation of the Occupational Safety and Health Administration (OSHA) standard at 29 CFR 1910.272(o), specifically of 1910.272(o)(1)(ii). Your question with respect to 1910.272 (o)(1)(ii) pertained to location of the excessive temperature sensors.

The OSHA standard 1910.272(o) states, "Continuous-flow bulk raw grain dryers. (1) Not later than April 1,1991, 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 drying section."

As you may know, the implementation of the standard at 1910.272(o)(1)(ii) serves two purposes. First, the grain is stopped from being fed into a dryer. Second, further transfer of any ignited or burning material to storage or other processing areas is eliminated. Therefore, a sensor(s) located at the discharge side of the dryer, which would detect excessive grain temperature and would stop the grain from further movement in the event of an excessive temperature's detection, will meet the requirements of the standard.

Thank you for your interest in employee safety and health. If we may be of further assistance, please contact us.

Sincerely,

Patricia K. Clark, Director

Directorate of Compliance Program

**Standard Number: 1910.272**

**July 29, 1991**

Mr. John J. Sacco  
Senior Industrial Hygienist  
Continental Insurance  
Technical Services  
Pacific Regional Office  
11031 Sun Center Drive  
Rancho Cordova, California 95670

Dear Mr. Sacco:

Your June 19 letter requests interpretations regarding issues relating to the 29 CFR 1910.272, Grain Handling Facilities Standard. Namely, does the standard apply to bean or seed handling facilities? Also, are employers mandated to have in-house rescue capabilities, or is reliance on outside rescue acceptable?

In response to your first question, 29 CFR 1910.272 is applicable to establishments handling bulk raw agricultural commodities including unprocessed seeds (and beans) except for grain handling facilities engaged primarily in the production of crops or livestock, such as farm or feed lots. As to your second question, the 29 CFR 1910.272, Grain Handling Facilities Standard does not preclude employer use of an outside rescue team. With reference to 1910.272(g)(5), additional assistance could be provided by either an in-house or outside rescue team chosen by the employer to best suit his or her circumstances. The intent of 1910.272(g)(5) is to provide for performance of assigned rescue and emergency duties by the observer without entering the permit space. The observer must also be trained in how to obtain additional assistance, whether located at or nearby the grain handling facility. Similar requirements are contained in the proposed OSHA standard [1910.146] for an attendant of a confined space.

[This document was edited on 02/15/99 to strike information that no longer reflects current OSHA policy.]

We appreciate your interest in employee safety and health. If we can be of further assistance, please do not hesitate to contact us.

Sincerely,

Patricia K. Clark, Director  
Directorate of Compliance Programs

**Standard Number: 1910.272**

**October 8, 1991**

Mr. Clyde Carson  
Director of Sanitation and Safety Grain  
Millers, Inc.  
P.O. Box 21339  
Eugene, Oregon 97402-0405

Dear Mr. Carson:

This is in response to your letter of May 20 requesting an interpretation of 29 CFR 1910.272, the standard for Grain Handling Facilities. Please accept our apologies for the delay in responding.

Specifically, you asked about the applicability of 1910.272(i)(2) which addresses grain dust accumulations, and 1910.272(p), which covers inside bucket elevators, to the Eugene milling facility. As described in your letter, a bulk raw agricultural commodity, that is, oats, is conveyed for storage and, subsequently, for mill processing in the same building.

The grain dust housekeeping and inside bucket elevator standards are not applicable to your facility when the bulk raw oats are conveyed to storage for mill processing at speeds no greater than the speeds of conveyers transporting the oats during mill processing. However, bulk raw oats conveyed to storage for mill processing at high speeds similar to the speeds of conveyers in grain elevators are subject to 29 CFR 1910.272 standards. Then, in accordance with 1910.272(i)(2)(i)(A) and (i)(2)(ii), floor areas within 35 feet of the inside bucket elevators are priority housekeeping areas from which fugitive grain dust accumulations, whenever they exceed 1/8 inch (0.32 cm), shall be removed immediately by the employer. Conveyance of the oats from storage to processing, and mill processing of the oats subsequently conveyed from storage are not subject to 29 CFR 1910.272(i)(2),(m),(o), and (p) of the standard. However, the conveyance of bulk raw oats from storage for the purpose of shipment from the building to an external storage area or to another building or establishment is subject to these grain handling standards.

We appreciate your interest in employee safety and health. If we can be of further assistance, please do not hesitate to contact us.

Sincerely,

Patricia K. Clark, Director  
Directorate of Compliance Program

**Standard Number: 1910.272(p)(4)(ii)**

**OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>.**

**October 31, 1991**

Mr. Kevin J. Schultze  
Continental-Agra Grain Equipment, Inc.  
1400 South Spenser Road  
Post Office Box 525  
Newton, Kansas 67114

Dear Mr. Schultze:

This is in response to your April 18 letter with supporting information enclosures requesting interpretations and clarifications of 29 CFR 1910.272 as delineated in Occupational Safety and Health Administration (OSHA) Instruction, [CPL 02-01-004] on Grain Handling Facilities. Please accept our apology for the delay in response.

Your first request is to clarify the terminology "making contact with the interior leg casing" in [CPL 02-01-004 (formerly CPL 2-1.4C), paragraph 19] which interprets the "partially inside the leg" terminology of the 29 CFR 1910.272(p)(4)(ii) bearing monitor standard. Note that bearings can be installed inside, partially inside or externally with respect to the leg casing of bucket elevators. Therefore, 29 CFR 1910.272(p)(4)(ii) is interpreted to require bearing monitoring unless the bearing assembly including associated inner dust seals are installed externally, that is, without touching, to the leg casing. Also, note that the "interior leg casing" describes that part of the bucket elevator which is inside of the grain elevator structure. The 29 CFR 1910.272(p)(4)(ii) bearing monitoring requirement only applies to "inside bucket elevators" as defined in 29 CFR 1910.272(c)(5). Thus, the monitoring requirements of 29 CFR 1910.272(p)(4)(ii) do not apply to bearings mounted inside or partially-inside the interior leg casings of other bucket elevators for example, those which have the boot and no more than 20 percent of the total leg height inside the grain elevator structure.

Your other request is to clarify that the 29 CFR 1910.272(p)(7) standard does not preclude the applicability of the 29 CFR 1910.272(p)(4) bearing monitoring standard to grain handling facilities with less than one million bushels permanent storage capacity. This literal interpretation of the aforementioned standards will be emphasized in a revision to the OSHA Instruction, [CPL 02-01-004]. Expanding on your recommendation, the following clarification addresses the interpretation more



specifically. Monitoring equipment shall be installed on inside bucket elevators except when bearings are mounted externally to the interior leg casing in compliance with 29 CFR 1910.272(p)(4)(i) or when a fire and explosion suppression system or pneumatic or other dust control system or method is installed as provided by 29 CFR 1910.272(p)(8).

We appreciate your interest in employee safety and health. If we can be of further assistance, please do not hesitate to contact us.

Sincerely,

Patricia K. Clark, Director  
[Directorate of Enforcement Programs]

[Corrected 05/28/2004]

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**Standard Number: 1910.272**

**November 15, 1990**

Ms. Julie A. Emmerich  
Suite 400  
Chouteau Center  
133 South Eleventh Street  
St. Louis, Missouri 63102

Dear Ms. Emmerich:

This is in response to your letter of August 1, addressed to Ms. Cynthia Wolfe, Assistant Regional Administrator for Technical Support, of the Occupational Safety and Health Administration (OSHA) Regional office in Atlanta, Georgia. You wrote your letter on behalf of your client, Purina Mills, Inc., as a result of an OSHA inspection at one of their facilities. Your letter was subsequently forwarded to the National Office for a response. We apologize for the delay in our response.

Your letter focused on two issues concerning the OSHA standard at 29 CFR 1910.272(g)(4), for which one of your client's facilities located in Montgomery, Alabama, was cited for violation of the standard. The issues of your concern are:

1) The type and quantity of rescue equipment that is required, that is, how many hoists, boatswain chairs, etc., must be kept available for rescue, and what factors should be considered in determining the location where such equipment shall be kept.

2) Whether a provision for outside rescue teams can be used in conjunction with an in-house rescue plan. If so, how can the rescue plan be tailored so that it specifies when the outside rescue team should be relied upon.

In response to the first issue, an employee waiting outside a bin, silo, or tank as an observer, for the purpose of rescue operation, must be provided with a protection equivalent to the protection provided to the employee entering the bin, silo, or tank. Therefore, at a minimum, each establishment must have one set of the following equipment available in the immediate vicinity of the observer:

1) A hoist; and

2) A two-way radio (intrinsically safe), if use of voice or signal communication is not feasible; and

3) A body harness attached to an independent lifeline, or a boatswain chair meeting the requirements contained in subpart D of OSHA general industry 1910 standards. If a boatswain chair is provided to the observer for rescue operation, the observer must then be protected by requiring him or her to wear a safety belt attached to a lifeline. This lifeline must be securely attached to an independent structure other than the members or support of the scaffold.

4) A self-contained breathing apparatus or an airline respirator, if the atmosphere within silo, bin, or tank has not been tested, or has been tested and determined to endanger the life and health of the observer, prior to observer's entry.

With respect to your second issue, OSHA does not prohibit the use of an outside rescue team in conjunction with in-house rescue plan. However, use of additional outside rescue teams would be beneficial, primarily if the teams can arrive immediately after an incident requiring a rescue operation occurs. Therefore, if a company chooses to use outside rescue team in conjunction with the in-house rescue team, the employee acting as observer must not only be trained to notify the plant personnel for additional assistance, but also be trained to notify the outside rescue team to obtain additional assistance.

Thank you for your interest in safety and health. If we may be of further assistance, please contact us.

Sincerely,

Patricia K. Clark, Director  
Directorate of Compliance Programs

**Standard Number: 1910 Subpart D; 1910.132(d)**

**OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>.**

October 18, 1996

MEMORANDUM FOR: REGIONAL ADMINISTRATORS

FROM: JOHN B. MILES, JR, DIRECTOR

[DIRECTORATE OF ENFORCEMENT PROGRAMS]

SUBJECT: Enforcement of Fall Protection on Moving Stock

The Directorate has been asked by the National Grain and Food Association (NGFA) to clarify the Agency's enforcement policy relating to fall hazards from the tops of "rolling stock," such as rail tank or hopper cars and tank or hopper trucks or trailers. The reason for this request is that the NGFA is concerned that the Agency may inappropriately issue citations for fall hazards from such equipment. Part of the NGFA's concern is that inspectors from the Federal Grain Inspection Service allegedly have indicated to grain handling companies that they are unwilling to place themselves in situations which potentially violate OSHA regulations, thereby, risking citation.

The contents of rolling stock, when located in yards, on sidings or similar locations, frequently have to be sampled to ensure continued grain quality. Without Federal grain inspection services, no grain can be moved to market. Employees or inspectors may walk along the tops of the cars while they go from car to car to obtain samples.

The current fall protection standard in general industry (Subpart D) does not specifically address fall hazards from the tops of rolling stock. The new proposed fall protection standard, 55 Fed. Reg. 13360, explicitly excludes rolling stock from coverage. The enforcement policy of the Agency, consequently, is that falls from rolling stock also will not be cited under Subpart D.

Additionally, it would not be appropriate to use the personal protection equipment standard, 29 CFR 1910.132(d), to cite exposure to fall hazards from the tops of rolling stock, unless employees are working atop stock that is positioned inside of or contiguous to a building or other structure where the installation of fall protection is feasible. In such cases, fall protection systems often can be and, in fact, are used in many facilities in the industry.

Apart from the safety obligations of grain handling companies toward their employees, the U.S. Department of Agriculture is obligated under Section 1960.9, as an employer, to provide its employees,

the grain inspectors, a place of employment that is free from recognized hazards that are causing or are likely to cause death or serious harm, in addition to complying with OSHA's regulations.

The General Duty Clause, Section 5(a)(1) of the OSHA Act, requires an employer to provide employees with a workplace that is free from hazards that are recognized by the employer's industry and that are likely to cause death or serious physical harm. Thus, where feasible means exist to eliminate or materially reduce the hazard, a citation can be issued for a Section 5(a)(1) violation. For example, in the case of inclement weather such as icy conditions or heavy rains and winds, both the grain handling company and the U.S. Department of Agriculture are responsible for guarding against workplace hazards. In addition to making a determination as to whether the tops of the rail cars are safe and free from hazards to allow employees to perform their duties, the employers should also make an assessment of the employee's physical ability to perform the job and ensure that employees have received adequate training to perform the job safely.

[Corrected 2/6/2009]



## Health Regulatory Compliance Program



Maintaining employee health is important to our company. This chapter identifies procedures used at this facility to foster employee health

These procedures also comply with three health-related standards issued by the Occupational Safety and Health Administration:

- OSHA's air containments standard *[29 C.F.R 1910.1000]*
- OSHA's respiratory protection standard *[29 C.F.R. 1910.134]*
- OSHA's Hazard communication standard *[29 C.F.R. 1910.1200]*

This company's safety procedures and methods for complying with OSHA standards that pertain to employee safety are found in Safety Regulatory Compliance

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# Respiratory Protection

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This company relies primarily on engineering controls to eliminate respiratory hazards from the workplace. In work situations where engineering controls are either infeasible or being installed, the company will provide appropriate and suitable respirators to protect employees from exposure to respiratory hazards that may be present.

Under OSHA standards, some areas and work activities may require the use of respirators to protect employees from exposure to excessive dust levels or other respiratory hazards. In addition, our company's policy is to furnish dust masks to all workers who request them.

This document specifies the respiratory protection program in effect to protect employees at this facility.

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## Program Administrator

The respiratory protection program at this company (or at this facility) is to be administered by:

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*(Name and Title of Company Official Responsible)*

The program administrator has the requisite knowledge and training to administer the respiratory protection program. The administrator shall have full authority and responsibility to ensure that the respiratory protection program is implemented and enforced and that employees abide by its requirements. The program administrator will maintain a copy of the written program and make it available to employees, their designated representative or OSHA officials, upon request.

The program administrator will conduct inspections periodically to ensure that the program is being effectively implemented. The program administrator will discuss the program with employees required to use respirators and correct any problems identified. Factors to be discussed include:

- respirator fit
- respirator selection
- respirator-related medical conditions
- respirator use under workplace conditions
- respirator maintenance

Respirators may be used at the discretion of employees at this company (or at this facility) if desired for comfort purposes. Voluntary use of filtering facepiece (particulate) respirators is not covered by this program. However, employees voluntarily using dust masks will be provided the information contained in Appendix D.

Any employee exposed or potentially exposed to a hazardous atmosphere will be provided with suitable respiratory protection. Employees are responsible for utilizing these devices in accordance with the instructions and training under this program.

## Medical Evacuation

Before fit testing and using respiratory protection in the workplace, employees will be medically evaluated to determine the employee's ability to use the respirator. The medical evaluation will be done by the following physician or licensed health care provider:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Phone: \_\_\_\_\_

The medical evaluation will be conducted using Sections 1 and 2 of the medical questionnaire found in Appendix C of this program. The cost of the medical evaluation will be paid by the company and will be done during normal working hours at a time and place convenient to the employee in a manner that ensures the employee understands its contents. Employees will be given an opportunity to discuss the questionnaire and any follow-up examination results with the health care provider.

For each employee undergoing a medical evaluation, the following information must be provided to the health care provider.

- The type and weight of the respirator to be used by the employee
- The duration and frequency of respirator use.
- The expected physical work effort.
- Additional protective clothing and equipment to be worn (if any).
- Temperature and humidity extremes that may be encountered in the workplace

Additional medical evaluations will be provided if any of the following conditions occur:

- An employee reports medical signs or symptoms that are related to the ability to use a respirator.



- The health care provider, supervisor or program administrator believes an employee needs to be reevaluated.
- A change occurs in the workplace that could result in a substantial increase in the physiological burden on the employee.
- Any other information obtained during fit testing or periodic program evaluation indicates that medical reevaluation is needed.

A copy of this program will be provided to the health care provider. In addition, the health care provider will supply a written determination of the employee's ability to use the respirator; any limitations on respirator use resulting from the employee's medical condition; the need (if any) for follow-up medical evaluations; and a statement that the employee has been given a written copy of the health care provider's recommendations.

As required by OSHA, medical evaluation records will be maintained for the duration of employment, plus 30 years. An exception to this rule occurs for employees whose term of employment is less than one year. In this case, medical evaluations need only be retained for the term of employment, but must be provided to the employee upon termination. Copies of the medical evaluations will be provided at no cost to the employee, the employee's designated representative or to OSHA representatives, upon request.

## Employee Use of Respirator

Respirators are to be furnished to, and used by, employees for personal protection in the following circumstances:

When working in locations of the facility where engineering controls are infeasible and atmospheres exceed the employee permissible exposure limits required to be met under OSHA's air contaminants standard.

In this facility, employees are directed to wear the following respirators when working in these locations or during these specified job tasks (*specify*):

Type of Respirator	Location/Job Tasks
a. _____	_____
b. _____	_____
c. _____	_____

- d. \_\_\_\_\_
- e. \_\_\_\_\_
- f. \_\_\_\_\_
- g. \_\_\_\_\_

When working in locations where atmospheres exceed the employee permissible exposure limits while engineering controls (i.e., dust control systems) are being installed

When working in locations during periods when engineering controls (i.e., dust control systems) fail or become inoperable, and the atmospheres exceed the employee permissible exposure limits.

Employees are directed to wear the following respirators if the dust control system fails or becomes inoperable in the following locations in this facility (*specify*):

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
- e. \_\_\_\_\_
- f. \_\_\_\_\_
- g. \_\_\_\_\_

When entering grain bins, silos or tanks when the manager has reason to believe that the atmosphere contains combustible gases, toxic substances or a lack of oxygen, the atmosphere should be tested in advance and aired out, if possible. In the absence of atmospheric testing or if the hazardous atmosphere cannot be eliminated, the exposed employee is to wear a full face piece pressure-demand self-contained breathing apparatus certified by NIOSH for a minimum service of 30 minutes or a combination full face piece-pressure demand- supplied- air respirator with auxiliary self-contained air supply.

At this facility, respirators are to be worn when entering bins, silos or tanks unless permission for not wearing a respirator is granted in writing by the manager, or the following authorized person(s):

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When working in locations where engineering controls are minimally effective and grain dust levels exceed the employee permissible exposure limits.

At this facility, the following are locations where engineering controls are minimally effective and grain dust levels may exceed OSHA's permissible exposure limits (*specify*):

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
- e. \_\_\_\_\_
- f. \_\_\_\_\_
- g. \_\_\_\_\_

### Voluntary Use

In situations when the permissible exposure limit is not exceeded, a filtering facepiece (dust mask) will be provided to employees who request them for comfort purposes when working in the following areas

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_
- d. \_\_\_\_\_
- e. \_\_\_\_\_
- f. \_\_\_\_\_
- g. \_\_\_\_\_

## Respirator Selection

Only respirators certified as approved by the National Institute for Occupational Safety and Health (NIOSH) are to be used at this facility. The type and model of respirators selected will be based upon an evaluation of the hazard to which the employee is exposed and user factors that may affect respirator performance. In making this evaluation, the following factors will be considered:

**The Nature of the Hazard:** This evaluation includes a determination as to whether: 1) the atmosphere contains grain dust particles at levels exceeding OSHA's permissible exposure limits; 2) the atmosphere contains toxic chemicals at hazardous levels; or 3) the atmosphere is deficient of oxygen.

**Employee Exposures:** This involves a reasonable estimate of employee exposure, including an evaluation of the length of time respiratory protection is to be provided and the nature of the employee's activity in the specific location of the facility

**The Characteristics, Capabilities and Limitation of the Respirator:** This involves an evaluation and determination of the type of respirator to be provided

When working in atmospheres where airborne grain dust exceeds the permissible exposure limits (eight-hour, time-weighted average of 10 milligrams per cubic meter for wheat, oat and barley dust and 15 milligrams for other agricultural dusts), several different types of NIOSH-certified respirators are acceptable. They include the following: 1) disposable filtering facepiece respirators; 2) air purifying respirators with replaceable or reusable filters; and 3) a full-facepiece dust mask with replaceable or reusable filters supplied with an intrinsically safe, electrically powered blower.

The following types of respirators are acceptable when working in atmospheres containing combustible gases, vapors and toxic agents hazardous to life, as well as atmospheres with an oxygen deficiency:

1. self-contained breathing apparatus
2. a supplied air respirator with self- contained air supply. If the space contains sufficient oxygen levels, an air line or a similar atmosphere-supplying respirator may be used

In situations where the concentration of gas or vapor is not immediately dangerous to life and health and there is sufficient oxygen in the atmosphere, an atmosphere-supplying respirator or air- purifying respirator with an air-purifying filter, cartridge or canister appropriate for the chemical or state and physical form of the contaminant, **provided:** *a) a canister-equipped respirator is equipped with an end-of-service life indicator certified for the contaminant; or b) a change schedule is implemented at the following frequency based upon the indicated information*

Canister/ Cartridge	Work Location/Task	Frequency	Basis
1.			
2.			
3.			
4.			
5.			
6.			

The employee will be allowed to select a respirator from a sufficient number of respirator models and sizes to achieve a comfortable fit acceptable to the employee.

At this facility, the following type(s) of respirator(s) are to be used by employees when working in the following locations or are engaged in the following job tasks:

Type of Respirator	Work Location/Job Tasks

## Employee Fit Testing

The employee will be fit tested before being permitted to use required respiratory protection, and at least annually thereafter. This will include fit testing air-purifying respirators — such as dust masks or masks with filters, canisters or cartridges — and self-contained breathing apparatus and supplied air respirator, that the employee may be required to use by the employer. Fit testing will be conducted using the same make, model, style and size of respirator that will be used in the workplace. Additional fit testing will be conducted whenever there are changes in the employee's physical condition (such as facial scarring, dental changes, cosmetic surgery, etc.) or obvious changes in body weight.

Fit testing will be conducted using the qualitative or quantitative fit testing protocols listed in Appendix A of this program.

- Fit testing of air-purifying respirators that develop a negative pressure inside the mask (particulate filtering facepiece and masks with filters, cartridges and canisters) must be conducted using one of the qualitative fit testing procedures listed in Appendix A. A fit factor of 100 or less must be achieved.
- Fit testing of atmosphere-supplying (such as self-contained breathing apparatus and supplied air respirator) and tight-fitting powered air-purifying respirators can be accomplished using the qualitative or quantitative fit test protocols listed in Appendix A, but must be accomplished in the negative-pressure mode.

Records of fit tests will be retained until the next fit test occurs. These records are to contain the following information:

- The name or identification of the employee.
- Type of fit test conducted
- The specific make, model, style and size of respirator.
- Date of test.
- Test results (e.g., pass/fail for qualitative fit tests; fit factor and strip chart recording for quantitative fit tests).

## Use of Respirators

To prevent conditions that may result in facepiece seal leakage, the following procedures apply:

- Employees required to use a respirator cannot have facial hair that comes between the sealing surface of the facepiece and the face, or that interferes with the functioning of the valve.
- Glasses or goggles must be worn in a manner that will not interfere with the seal of the facepiece.
- Employees required to wear a tight-fitting respirator must perform a seal check each time they wear the respirator, using the procedures specified in Appendix B-1.

Employees are to exit work areas where respiratory protection is required if any of the following conditions exist:

- If vapor or gas breakthrough, changes in breathing resistance or leakage of the facepiece is detected. If any of these conditions are noted, the respirator must be replaced or repaired before further use.
- The employee finds it necessary to replace the respirator or the filter, cartridge or canister.
- An oxygen deficiency or other atmospheric condition is detected through use of measurement testing or other methods.

## Respiratory Maintenance

The following guidelines apply when cleaning, inspecting, storing and repairing respirators:

1. Disposable dust masks are to be discarded after each use, whenever a good face-to-face seal no longer can be made, or if it becomes hard to breathe through the mask.
2. Reusable respiratory facepieces (i.e., air purifying respirator with filter, cartridges or canisters, self-contained breathing apparatus, supplied air respirator, air line respirators, powered air-purifying respirators) should be cleaned using the procedures specified in Appendix B-2 according to the following schedule:
  - Respirators used by one individual are to be cleaned as often as necessary and be maintained in a sanitary condition.
  - Respirators used by several individuals are to be cleaned and disinfected after each use.
  - Respirators for emergency use and those used for fit testing or training must be cleaned after each use. For emergency-use respirators, a tag or label certifying the date of inspection, the inspector, findings, recommended remedial action, and serial number

(or some other identification) of the respirator must be attached to the storage compartment for the respirator until replaced by a subsequent inspection

3. Before each use and during cleaning, respirators are to be inspected for worn or defective parts (including the facepiece, head straps, valves, connecting tubes, and cartridges, filter or canisters), tightness of connections and pliability of elastomeric parts. Emergency-use respirators will be inspected at least monthly and before and after each use.
4. Self-contained breathing apparatus will be inspected monthly, including the regulator and warning devices. Air and oxygen cylinders are to be maintained in a fully charged state and are to be recharged when the pressure drops to 90 percent of the manufacturer's recommended pressure.
5. Repairs are to be made only by appropriately trained individuals using NIOSH-approved parts designed for the respirator being repaired. Repairs are to be made according to manufacturer's directions. Reducing and admission valve repairs are to be made only by a technician trained by the manufacturer.
6. Compressed and liquid oxygen must meet U.S. Pharmacopoeia requirements for medical breathing air. When purchasing compressed breathing air, a certificate is to be obtained from the supplier that the air meets the requirements for Type 1-Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989 and the moisture content of the cylinder does not exceed a dew point of -50°C at 1 atmosphere pressure. Compressed oxygen is not to be used in atmosphere-supplying respirators that have previously used compressed air.
7. Cylinders used to supply breathing air must be tested and maintained as prescribed by Department of Transportation regulations (49 CFR parts 173 and 178). Only breathing gas containers marked in accordance with the NIOSH respirator certification standard (42 CFR part 84) are to be used
8. To be authorized for use in this workplace, compressors that supply breathing air to respirators are required to be constructed and situated so that they:
  - prevent entry of contaminated air into the air-supply system.
  - minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F (5.56 degrees C) less than the ambient air temperature;



- have suitable in-line air purifying sorbent beds and filters to further ensure the quality of air supplied. Sorbent beds and filters shall be maintained and replaced or refurbished periodically following the manufacturer's instructions. Further, they shall have a tag containing the most recent change date and the signature of the person authorized by the employer to perform the change. The tag must be maintained at the compressor.
  - for compressors that are not oil-lubricated, the carbon monoxide levels in the breathing air must not exceed 10 parts per million.
  - for oil-lubricated compressors, a high-temperature or carbon monoxide alarm, or both, will be used to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply must be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 parts per million.
  - breathing air couplings must be incompatible with outlets for nonrespirable worksite air or other gas systems. Care is to be taken to avoid introducing asphyxiating substances into breathing air lines.
9. Filters, cartridges and canisters will be labeled and color coded with the NIOSH-approved label. Care is to be taken not to remove the label and ensure that it remains legible
10. Respirators are to be stored in a clean and sanitary location and protected from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture and damaging chemicals. Emergency respirators must be stored in clearly marked containers near the workplace.

At this company (facility), respirators are to be stored in the following location(s) (Specify where respirators are stored):

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## Respirator Training

Employees are required to be able to demonstrate knowledge of the following subject matter before being required to use respiratory protection:

- Why a respirator is necessary and how improper fit, usage or maintenance can compromise the protective effect of the respirator

- The limitations and capabilities of respirators
- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions
- How to inspect, put on and remove, use and check the seals of the respirator
- The procedures for proper maintenance and storage of the respirators
- How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators
- The general requirements of the facility's respiratory protection program.

In addition, retraining must occur annually, as well as whenever any of the following situations occur:

- Changes in the workplace or the type of respirators render previous situations obsolete
- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill
- Any other situation arises in which retraining appears necessary to ensure safe respirator use

Employees voluntarily using dust masks or other respiratory devices will be provided the information contained in Appendix D of this program.



## Appendix A - Fit Testing Procedures (Mandatory)

### \*Part I. OSHA-Accepted Fit Test Protocols

#### \*A. Fit Testing Procedures--General Requirements

\*The employer shall conduct fit testing using the following procedures. The requirements in this appendix apply to all OSHA- accepted fit test methods, both QLFT and QNFT.

\*1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

\*2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.

\*3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.

\*4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.

\*5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

\*6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:

\*(a) Position of the mask on the nose

\*(b) Room for eye protection

\*(c) Room to talk

\*(d) Position of mask on face and cheeks

\*7. The following criteria shall be used to help determine the adequacy of the respirator fit:

\*(a) Chin properly placed

\*(b) Adequate strap tension, not overly tightened

- \* (c) Fit across nose bridge
- \* (d) Respirator of proper size to span distance from nose to chin
- \* (e) Tendency of respirator to slip;
- \* (f) Self-observation in mirror to evaluate fit and respirator position.

\*8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in Appendix B-1 of this section or those recommended by the respirator manufacturer which provide equivalent protection to the procedures in Appendix B- 1. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

\*9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.

\*10. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.

\*11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

\*12. Exercise regimen. Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

\*13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit.

\*14. Test Exercises. (a) The following test exercises are to be performed for all fit testing methods prescribed in this appendix, except for the CNP method. A separate fit testing exercise regimen is contained in the CNP protocol. The test subject shall perform exercises, in the test environment, in the following manner:

\*(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.

\*(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

\*(3) Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.

\*(4) Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).

\*(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song

\*Rainbow Passage

\*When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

\*(6) Grimace. The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT)

\*(7) Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.

\*(8) Normal breathing. Same as exercise (1).

\*(b) Each test exercise shall be performed for one minute except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

\*B. Qualitative Fit Test (QLFT) Protocols

\*1. General

\*(a) The employer shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

\*(b) The employer shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

\*2. Isoamyl Acetate Protocol

\*Note: This protocol is not appropriate to use for the fit testing of particulate respirators. If used to fit test particulate respirators, the respirator must be equipped with an organic vapor filter.

\*(a) Odor Threshold Screening

\*Odor threshold screening, performed without wearing a respirator, is intended to determine if the individual tested can detect the odor of isoamyl acetate at low levels.

\*(1) Three 1 liter glass jars with metal lids are required.

\*(2) Odor-free water (e.g., distilled or spring water) at approximately 25 deg. C (77 deg. F) shall be used for the solutions.

\*(3) The isoamyl acetate (IAA) (also known as isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 ml of odor-free water in a 1 liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.

\*(4) The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.

\*(5) The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.

\*(6) A test blank shall be prepared in a third jar by adding 500 cc of odor-free water.

\*(7) The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.

\*(8) The following instruction shall be typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2): "The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."

\*(9) The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.

\*(10) If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.

\*(11) If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

\*(b) Isoamyl Acetate Fit Test

\*(1) The fit test chamber shall be a clear 55-gallon drum liner suspended inverted over a 2-foot diameter frame so that the top of the chamber is about 6 inches above the test subject's head. If no drum liner is

available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.

\*(2) Each respirator used for the fitting and fit testing shall be equipped with organic vapor cartridges or offer protection against organic vapors.

\*(3) After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well-ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.

\*(4) A copy of the test exercises and any prepared text from which the subject is to read shall be taped to the inside of the test chamber.

\*(5) Upon entering the test chamber, the test subject shall be given a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.

\*(6) Allow two minutes for the IAA test concentration to stabilize before starting the fit test exercises. This would be an appropriate time to talk with the test subject; to explain the fit test, the importance of his/ her cooperation, and the purpose for the test exercises; or to demonstrate some of the exercises.

\*(7) If at any time during the test, the subject detects the banana-like odor of IAA, the test is failed. The subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.

\*(8) If the test is failed, the subject shall return to the selection room and remove the respirator. The test subject shall repeat the odor sensitivity test, select and put on another respirator, return to the test area and again begin the fit test procedure described in (b) (1) through (7) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject shall wait at least 5 minutes before retesting. Odor sensitivity will usually have returned by this time.

\*(9) If the subject passes the test, the efficiency of the test procedure shall be demonstrated by having the subject break the respirator face seal and take a breath before exiting the chamber.

\*(10) When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person conducting the test, so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.

\*3. Saccharin Solution Aerosol Protocol

\*The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

\*(a) Taste threshold screening. The saccharin taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of saccharin.

\*(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall with at least the front portion clear and that allows free movements of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

\*(2) The test enclosure shall have a 3/4-inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

\*(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his/her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a sweet taste.

\*(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. The nozzle is directed away from the nose and mouth of the person. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

\*(5) The threshold check solution is prepared by dissolving 0.83 gram of sodium saccharin USP in 100 ml of warm water. It can be prepared by putting 1 ml of the fit test solution (see (b)(5) below) in 100 ml of distilled water.

\*(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then released and allowed to fully expand.

\*(7) Ten squeezes are repeated rapidly and then the test subject is asked whether the saccharin can be tasted. If the test subject reports tasting the sweet taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

\*(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

\*(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

\*(10) The test conductor will take note of the number of squeezes required to solicit a taste response.



\*(11) If the saccharin is not tasted after 30 squeezes (step 10), the test subject is unable to taste saccharin and may not perform the saccharin fit test.

\*Note to paragraph 3. (a): If the test subject eats or drinks something sweet before the screening test, he/she may be unable to taste the weak saccharin solution.

\*(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

\*(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

\*(14) The nebulizer shall be thoroughly rinsed in water, shaken dry, and refilled at least each morning and afternoon or at least every four hours.

\*(b) Saccharin solution aerosol fit test procedure.

\*(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

\*(2) The fit test uses the same enclosure described in 3. (a) above

\*(3) The test subject shall don the enclosure while wearing the respirator selected in section I. A. of this appendix. The respirator shall be properly adjusted and equipped with a particulate filter(s).

\*(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

\*(5) The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 ml of warm water.

\*(6) As before, the test subject shall breathe through the slightly open mouth with tongue extended, and report if he/she tastes the sweet taste of saccharin.

\*(7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of saccharin fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test. A minimum of 10 squeezes is required.

\*(8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

\*(9) Every 30 seconds the aerosol concentration shall be replenished using one half the original number of squeezes used initially (e.g., 5, 10 or 15).

\*(10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of saccharin is detected. If the test subject does not report tasting the saccharin, the test is passed.

\*(11) If the taste of saccharin is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

\*(12) Since the nebulizer has a tendency to clog during use, the test operator must make periodic checks of the nebulizer to ensure that it is not clogged. If clogging is found at the end of the test session, the test is invalid.

#### \*4. Bitrex<sup>TM</sup> (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol

\*The Bitrex<sup>TM</sup> (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National Safety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

##### \*(a) Taste Threshold Screening.

\*The Bitrex taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of Bitrex.

\*(1) During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

\*(2) The test enclosure shall have a  $\frac{3}{4}$  inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

\*(3) The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a bitter taste

\*(4) Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the Threshold Check Solution into the enclosure. This Nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

\*(5) The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex to 100 ml of 5% salt (NaCl) solution in distilled water.

\*(6) To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.

\*(7) An initial ten squeezes are repeated rapidly and then the test subject is asked whether the Bitrex can be tasted. If the test subject reports tasting the bitter taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

\*(8) If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

\*(9) If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

\*(10) The test conductor will take note of the number of squeezes required to solicit a taste response.

\*(11) If the Bitrex is not tasted after 30 squeezes (step 10), the test subject is unable to taste Bitrex and may not perform the Bitrex fit test.

\*(12) If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

\*(13) Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

\*(14) The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every four hours.

\*(b) Bitrex Solution Aerosol Fit Test Procedure.

\*(1) The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

\*(2) The fit test uses the same enclosure as that described in 4. (a) above.

\*(3) The test subject shall don the enclosure while wearing the respirator selected according to section I. A. of this appendix. The respirator shall be properly adjusted and equipped with any type particulate filter(s).

\*(4) A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

\*(5) The fit test solution is prepared by adding 337.5 mg of Bitrex to 200 ml of a 5% salt (NaCl) solution in warm water.

\* (6) As before, the test subject shall breathe through his or her slightly open mouth with tongue extended, and be instructed to report if he/she tastes the bitter taste of Bitrex.

\* (7) The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test.

\* (8) After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

\* (9) Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).

\* (10) The test subject shall indicate to the test conductor if at any time during the fit test the taste of Bitrex is detected. If the test subject does not report tasting the Bitrex, the test is passed.

\* (11) If the taste of Bitrex is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

#### \*5. Irritant Smoke (Stannic Chloride) Protocol

\* This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

##### \* (a) General Requirements and Precautions

\* (1) The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

\* (2) Only stannic chloride smoke tubes shall be used for this protocol.

\* (3) No form of test enclosure or hood for the test subject shall be used.

\* (4) The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

\* (5) The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

##### \* (b) Sensitivity Screening Check

\*The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

\*(1) The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

\*(2) The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

\*(3) The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

\*(c) Irritant Smoke Fit Test Procedure

\*(1) The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

\*(2) The test subject shall be instructed to keep his/her eyes closed.

\*(3) The test operator shall direct the stream of irritant smoke from the smoke tube toward the faceseal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

\*(4) If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.

\*(5) The exercises identified in section I.A. 14. of this appendix shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

\*(6) If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

\*(7) Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.

\*(8) If a response is produced during this second sensitivity check, then the fit test is passed.

### \*C. Quantitative Fit Test (QNFT) Protocols

\*The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non-hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

#### \*1. General

\*(a) The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order.

\*(b) The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

#### \*2. Generated Aerosol Quantitative Fit Testing Protocol

##### \*(a) Apparatus.

\*(1) Instrumentation. Aerosol generation, dilution, and measurement systems using particulates (corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS] or sodium chloride) as test aerosols shall be used for quantitative fit testing.

\*(2) Test chamber. The test chamber shall be large enough to permit all test subjects to perform freely all required exercises without disturbing the test agent concentration or the measurement apparatus. The test chamber shall be equipped and constructed so that the test agent is effectively isolated from the ambient air, yet uniform in concentration throughout the chamber.

\*(3) When testing air-purifying respirators, the normal filter or cartridge element shall be replaced with a high efficiency particulate air (HEPA) or P100 series filter supplied by the same manufacturer.

\*(4) The sampling instrument shall be selected so that a computer record or strip chart record may be made of the test showing the rise and fall of the test agent concentration with each inspiration and expiration at fit factors of at least 2,000. Integrators or computers that integrate the amount of test agent penetration leakage into the respirator for each exercise may be used provided a record of the readings is made.

\*(5) The combination of substitute air-purifying elements, test agent and test agent concentration shall be such that the test subject is not exposed in excess of an established exposure limit for the test agent at any time during the testing process, based upon the length of the exposure and the exposure limit duration.

\*(6) The sampling port on the test specimen respirator shall be placed and constructed so that no leakage occurs around the port (e.g., where the respirator is probed), a free air flow is allowed into the sampling line

at all times, and there is no interference with the fit or performance of the respirator. The in-mask sampling device (probe) shall be designed and used so that the air sample is drawn from the breathing zone of the test subject, midway between the nose and mouth and with the probe extending into the facepiece cavity at least 1/4 inch.

\*(7) The test setup shall permit the person administering the test to observe the test subject inside the chamber during the test.

\*(8) The equipment generating the test atmosphere shall maintain the concentration of test agent constant to within a 10 percent variation for the duration of the test.

\*(9) The time lag (interval between an event and the recording of the event on the strip chart or computer or integrator) shall be kept to a minimum. There shall be a clear association between the occurrence of an event and its being recorded.

\*(10) The sampling line tubing for the test chamber atmosphere and for the respirator sampling port shall be of equal diameter and of the same material. The length of the two lines shall be equal.

\*(11) The exhaust flow from the test chamber shall pass through an appropriate filter (i.e., high efficiency particulate filter) before release.

\*(12) When sodium chloride aerosol is used, the relative humidity inside the test chamber shall not exceed 50 percent.

\*(13) The limitations of instrument detection shall be taken into account when determining the fit factor.

\*(14) Test respirators shall be maintained in proper working order and be inspected regularly for deficiencies such as cracks or missing valves and gaskets.

\*(b) Procedural Requirements

\*(1) When performing the initial user seal check using a positive or negative pressure check, the sampling line shall be crimped closed in order to avoid air pressure leakage during either of these pressure checks.

\*(2) The use of an abbreviated screening QLFT test is optional. Such a test may be utilized in order to quickly identify poor fitting respirators that passed the positive and/or negative pressure test and reduce the amount of QNFT time. The use of the CNC QNFT instrument in the count mode is another optional method to obtain a quick estimate of fit and eliminate poor fitting respirators before going on to perform a full QNFT.

\*(3) A reasonably stable test agent concentration shall be measured in the test chamber prior to testing. For canopy or shower curtain types of test units, the determination of the test agent's stability may be established after the test subject has entered the test environment.

\*(4) Immediately after the subject enters the test chamber, the test agent concentration inside the respirator shall be measured to ensure that the peak penetration does not exceed 5 percent for a half mask or 1 percent for a full facepiece respirator.

\*(5) A stable test agent concentration shall be obtained prior to the actual start of testing.

\*(6) Respirator restraining straps shall not be over-tightened for testing. The straps shall be adjusted by the wearer without assistance from other persons to give a reasonably comfortable fit typical of normal use. The respirator shall not be adjusted once the fit test exercises begin.

\*(7) The test shall be terminated whenever any single peak penetration exceeds 5 percent for half masks and 1 percent for full facepiece respirators. The test subject shall be refitted and retested.

\*(8) Calculation of fit factors

\*(i) The fit factor shall be determined for the quantitative fit test by taking the ratio of the average chamber concentration to the concentration measured inside the respirator for each test exercise except the grimace exercise.

\*(ii) The average test chamber concentration shall be calculated as the arithmetic average of the concentration measured before and after each test (i.e., 7 exercises) or the arithmetic average of the concentration measured before and after each exercise or the true average measured continuously during the respirator sample.

\*(iii) The concentration of the challenge agent inside the respirator shall be determined by one of the following methods:

\*(A) Average peak penetration method means the method of determining test agent penetration into the respirator utilizing a strip chart recorder, integrator, or computer. The agent penetration is determined by an average of the peak heights on the graph or by computer integration, for each exercise except the grimace exercise. Integrators or computers that calculate the actual test agent penetration into the respirator for each exercise will also be considered to meet the requirements of the average peak penetration method.

\*(B) Maximum peak penetration method means the method of determining test agent penetration in the respirator as determined by strip chart recordings of the test. The highest peak penetration for a given exercise is taken to be representative of average penetration into the respirator for that exercise.

\*(C) Integration by calculation of the area under the individual peak for each exercise except the grimace exercise. This includes computerized integration.

\*(D) The calculation of the overall fit factor using individual exercise fit factors involves first converting the exercise fit factors to penetration values, determining the average, and then converting that result back to a fit factor. This procedure is described in the following equation:

\*Where  $ff_1$ ,  $ff_2$ ,  $ff_3$ , etc. are the fit factors for exercises 1, 2, 3, etc.



\*(9) The test subject shall not be permitted to wear a half mask or quarter facepiece respirator unless a minimum fit factor of 100 is obtained, or a full facepiece respirator unless a minimum fit factor of 500 is obtained.

\*(10) Filters used for quantitative fit testing shall be replaced whenever increased breathing resistance is encountered, or when the test agent has altered the integrity of the filter media.

\*3. Ambient aerosol condensation nuclei counter (CNC) quantitative fit testing protocol.

\*The ambient aerosol condensation nuclei counter (CNC) quantitative fit testing (Portacount TM ) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator, that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

\*(a) Portacount Fit Test Requirements.

\*(1) Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 series 100, series 99, or series 95 particulate filter) per manufacturer's instruction.

\*(2) Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.

\*(3) Check the following conditions for the adequacy of the respirator fit: Chin properly placed; Adequate strap tension, not overly tightened; Fit across nose bridge; Respirator of proper size to span distance from nose to chin; Tendency of the respirator to slip; Self-observation in a mirror to evaluate fit and respirator position.

\*(4) Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting facepiece, try another size of the same model respirator, or another model of respirator.

\*(5) Follow the manufacturer's instructions for operating the Portacount and proceed with the test.

\*(6) The test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

\*(7) After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

\*(b) Portacount Test Instrument.

\*(1) The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.

\*(2) Since the pass or fail criterion of the Portacount is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this Appendix.

\*(3) A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

\*4. Controlled negative pressure (CNP) quantitative fit testing protocol.

\*The CNP protocol provides an alternative to aerosol fit test methods. The CNP fit test method technology is based on exhausting air from a temporarily sealed respirator facepiece to generate and then maintain a constant negative pressure inside the facepiece. The rate of air exhaust is controlled so that a constant negative pressure is maintained in the respirator during the fit test. The level of pressure is selected to replicate the mean inspiratory pressure that causes leakage into the respirator under normal use conditions. With pressure held constant, air flow out of the respirator is equal to air flow into the respirator. Therefore, measurement of the exhaust stream that is required to hold the pressure in the temporarily sealed respirator constant yields a direct measure of leakage air flow into the respirator. The CNP fit test method measures leak rates through the facepiece as a method for determining the facepiece fit for negative pressure respirators. The CNP instrument

manufacturer Dynatech Nevada also provides attachments (sampling manifolds) that replace the filter cartridges to permit fit testing in an employee's own respirator. To perform the test, the test subject closes his or her mouth and holds his/her breath, after which an air pump removes air from the respirator facepiece at a pre-selected constant pressure. The facepiece fit is expressed as the leak rate through the facepiece, expressed as milliliters per minute. The quality and validity of the CNP fit tests are determined by the degree to which the in-mask pressure tracks the test pressure during the system measurement time of approximately five seconds. Instantaneous feedback in the form of a real-time pressure trace of the in-mask pressure is provided and used to determine test validity and quality. A minimum fit factor pass level of 100 is necessary for a half-mask respirator and a minimum fit factor of at least 500 is required for a full facepiece respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

\*(a) CNP Fit Test Requirements.

\*(1) The instrument shall have a non-adjustable test pressure of 15.0 mm water pressure.

\*(2) The CNP system defaults selected for test pressure shall be set at -- 15 mm of water (-0.58 inches of water) and the modeled inspiratory flow rate shall be 53.8 liters per minute for performing fit tests.

\*(Note: CNP systems have built-in capability to conduct fit testing that is specific to unique work rate, mask, and gender situations that might apply in a specific workplace. Use of system default values, which were selected to represent respirator wear with medium cartridge resistance at a low-moderate work rate, will allow inter- test comparison of the respirator fit.)

\*(3) The individual who conducts the CNP fit testing shall be thoroughly trained to perform the test.

\*(4) The respirator filter or cartridge needs to be replaced with the CNP test manifold. The inhalation valve downstream from the manifold either needs to be temporarily removed or propped open.

\*(5) The test subject shall be trained to hold his or her breath for at least 20 seconds.

\*(6) The test subject shall don the test respirator without any assistance from the individual who conducts the CNP fit test.

\*(7) The QNFT protocol shall be followed according to section I. C. 1. of this appendix with an exception for the CNP test exercises.

\*(b) CNP Test Exercises.

\*(1) Normal breathing. In a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject needs to hold head straight ahead and hold his or her breath for 10 seconds during the test measurement.

\*(2) Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply for 1 minute, being careful not to hyperventilate. After the deep breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during test measurement.

\*(3) Turning head side to side. Standing in place, the subject shall slowly turn his or her head from side to side between the extreme positions on each side for 1 minute. The head shall be held at each extreme momentarily so the subject can inhale at each side. After the turning head side to side exercise, the subject

needs to hold head full left and hold his or her breath for 10 seconds during test measurement. Next, the subject needs to hold head full right and hold his or her breath for 10 seconds during test measurement.

\*(4) Moving head up and down. Standing in place, the subject shall slowly move his or her head up and down for 1 minute. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling). After the moving head up and down exercise, the subject shall hold his or her head full up and hold his or her breath for 10 seconds during test measurement. Next, the subject shall hold his or her head full down and hold his or her breath for 10 seconds during test measurement.

\*(5) Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from

100, or recite a memorized poem or song for 1 minute. After the talking exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

\*(6) Grimace. The test subject shall grimace by smiling or frowning for 15 seconds.

\*(7) Bending Over. The test subject shall bend at the waist as if he or she were to touch his or her toes for 1 minute. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT units that prohibit bending at the waist. After the bending over exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

\*(8) Normal Breathing. The test subject shall remove and re-don the respirator within a one-minute period. Then, in a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of a respirator shall be tried.

\*(c) CNP Test Instrument.

\*(1) The test instrument shall have an effective audio warning device when the test subject fails to hold his or her breath during the test. The test shall be terminated whenever the test subject failed to hold his or her breath. The test subject may be refitted and retested.

\*(2) A record of the test shall be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style and size of respirator used; and date tested.

\*Part II. New Fit Test Protocols

\*A. Any person may submit to OSHA an application for approval of a new fit test protocol. If the application meets the following criteria, OSHA will initiate a rulemaking proceeding under section 6(b)(7) of the OSH Act to determine whether to list the new protocol as an approved protocol in this Appendix A.

\*B. The application must include a detailed description of the proposed new fit test protocol. This application must be supported by either:

\*1. A test report prepared by an independent government research laboratory (e.g., Lawrence Livermore National Laboratory, Los Alamos National Laboratory, the National Institute for Standards and Technology) stating that the laboratory has tested the protocol and had found it to be accurate and reliable; or

\*2. An article that has been published in a peer-reviewed industrial hygiene journal describing the protocol and explaining how test data support the protocol's accuracy and reliability.

\*C. If OSHA determines that additional information is required before the Agency commences a rulemaking proceeding under this section, OSHA will so notify the applicant and afford the applicant the opportunity to submit the supplemental information. Initiation of a rulemaking proceeding will be deferred until OSHA has received and evaluated the supplemental information.



## Appendix B-1 -User Seal Check Procedures (Mandatory)

\*The individual who uses a tight-fitting respirator is to perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed in this appendix, or the respirator manufacturer's recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

### \*I. Facepiece Positive and/or Negative Pressure Checks

\*A. Positive pressure check. Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

\*B. Negative pressure check. Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

### \*II. Manufacturer's Recommended User Seal Check Procedures

\*The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided that the employer demonstrates that the manufacturer's procedures are equally effective.



## Appendix B-2 -Respirator Cleaning Procedures (Mandatory)

\*These procedures are provided for employer use when cleaning respirators. They are general in nature, and the employer as an alternative may use the cleaning recommendations provided by the manufacturer of the respirators used by their employees, provided such procedures are as effective as those listed here in Appendix B-2. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth in Appendix B-2, i.e., must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

### \*I. Procedures for Cleaning Respirators

\*A. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure- demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.

\*B. Wash components in warm (43 deg. C [110 deg. F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

\*C. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain.

\*D. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:

\*1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 deg. C (110 deg. F); or,

\*2. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 deg. C (110 deg. F); or,

\*3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

\*E. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

\*F. Components should be hand-dried with a clean lint-free cloth or air-dried.

\*G. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.

\*H. Test the respirator to ensure that all components work properly.



## Appendix C -Respirator Medical Evaluation Questionnaire(Mandatory)

\*To the employer: Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.

\*To the employee:

\*Can you read (circle one): Yes/No

\*Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

\*Part A. Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

\*1. Today's date: \_\_\_\_\_

\*2. Your name: \_\_\_\_\_

\*3. Your age (to nearest year): \_\_\_\_\_

\*4. Sex (circle one): Male/Female

\*5. Your height: \_\_\_\_\_ ft. \_\_\_\_\_ in.

\*6. Your weight: \_\_\_\_\_ lbs.

\*7. Your job title: \_\_\_\_\_

\*8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code): \_\_\_\_\_

\*9. The best time to phone you at this number: \_\_\_\_\_

\*10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): Yes/No

\*11. Check the type of respirator you will use (you can check more than one category):

\*a. \_\_\_\_\_ N, R, or P disposable respirator (filter-mask, non- cartridge type only).

\*b. \_\_\_\_\_ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

\*12. Have you worn a respirator (circle one): Yes/No

\* If "yes," what type(s): \_\_\_\_\_

\*Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").

\*1. Do you currently smoke tobacco, or have you smoked tobacco in the last month: Yes/No

\*2. Have you ever had any of the following conditions?

\*a. Seizures (fits): Yes/No

\*b. Diabetes (sugar disease): Yes/No

\*c. Allergic reactions that interfere with your breathing: Yes/No

\*d. Claustrophobia (fear of closed-in places): Yes/No

\*e. Trouble smelling odors: Yes/No

\*3. Have you ever had any of the following pulmonary or lung problems?

\*a. Asbestosis: Yes/No

\*b. Asthma: Yes/No

\*c. Chronic bronchitis: Yes/No

\*d. Emphysema: Yes/No

\*e. Pneumonia: Yes/No

\*f. Tuberculosis: Yes/No

\*g. Silicosis: Yes/No

\*h. Pneumothorax (collapsed lung): Yes/No

\*i. Lung cancer: Yes/No

\*j. Broken ribs: Yes/No

\*k. Any chest injuries or surgeries: Yes/No

\*l. Any other lung problem that you've been told about: Yes/No

\*4. Do you currently have any of the following symptoms of pulmonary or lung illness?

\*a. Shortness of breath: Yes/No

\*b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: Yes/No

\*c. Shortness of breath when walking with other people at an ordinary pace on level ground: Yes/No  
\*d. Have to stop for breath when walking at your own pace on level ground: Yes/No

\*e. Shortness of breath when washing or dressing yourself: Yes/No

\*f. Shortness of breath that interferes with your job: Yes/No

\*g. Coughing that produces phlegm (thick sputum): Yes/No

\*h. Coughing that wakes you early in the morning: Yes/No

\*i. Coughing that occurs mostly when you are lying down: Yes/No

\*j. Coughing up blood in the last month: Yes/No

\*k. Wheezing: Yes/No

\*l. Wheezing that interferes with your job: Yes/No

\*m. Chest pain when you breathe deeply: Yes/No

\*n. Any other symptoms that you think may be related to lung problems: Yes/No



\*5. Have you ever had any of the following cardiovascular or heart problems?

- \*a. Heart attack: Yes/No
- \*b. Stroke: Yes/No
- \*c. Angina: Yes/No
- \*d. Heart failure: Yes/No
- \*e. Swelling in your legs or feet (not caused by walking): Yes/No
- \*f. Heart arrhythmia (heart beating irregularly): Yes/No
- \*g. High blood pressure: Yes/No
- \*h. Any other heart problem that you've been told about: Yes/No

\*6. Have you ever had any of the following cardiovascular or heart symptoms?

- \*a. Frequent pain or tightness in your chest: Yes/No
- \*b. Pain or tightness in your chest during physical activity: Yes/No
- \*c. Pain or tightness in your chest that interferes with your job: Yes/No
- \*d. In the past two years, have you noticed your heart skipping or missing a beat: Yes/No
- \*e. Heartburn or indigestion that is not related to eating: Yes/ No
- \*f. Any other symptoms that you think may be related to heart or circulation problems: Yes/No

\*7. Do you currently take medication for any of the following problems?

- \*a. Breathing or lung problems: Yes/No
- \*b. Heart trouble: Yes/No
- \*c. Blood pressure: Yes/No
- \*d. Seizures (fits): Yes/No

\*8. If you've used a respirator, have you ever had any of the following problems? (If you've never used a respirator, check the following space and go to question 9:)

- \*a. Eye irritation: Yes/No
- \*b. Skin allergies or rashes: Yes/No
- \*c. Anxiety: Yes/No
- \*d. General weakness or fatigue: Yes/No
- \*e. Any other problem that interferes with your use of a respirator: Yes/No

\*9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire: Yes/No

\*Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.

\*10. Have you ever lost vision in either eye (temporarily or permanently): Yes/No

\*11. Do you currently have any of the following vision problems?

- \*a. Wear contact lenses: Yes/No
- \*b. Wear glasses: Yes/No
- \*c. Color blind: Yes/No
- \*d. Any other eye or vision problem: Yes/No

\*12. Have you ever had an injury to your ears, including a broken ear drum: Yes/No

\*13. Do you currently have any of the following hearing problems?

\*a. Difficulty hearing: Yes/No

\*b. Wear a hearing aid: Yes/No

\*c. Any other hearing or ear problem: Yes/No

\*14. Have you ever had a back injury: Yes/No

\*15. Do you currently have any of the following musculoskeletal problems?

\*a. Weakness in any of your arms, hands, legs, or feet: Yes/No

\*b. Back pain: Yes/No

\*c. Difficulty fully moving your arms and legs: Yes/No

\*d. Pain or stiffness when you lean forward or backward at the waist: Yes/No

\*e. Difficulty fully moving your head up or down: Yes/No

\*f. Difficulty fully moving your head side to side: Yes/No

\*g. Difficulty bending at your knees: Yes/No

\*h. Difficulty squatting to the ground: Yes/No

\*i. Climbing a flight of stairs or a ladder carrying more than 25 lbs: Yes/No

\*j. Any other muscle or skeletal problem that interferes with using a respirator: Yes/No

\*Part B Any of the following questions, and other questions not listed, may be added to the questionnaire at the discretion of the health care professional who will review the questionnaire.

\*1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal amounts of oxygen: Yes/No

If "yes," do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you're working under these conditions: Yes/No

\*2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals: Yes/No

If "yes," name the chemicals if you know them: \_\_\_\_\_

\*3. Have you ever worked with any of the materials, or under any of the conditions, listed below:

a. Asbestos: Yes/No

b. Silica (e.g., in sandblasting): Yes/No

c. Tungsten/cobalt (e.g., grinding or welding this material): Yes/No d. Beryllium: Yes/No

e. Aluminum: Yes/No

f. Coal (for example, mining): Yes/No g. Iron: Yes/No

h. Tin: Yes/No

i. Dusty environments: Yes/No

j. Any other hazardous exposures: Yes/No

If "yes," describe these exposures: \_\_\_\_\_

\*4. List any second jobs or side businesses you have: \_\_\_\_\_

\*5. List your previous occupations: \_\_\_\_\_

\*6. List your current and previous hobbies: \_\_\_\_\_

\*7. Have you been in the military services? Yes/No

If "yes," were you exposed to biological or chemical agents (either in training or combat): Yes/No

\*8. Have you ever worked on a HAZMAT team? Yes/No

\*9. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications): Yes/No

If "yes," name the medications if you know them: \_

\*10. Will you be using any of the following items with your respirator(s)?

a. HEPA Filters: Yes/No

b. Canisters (for example, gas masks): Yes/No c. Cartridges: Yes/No

\*11. How often are you expected to use the respirator(s) (circle "yes" or "no" for all answers that apply to you)?:

a. Escape only (no rescue): Yes/No b. Emergency rescue only: Yes/No

c. Less than 5 hours per week: Yes/No d. Less than 2 hours per day: Yes/No

e. 2 to 4 hours per day: Yes/No f. Over 4 hours per day: Yes/No

\*12. During the period you are using the respirator(s), is your work effort:

a. Light (less than 200 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift: \_\_\_\_\_ hrs. \_\_\_\_\_ mins. Examples of a light work effort are sitting while writing, typing, drafting, or performing light assembly work; or standing while operating a drill press (1-3 lbs.) or controlling machines.

b. Moderate (200 to 350 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift: \_\_\_\_\_ hrs. \_\_\_\_\_ mins. Examples of moderate work effort are sitting while nailing or filing; driving a truck or bus in urban traffic; standing while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at trunk level; walking on a level surface about 2 mph or down a 5-degree grade about 3 mph; or pushing a wheelbarrow with a heavy load (about 100 lbs.) on a level surface

c. Heavy (above 350 kcal per hour): Yes/No

If "yes," how long does this period last during the average shift: \_\_\_\_\_ hrs. \_\_\_\_\_ mins. Examples of heavy work are lifting a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working on a loading dock; shoveling; standing while bricklaying or chipping castings; walking up an 8-degree grade about 2 mph; climbing stairs with a heavy load (about 50 lbs.).

\*13. Will you be wearing protective clothing and/or equipment (other than the respirator) when you're using your respirator: Yes/No

If "yes," describe this protective clothing and/or equipment: \_\_\_\_\_

\*14. Will you be working under hot conditions (temperature exceeding 77 deg. F): Yes/No

\*15. Will you be working under humid conditions: Yes/No

\*16. Describe the work you'll be doing while you're using your respirator(s): \_\_\_\_\_

\*17. Describe any special or hazardous conditions you might encounter when you're using your respirator(s) (for example, confined spaces, life-threatening gases) \_\_\_\_\_

\*18. Provide the following information, if you know it, for each toxic substance that you'll be exposed to when you're using your respirator(s):

Name of the first toxic substance: \_\_\_\_\_

Estimated maximum exposure level per shift: \_\_\_\_\_

Duration of exposure per shift \_\_\_\_\_

Name of the second toxic substance: \_\_\_\_\_

Estimated maximum exposure level per shift: \_\_\_\_\_

Duration of exposure per shift: \_\_\_\_\_

Name of the third toxic substance: \_\_\_\_\_

Estimated maximum exposure level per shift: \_\_\_\_\_

Duration of exposure per shift: \_\_\_\_\_

The name of any other toxic substances that you'll be exposed to while using your respirator: \_\_\_\_\_

\*19. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (for example, rescue, security):

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## Appendix D: Information for Employees Volunteering Using Respirators (Mandatory)

\*Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

\*You should do the following:

\*1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.

\*2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.

\*3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.

\*4. Keep track of your respirator so that you do not mistakenly use someone else's respirator