SUBJECT: Respiratory Protection Enforcement Procedures

Purpose: This instruction provides guidelines to promote uniform enforcement of the Respiratory Protection Standard, 29 CFR 1910.134.

Scope: This instruction applies MNOSHA-wide

References:

- MNOSHA Instruction Field Compliance Manual.
- MNOSHA Instruction CPL 2.111C, Paperwork and Written Program Violations, November 29, 2010.
- MNOSHA Instruction STD 1-4.1 Citation Guidelines for Air Contaminant Overexposures, March 4, 2013.
- MNOSHA Instruction CPL 2-2.59, Inspection Procedures for the Hazardous Waste Operations and Emergency Response Standard, February 13, 2013.
- OSHA Instruction CPL 02-00-158, Inspection Procedures for the Respiratory Protection Standard, June 26, 2014.
- 29 CFR 1910.134, Respiratory Protection Standard.
- NIOSH Respirator Certification Requirements 42 CFR 84 and 30 CFR 11.
- 1992 American National Standards Institute (ANSI) Z88.2 Respirator Standard.

Cancellation: This instruction supersedes CPL 2-2.120, Respiratory Protection Enforcement Procedures, dated March 4, 2013.

Background: In 1971, OSHA adopted the ANSI standard Z88.2-1969, "Practices for Respiratory Protection," as well as ANSI Standard K13.1-1969, "Identification of Gas Mask Canisters" as its standard for respiratory protection. In April of 1971, OSHA promulgated 29 CFR 1926.103, the initial respiratory protection standard for the construction industry. On February 9, 1979, OSHA announced that 29 CFR 1910.134 would be formally recognized as also being applicable to the construction industry (44 FR 8577).

On November 15, 1994, OSHA issued a Notice of Proposed Rulemaking to revise 29 CFR 1910.134. On January 8, 1998, federal OSHA published the Final Rule in the Federal Register; effective October 5, 1998. The prior respirator standard was re-designated as 1910.139 and applied only to respiratory protection against M. tuberculosis.

On December 31, 2003, federal OSHA withdrew 1910.139. The withdrawal made compliance with 1910.134 effective immediately, but federal OSHA delayed enforcement of several portions of 1910.134 until July 2, 2004.

On August 24, 2006, federal OSHA published revisions to the 1910.134 Final Rule, to add definitions and requirements for Assigned Protection Factors (APFs) and Maximum Use Concentrations (MUCs). The revisions also supersede the respirator selection provisions of existing substance-specific standards with these new APFs (except for the respirator selection provisions of the 1,3-Butadiene Standard). On February 20, 2007, MNOSHA adopted the revisions.

An outline is provided on the following page to assist the reader in locating specific sections of the directive.

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ACTION

## A. Scope and Application

1. This standard applies to all respirator usage in General Industry, Shipyards, Marine Terminals, Longshoring and Construction workplaces. A citation issued under parts 1910, 1915, 1917, 1918, and 1926 shall have a reference in the citation's SAVE as follows: 29 CFR 1910.134(a)(2): The employer did not establish and maintain . . . . . outlined in 29 CFR 1910.134(c) (Construction Reference 1926.103).

2. This standard **does not** apply to agricultural operations. For direction on agricultural operations, refer to the Field Compliance Manual.

3. The standard covers respirator use where respirators are being worn to protect employees from exposure to air contaminants above an exposure limit or are otherwise necessary to protect employee health, where respirators are otherwise required to be worn by the employer, and where respirators are voluntarily worn by employees for comfort or other reasons.

4. 1910.94, 1910.111, 1910.156, 1910.252, 1910.261, 1926.57, 1926.800 and substance specific standards contain respirator provisions. Where applicable, these standards must be reviewed for specific respirator requirements in addition to 1910.134.

**B**. **Definitions-1910.134(b):** The revised standard contains definitions in paragraph (b) that provide a clearer understanding of specific terminology used in the standard and how these terms are applied to respirators and their use.

1. "Adequate warning properties" is not included in the standard because the two major warning properties, odor and irritation, are unreliable or otherwise inappropriate to be used as primary indicators of sorbent exhaustion.

2. "Assigned Protection Factor (APF)" is the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program.

3. "Filtering facepiece" (FFP or dust mask) means a negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium. Whenever a filtering facepiece is used to meet the requirements of the standard, it must be NIOSH approved.

4. A "HEPA filter"(High Efficiency Particulate Air) is a filter that is 99.97% efficient in removing monodispersed particles of 0.3 micrometers in diameter. NIOSH no longer uses this term in its new respirator certification standard (42 CFR 84). However, OSHA has retained this definition because it is used in many of the existing substance-specific standards. When HEPA filters are required by an OSHA standard, N100, R100, and P100 filters can be used to replace them.

5. “Maximum use concentration (MUC)” is the maximum concentration of a hazardous substance from which an employee can be expected to be protected when wearing a specific class of respirator. The MUC is determined by multiplying the assigned protection factor of the respirator by the permissible exposure limit (8-hour TWA, STEL or Ceiling) of the hazardous substance. If there is no PEL, the employer must determine a MUC using the best available information. If a calculated MUC exceeds the IDLH, then the IDLH becomes the MUC.

6. The "PLHCP" (Physician or Licensed Health Care Professional) may be a physician, a registered nurse, a nurse practitioner, a physician assistant, or other licensed health care professional acting within the scope of his or her state license, registration, or certification.

**C.** **Voluntary Use**: One significant feature in the standard is the distinction made between required and voluntary use of respiratory protection devices. The OSHI must determine whether use of respirators is voluntary, required by the employer, required because OSHA sampling indicates exposure above a PEL, or otherwise needed to protect the health of a worker. Most types of respirators may be used voluntarily. However, mouthbit, SCBA, and in most cases, gas masks, are not used voluntarily.

For voluntary use of any type of respirators, including filtering facepieces, the employer must determine that the respirator use will not create a hazard, and provide the information in Appendix D.

For voluntary use of any respirators except filtering facepieces, a limited written program must be implemented to ensure that voluntary users are medically able to use the respirator, and that the respirator is cleaned, stored and maintained so that its use does not present a health hazard. Employers do not have to follow the requirements of paragraph (e) for determining whether a user is medically able to use respirators.

If employers allow the voluntary use of respirators, the costs associated with ensuring the respirator itself does not create a hazard, such as medical evaluations and maintenance, must be provided at no cost to the employee. The employer may allow the employee to provide his/her own respirator (employer does not have to pay for it).

Where there is voluntary use of respirators that are not approved by NIOSH, OSHIs should strongly recommend the use of NIOSH-approved respirators. Unapproved respirators are still considered respirators and employers who allow their use are required to comply with the provisions in 1910.134 relating to voluntary use.

1. Inspection Guidelines
   a. OSHI must determine whether use of respirators is voluntary. Paying for, providing, or otherwise permitting their use does not mean that they are required to be used. Some pertinent indicators for voluntary use include:
      1) employer and employees agree there is no verbal or written policy or statement requiring their use.
      2) employer and employees agree there is no disciplinary action for failure to use respirator.
      3) there is no potential for overexposure to hazardous substances.
      4) there is no emergency use of respirators.
      5) there is no potential for exceeding PEL or IDLH values during spill cleanup.

   b. OSHI must determine whether the employer has provided each user with the information in Appendix D.

   c. OSHI should look for possible safety and health hazards created by use of the respirator. These may include:

      1) an employee's health being jeopardized by the wearing of a respirator (e.g., employee has a cardiac and/or pulmonary disorder that could be aggravated by respirator use).
      2) the wearing of a contaminated respirator that can cause dermatitis or ingestion of a hazardous chemical.
      3) the sharing of a respirator that leads to transmittal of disease.
      4) filtering facepiece used for paint spraying with solvent-containing paints. (may increase solvent exposure due to paint aerosols trapped in mask).
      5) use of airline respirator and adequate steps were not taken to ensure grade D air.
      6) respirator use restricts vision (peripheral vision affected by facepiece).

2. Citation Guidelines

   a. Cite (c)(2)(i) if a respirator was used and the employee was not provided with the information in Appendix D. Posting Appendix D in the workplace is not considered adequate.

   b. Cite (c)(2)(i) if use of a respirator (includes filtering facepiece) created a hazard or had significant potential to create a hazard. Note that the employer may be able to control potential hazards by developing a respirator program that includes elements such as selection, use, air quality and training, to address the hazards.

   c. Cite (c)(2)(ii) if a respirator was used that was not a filtering facepiece, and any of the following deficiencies exist:

1) no or deficient written program (required to determine if users are medically able to wear respirator, and required to address cleaning/storage/maintenance).
2) no medical evaluation.
3) problems with respirator cleaning/storage/maintenance.

NOTE: Only (c)(2)(i) and (ii) can be cited for voluntary use, regardless of the type of violation, e.g., no medical evaluation, dirty respirator.

**D.** **Required Use** Respirators are required for several reasons, including:

- Employer requires employees to use respirators even though exposures do not exceed exposure limits.
- Employees are overexposed to hazardous substances.
- Employees need respirators for protection (no PEL for substance, but exposed at a level shown to be hazardous). Standard requires "where respirators are needed to protect the health of employees, the employer must provide the respirators and ensure their use."

1. General Inspection guidelines

a. Permissible Practice. OSHI should determine if employer requires employees to use respirators even if exposures do not exceed PELs. Employer and employees should be interviewed.

Respirator use during spill response and confined space entry generally would be required use. However, some respirator use may be voluntary, such as wearing a filtering face piece respirator for protection against nuisance level dusts during cleanup of a spill.

If the OSHI has documented that exposures exceed PELs, OSHI should also determine what engineering and work practice controls have been instituted, and evaluate the effectiveness of any respiratory protection being used. If an appropriate respirator was used, but the employee had not been fit tested, or the respirator was not used properly, then effective respiratory protection was not used. Note that engineering and work practice controls should be the primary means to reduce employee exposures, with respiratory protection used during their implementation, or when other controls are not feasible or sufficient alone.

If there is no PEL, but recommended limits (NIOSH, ACGIH, manufacturer, or other) are exceeded, OSHI also should determine employer knowledge of recommended limits, whether employees are experiencing adverse health effects consistent with the exposure, and whether exposures are known to be hazardous at the level measured (merely exceeding a TLV or REL is not enough to show a hazard).

If the employer allows or requires respirator use, the employer is required to designate a respiratory protection program administrator who has adequate training and experience for the complexity of the respiratory hazards in the workplace.

b. Written Program. A written respiratory protection program is required when respirators are necessary to protect the health of the employee from workplace contaminants or when the employer requires the use of respirators. The program must include workplace specific procedures and contain all applicable program elements.

The written program needs to include:

- Which employees must wear a respirator
- What respirators are to be worn
- When are the respirators to be worn
- Why the respirator is needed and why was the specific respirator selected
- How the respirators are to be worn/used (how fit testing will be done, how medical determinations will be obtained, how respirators will be cleaned/inspected, how beards will be addressed)

The written program needs to contain procedures (this is what we are doing and this is how we are doing it), not just policy (we will ensure x is done).

Example – Selection:

Procedure: Painters are required to wear respirators at all times when paint spraying and cleaning guns. They will use Brand X, Model Y paint spray respirators, for protection against solvents and paint spray mist. The paints contain xylene, toluene and 2-butoxyethanol. Exposure monitoring conducted in 2002 indicates combined exposures are less than half the PEL. The Brand X 100 organic vapor cartridge provides adequate protection against the solvent vapors from the paints (Brand X website on change schedules), and the P95 prefilter provides protection against the paint mist. See Appendix F for change schedule rationale.

Policy: Painters will be required to wear respirators when painting. NIOSH certified respirators will be selected according to the respiratory hazards present, and will be used in compliance with the conditions of their certification.

Example – Cleaning respirators:

Procedure: Each employee will clean his own respirator at least weekly. Respirators should be washed at a sink in the Q/A area using hand dishwashing detergent, special brushes and small buckets kept in Q/A for respirator cleaning. Rinse all parts well with warm water. The cleaned respirator parts should be air dried overnight by laying them on paper towels on the designated shelves in Q/A (write your name on the paper towel). Refer to Appendix D for specific manufacturer's cleaning instructions.

Policy: Respirators will be cleaned as often as necessary so that they are maintained in a clean and sanitary condition.

c. Selection**.** The employer is required to select an appropriate respirator. Employers must identify hazardous airborne contaminants in the workplace and make a reasonable estimate of employee exposures. This standard does not explicitly require personal air monitoring.

During selection, the employer also must consider other workplace factors, such as other contaminants that may be present (e.g., oil mist), level of work effort, hot/cold environment, how long the respirator is worn, other PPE, communication requirements.

Some workplace settings may have the potential for oxygen deficiency, such as food packaging with nitrogen, use of dry ice or carbon dioxide, and confined space entries.

OSHI should determine whether the employer considered possible emergency situations or non-routine tasks, such as spill response, confined space entry and maintenance tasks, during respirator selection. It can be difficult to estimate employee exposures during these situations, and it may not be feasible to obtain representative monitoring data in all cases. If exposures are unknown and have the potential for exceeding IDLH, SCBA must be used.

On August 24, 2006, assigned protection factors were added to the rule. All assigned protection factors listed in substance specific standards (with the exception of 1, 3-butadiene) were eliminated and replaced with a reference to 1910.134.

Note that helmet/hood PAPRs and helmet/hood airline respirators have a protection factor of 25 unless the employer has evidence provided by the manufacturer that demonstrates performance of the respirator at a level of protection ≥ 1000.

d. Medical Evaluation**.** All users of respirators must be medically evaluated before the initial fit testing and first use. Periodic medical determinations are not required. However, certain factors may trigger the requirement for additional medical evaluations (see 1910.134(e)(7)).

Exceptions: a medical determination is not required for escape-only respirators (03/08/1999 letter of interpretation); some substance specific standards have different requirements for medical evaluation for respirator use.

A medical evaluation consists of the administration of the medical questionnaire in Appendix C of the standard, or provision of a physical examination. The employer is required to provide the PLHCP with specific information on the respirators to be used and conditions of their use (e.g. duration, level of exertion, PPE worn).

If the employer provides the medical questionnaire to employees, the administration must be done in a way that maintains confidentiality.

e. Fit testing**.** Fit testing is required for all employees required to use tight-fitting respirators. Fit testing is not required for voluntary use of respirators, or for mouth-bit respirators used for escape.

All respirators must be fit tested in a negative pressure mode. Positive pressure facepieces either need to be converted temporarily to negative pressure air purifying respirators (APRs), or surrogate APRs with the same facepiece mold may be used. While powered air purifying respirators (PAPRs) may be fit tested with the blower off, it is preferred that PAPRs with corrugated breathing tubes be converted or a surrogate be used, due to the large volume of dead air space.

Fit tests must be conducted in accordance with the protocols in Appendix A of the standard.

Quantitative fit testing (QNFT) must be used for full facepiece negative pressure air purifying respirators that may be used where exposures are greater than 10 times the PEL (or other limit being used, such as a TLV).

Either qualitative fit testing (QLFT) or QNFT may be used for all other tight-fitting respirators, and full facepiece negative pressure air purifying respirators that are used where exposures are less than 10 times the PEL.

If QNFT is used, a fit factor of 100 must be achieved for respirators with ½ mask or ¼ mask facepieces, and a fit factor of 500 must be achieved for respirators with full facepieces.

The OSHI should determine which protocol was used for fit testing and if all employees who are wearing tight-fitting respirators have been fit-tested in the last twelve months for the respirator they are wearing. Fit testing procedures should be discussed with the program administrator.

Where employees move from job to job within the year (e.g., temporary or construction workers), their fit test need not be repeated, if the employer obtains a copy of the original fit test record and the same respirator make, model and size is available and appropriate for use at their new work site.

Fit test records must be kept until the next fit test is administered.

f. Proper Use. A respirator must be used properly for it to provide the expected protection. Written and implemented procedures on proper use must be in place. These procedures include prohibiting conditions that may result in facepiece leakage, preventing employees from removing respirators in hazardous environments, ensuring continued respirator operation throughout the shift, and establishing procedures for the use of respirators in IDLH atmospheres.

OSHIs should observe employees for the following:

- Presence of facial hair (more than one day's growth) that comes between the sealing surface of the respirator and the face.
- Facial scars or other abnormalities that may interfere with the seal.
- Any item that passes between the facepiece seal and the face, such as MAG-1 goggle straps, jewelry, headsocks or other head gear.
- PPE such as safety glasses, goggles, faceshields, and helmets, that may interfere with the seal or fit of the respirator.
- Performance of a user seal check when putting on a tight fitting respirator.
- Removing respirators or pulling down masks to talk when respirators are required to be worn.

The employer is required to maintain appropriate surveillance of the work area where respirators are used. The intensity of the surveillance should be tailored to the hazards present in the workplace. Highly hazardous substances that pose acute respiratory hazards merit a higher degree of surveillance. If the OSHI identifies problems with respirator use, inadequate surveillance also may be a problem.

g. IDLH. Most IDLH conditions are associated with emergency response, interior structural firefighting, or confined space entry. However, it is possible for exposures to certain substances such as ammonia (including aqua ammonia) or perchloroethylene to be at IDLH levels even during routine tasks.

If respirators may be used for spill clean-up, the employer needs to determine if IDLH levels are possible (e.g. spills of aqua ammonia have the potential for concentrations to exceed the IDLH.)

For all respirator use (except escape) in IDLH conditions, an SCBA (not escape SCBA), or an airline with an escape bottle must be worn.

See section D.2.c. for Procedures for IDLH Atmospheres

h. Cleaning. Respirators that are shared must be cleaned and disinfected between users. All other respirators must be cleaned as necessary so they do not present a health risk to the user. Respirators that are used where hazardous substances with ingestion or dermal hazards are present (e.g. lead, diisocyanates) may need frequent cleaning, even though the respirators are not visibly dirty.

The OSHI should verify that the cleaning procedures in the mandatory Appendix B-2 or an equivalent method specified by the manufacturer are being followed and performed by employees who are adequately trained in the proper respirator care procedures.

Respirator wipes may be used as an interim method in the cleaning schedule for individually assigned respirators, but they must not be the only method used. During fit-testing, respirator wipes may be used between employees being tested, however these respirators must be thoroughly cleaned at the end of each day, using the procedures in Appendix B-2.

i. Storage. Respirators must be stored so that they do not become distorted, damaged, or contaminated; and the cartridges must not be exposed to air contaminants. Exposure to extremes of heat, cold, or sunlight may damage the respirator. A respirator should not be hung by its straps, because the straps will stretch out and affect fit. Acceptable storage may include sealed, reusable plastic bags or containers, or placement on shelves or in cabinets. Most plastic bags allow migration of chemicals and may not be appropriate in some environments. OSHI should determine that storage will not damage or contaminate the respirators or expose cartridges to air contaminants.

j. Inspection. The OSHI should determine if respirators are being inspected before each use and during cleaning, and by whom. The OSHI should check the condition of the respirators being used in the workplace. The presence of damaged or defective respirators is a strong indication that inspections are not being performed or are not being performed properly.

Inspections must include checks of the condition of all parts of the respirator, including mask, valves, straps, cartridges, connectors, hood, hoses and cylinder as applicable. Elastomeric parts need to be checked for pliability, deformation and signs of deterioration.

Escape respirators must be inspected monthly if they are stored in work areas. Escape respirators that are carried into the work area must be inspected before being carried into the area, or monthly.

k. Maintenance. Respirators must be maintained according to the manufacturer's instructions. The OSHI should observe the condition of the respirators in use for damaged, missing or unapproved parts. The employee(s) repairing respirators should be interviewed to determine their knowledge and training.

l. Labels. Filters and cartridges must be labeled, and the labels must be legible, so it can be determined that the appropriate filters and cartridges are being used. The OSHI should verify that properly labeled filters and cartridges are being used, and that the labels remain legible.

m. Training. The employer is required to provide effective, comprehensive and understandable training to employees who wear respirators. Training must be provided initially and annually, and more often if retraining appears necessary to ensure safe use. The employer must ensure that each employee can demonstrate a knowledge of all items in (k)(1)(i) thru (vii).

OSHIs should interview employees to determine if they have received the required training and the extent of that training. Improper wearing of respirators, failure to perform a user seal check, use of the wrong cartridges, dirty or defective respirators, or improper storage may be indicators of inadequate training.

n. Program Evaluation. The employer must conduct evaluations of the workplace and consult regularly with employees to ensure the respiratory protection program is properly implemented. Recent changes in the workplace such as new processes should have been evaluated for necessary respiratory program changes. The OSHI should determine if the employer is regularly evaluating the respirator program for effectiveness. A violation of the respiratory protection program requirements does not necessarily mean there was a failure to evaluate the program. However, the existence of multiple deficiencies is a strong indicator that evaluations have not been conducted.

o. Recordkeeping. The employer is required to keep medical determinations (PLHCP's written recommendation); the most recent fit testing records; and the most recent certifications of inspection for emergency use respirators. Training records are not required to be maintained. OSHIs should determine that the required records are maintained, and that the fit test record contains employee name, type of fit test (protocol used), date tested, results of the test, and the make, model and size of the respirator tested.

2. Specific Inspection Guidelines

a. Air Purifying Respirators

1) All Air Purifying Respirators used for protection against gases & vapors

Cartridges with end of service life indicators (ESLI) must be used if available for the respirator, unless the ESLI is not appropriate for the conditions in the workplace. If ESLIs are not used, a change schedule based on objective data must be implemented. Reliance on breakthrough is not acceptable.

The OSHI should determine if ESLIs or change schedules are used. OSHI should also interview employees to determine if breakthrough is being detected between scheduled cartridge changes or before the ESLI indicates the cartridge should be changed. If change schedules are used, the OSHI should review the employer's rationale for setting the schedule. (See Appendix A for more information on change schedules.)

2) Full Face Air Purifying Respirators

The use of corrective lenses with full face respirators may hinder a proper fit. If corrective lenses are needed and contact lenses are not worn or are not appropriate, spectacle kits should be used.

Full facepieces may fog up in some environmental conditions, impairing the employees' vision. Nosecups may reduce fogging.

3) Powered Air Purifying Respirators (PAPR)

Tight fitting facepiece PAPRs must be fit tested in the negative pressure mode. While it is acceptable to fit test with the blower off, it is not the preferred method. See *General Inspection Guidelines – Fit Testing* for further discussion of fit testing.

Battery maintenance is an important element. The minimum flow rate specified by the manufacturer must be provided at all times. Simple flow meters are available from manufacturers for testing air flow. Hoods require greater air flow than tight fitting facepieces.

Helmet/hood powered air purifying respirators have assigned protection factors of 25, unless the employer has evidence provided by the respirator manufacturer that testing demonstrates performance is at a level of protection ≥ 1000.

b. Air Supplying Respirators

The employer must ensure that devices providing breathing air meet the ANSI/CGA G7.1-1989 Grade D breathing air specifications:

| | |
|---|---|
| oxygen | 19.5-23.5% (v/v) |
| hydrocarbon (condensed) | $\leq$ 5 mg/m$^3$ |
| carbon monoxide | $\leq$ 10 ppm |
| carbon dioxide | $\leq$ 1000 ppm |
| lack of a noticeable odor | |

1) Airline respirator

Air Quality. If a compressor is used to supply breathing air, the OSHI should note the location of the compressor intake and ensure it is located in an area uncontaminated by combustion or vehicle exhaust gases, by the compressor exhaust itself (if applicable), or by discharge from plant process ventilation. If sorbent beds are used, OSHI should check for a tag indicating the most recent change date.

"Air pumps" and other non-oil lubricated compressors are not required to have carbon monoxide (CO) alarms or high temperature alarms, but the employer must ensure that CO levels in the breathing air do not exceed 10 ppm. The easiest way to ensure this is by locating the air intake in a clean area that cannot become contaminated with CO even intermittently (such as from forklift operations). In-line CO monitors also may be used.

Oil-lubricated compressors must have either a carbon monoxide alarm, high temperature alarm, or both. If only a high temperature alarm is used, then the breathing air must be tested for the presence of carbon monoxide at intervals sufficient to ensure that carbon monoxide levels do

not exceed 10 ppm. The alarm must be able to alert the users or another employee who knows to alert any respirator users.

In some cases, OSHIs may be able to use direct reading instruments to measure CO levels in functioning airline hoods or helmets. Measurements may also be taken in the area of the compressor air intake to ensure there is no contamination from outside sources.

Cylinders of purchased breathing air must have a certificate of analysis from the supplier that the breathing air meets Grade D air and moisture content requirements.

All breathing air couplings must be incompatible with those of non-respirable air or other gases used at the site to prevent inadvertent servicing of airline respirators with non-respirable gases or oxygen.

Pressures – adequate pressure is needed to ensure proper function and airflow. All manufacturers specify pressure ranges at which their airline respirators must operate. The pressures may vary depending on hose length, number of hose segments, and couplings. "Air pumps" come in several sizes, with the smallest only able to supply one hood, or possibly two tight fitting masks. The OSHI should determine if appropriate air pressures are used, and if the system is capable of supplying the number and types of respirators in use. The employer should have the specifications available; OSHI also can obtain the information from the respirator manufacturer.

Assigned Protection Factors – helmet/hood supplied air respirators have APFs of 25, unless the employer has evidence provided by the respirator manufacturer that testing demonstrates performance is at a level of protection ≥ 1000.

2) Self-Contained Breathing Apparatus

Medical - use of SCBAs presents a greater burden to the wearer. OSHIs must review the medical evaluation portion of the program thoroughly.

Training – while the standard does not contain special training requirements for SCBA use, OSHIs should determine if the training includes hands-on use of the SCBA, and whether the employees appear to have a good understanding of the use and limitations of the respirators. It is strongly recommended that employees receive hands-on training more frequently than annually, unless they routinely use SCBA.

Inspection**s** – OSHI should interview the individual performing SCBA inspections to determine whether the necessary inspections are performed. If possible, the OSHI should observe the individual performing an inspection of an SCBA unit. One indicator of proper inspection procedures includes the use of air from the cylinder to check the regulator and low air alarm. Generally, if unused cylinders connected to SCBA have not been refilled in the past 6-12 months, the inspection program is deficient. Cylinders must be maintained at 90-100% full.

Emergency use respirators must be inspected at least monthly, and before and after each use. The employer must maintain a written

certification of the most recent inspections. The certification must include the name of the person who made the inspection, the findings of the inspection, any remedial action, and a serial number or other means of identifying the inspected respirator. OSHI should review records of such inspections.

c. Procedures for IDLH Atmospheres:

Paragraph (g)(3) addresses all IDLH atmospheres. It contains requirements for standby personnel and communication, and is intended to assure adequate rescue capability exists in case of respirator failure or some other emergency inside the IDLH environment.

IDLH atmospheres may occur in confined spaces, during emergency response, during interior structural firefighting, and other non-emergency situations where the atmosphere is IDLH but may be well-characterized and controlled (e.g. some locations in refineries).

OSHIs should review protocols for communication, rescue, and notification for employees entering IDLH atmospheres. The standby person must be able to monitor entrant status. It is not sufficient to rely on entrants to call for help when needed.

Specific procedures addressing notification, standby, communication and rescue must be developed if respirators may be worn in IDLH conditions. While it is possible for IDLH atmospheres to occur during controlled situations that are well characterized and stable, most use of respirators in IDLH conditions occurs during interior structural firefighting (see Appendix C), or emergency response, where 29 CFR 1910.120(q) will apply in addition to 29 CFR 1910.134(g)(3). Where there is a difference in requirements, compliance with the most protective element is required.

IDLH conditions also may exist or develop during confined space entry, and compliance with the applicable confined space entry standard/rule is required in addition to 1910.134. Where there is a difference in requirements, compliance with the most protective element is required.

d. Procedures for Interior Structural Firefighting *See Appendix C.*

3. Citation Guidelines for Required Use

a. General Citation Guidelines
Cite 1910.134(a)(2) if there is more than one deficiency of 1910.134, and list the specific program deficiencies in the AVD. Rate the citation severity based on the highest severity for the individual violations (some deficiencies may interact, resulting in increased severity).

Where an overexposure has not been observed, if the OSHI determines that only one specific provision is deficient, cite the appropriate paragraph as outlined below in D.3.b. However, where an overexposure has been observed, follow the guidelines in D.3.a.2.

If more than one deficiency exists, but all of the deficiencies are closely related, such as inspections, consult with supervisor for possible grouping considerations.

1) If the OSHI can document that overexposures are likely, or it can be shown that a respirator was needed to protect the health of an employee, and a respirator was not used, consult with supervisor. This situation is likely to occur with silica in construction. Numerous local, regional and federal investigators have studied silica exposure for several construction activities. Generally, it can be shown that respiratory protection is necessary for most dry silica operations (brick or block cutting, tuck pointing, abrasive blasting, etc.)

2) For exposures exceeding a PEL in 1910.1000:

Overexposures to a single substance:

In general, cite (grouped) the appropriate item under 1910.1000(a)-(d) for exceeding the PEL for a specific substance (or equivalent exposure), and 1910.1000(e) for no or inadequate engineering and work practice controls (or 1910.252(c)(1)(iii) in place of 1910.1000(e) in the case of welding fume overexposures in general industry). Cite separately 1910.134(a)(2) if respirators were not provided, or if respirators were provided but there were one of more deficiencies in the respiratory protection program (e.g. lack of fit testing, damaged respirator).

Overexposures to multiple substances:

If there are overexposures to more than one substance, a grouped item for 1910.1000(a)-(d) and 1910.1000(e) (or 1910.252(c)(1)(iii) for welding fumes) must be written for each substance. Cite separately 1910.134(a)(2) one time for all overexposures if respirators were not provided, or if respirators were provided, but there were one or more deficiencies in the respiratory protection program. In the 1910.134 (a)(2) AVD, list the respirator deficiencies as they pertain to each substance.

See MNOSHA Instruction STD 1-4.1 Citation Guidelines for Air Contaminant Overexposures for additional guidance.

3) For 1926.55, cite in a similar fashion to 1910.1000.

4) For violations of substance specific standards, cite the equivalent paragraphs in the specific standard that require exposures to be below the PEL, respirators to be provided, compliance with specific paragraphs of 1910.134, and use of engineering/work practice controls.

5) For exposures where there is no PEL, consult with supervisor to determine if the evidence is sufficient to support a general duty citation for exposure to hazardous substances at harmful levels and lack of engineering/work practice controls, and/or a citation under 1910.134. See Appendix D for additional guidance.

b. Citation Guidelines for Single Deficiency Violations

1910.134(c)(1) Written Program
If the only deficiencies are in the written procedures or provisions, cite section (c)(1).

1910.134(d) Selection
1) Cite (d)(1)(i) if an inappropriate respirator was used.

2) Cite (d)(1)(ii) if a respirator was not certified by NIOSH or was not used in compliance with the conditions of its certification.
3) Cite (d)(1)(iii) if the evaluation of hazards was deficient and inappropriate or unapproved respirators were used.
4) Cite (d)(3)(iii)(B)(2) if a change schedule was not established.

1910.134(e) Medical Evaluation

1) If no medical evaluation was performed, cite (e)(1).
2) If an initial medical evaluation was performed, but clearly did not meet the requirements in paragraph (e)(2), cite (e)(2)(ii).
3) If the employer did not provide the PLHCP with supplemental information on types of respirators and workplace factors, cite (e)(5).
4) If additional medical evaluations were not provided when needed, cite (e)(7).

1910.134(f) Fit Testing

1) If fit testing was not performed or not performed annually, cite (f)(2).
2) If fit testing was performed, but records were not available, do not cite, per CPL 2.111.
3) If fit testing was performed by a previous employer within the required time, but no fit test record was obtained by the current employer, cite (m)(2).
4) If the fit test did not follow prescribed protocols, cite (f)(5)

1910.134(g)(1) Facepiece seal

1) Cite (g)(1)(i)(A) when facial hair comes between the sealing surface of the facepiece and the face, or interferes with valve function.
2) Cite (g)(1)(i)(B) when items such as headsocks come between the sealing surface of the facepiece and the face.
3) Cite (g)(1)(ii) if eyeglasses or PPE is worn that may interfere with the seal or fit, and was not worn during the fit test.
4) Cite (f)(3) if a scar or other facial abnormality is present, and the employee has not been fit tested since the abnormality occurred)
5) Cite (g)(1)(iii) if user seal checks are not being performed (generally should be based on multiple observations).

1910.134(g)(2) Respirator effectiveness

1) The OSHI should cite (c)(1)(ix) if the written procedures are inadequate to identify problems or changes.
2) This paragraph should not be cited independently because there have to be other deficiencies present for there to be a hazard) Therefore, cite (a)(2).

1910.134(g)(3) IDLH

For emergency response operations or confined space entry, OSHI should review both 1910.134(g)(3) and the standby and communication requirements in the applicable standards- 1910.120, 1910.146, or 5207.1000-5207.1040.

1) If the same requirement exists in both 1910.134(g)(3) and the applicable standard, cite the applicable standard, not 1910.134(g)(3).

2) If there is a conflict between 1910.134(g)(3) and the applicable standard, cite the more protective standard)
3) For entry into IDLH atmospheres that is neither emergency response nor confined space entry, cite the applicable subparagraph of (g)(3) if procedures were deficient or if procedures were not followed when an employee entered an IDLH atmosphere.

1910.134(g)(4) Procedures for Interior Structural Firefighting
See Appendix C

1910.134(h)(1) Maintenance
If respirators are not cleaned and disinfected according to the requirements of this part, cite the appropriate item under (h)(1).

1910.134(h)(2) Storage
1) Cite (h)(2)(i) if respirators were stored improperly to the extent that the respirators were likely to be damaged, distorted, contaminated, or cartridges depleted)
2) If emergency respirators were not accessible or clearly marked, cite the appropriate item under (h)(2)(ii).

1910.134(h)(3) Inspections
1) Cite (h)(3)(i)(A) if routinely used respirators are not being inspected)
2) Cite (h)(3)(i)(B) if there is no inspection program for emergency use respirators.
3) If there is an inspection program for emergency use respirators but no certification or label is kept, no citation will be issued for the first violation, pursuant to CPL 2.111, but the employer shall be informed of the need to maintain certification of inspections.
4) Cite the appropriate items under (h)(3)(ii) or (iii) if the inspections do not include the required elements.

1910.134(h)(4) Repair
1) Cite (h)(4) if a defective respirator was in use.
2) Cite (h)(4)(i) if an employee designated to perform repairs had not been trained appropriately or lacked the knowledge to repair the respirators and repaired respirators had not been repaired as require4)

1910.134(i) Air quality
1) Cite the appropriate paragraph if the employer is failing to verify and ensure breathing air quality (see below for further clarification).
2) Cite (i)(1)(ii) if there is documentation that the air supplied is not grade 4)
3) Cite (c)(1)(vi), and not (i)(6), if the employer does not have procedures to verify and ensure carbon monoxide is $\leq$ 10 ppm in air supplied by non oil-lubricated compressors.
4) Cite (i)(7) if an oil-lubricated compressor does not have either a high temperature alarm or a carbon monoxide alarm.

1910.134(j) Cartridge labels
1) Cite with no penalty if the identity of the filter/cartridge is absent or illegible.

2) Cite if it is also determined that an employee is using an incorrect filter/cartridge and this is due to inadequate labels.

1910.134(k) Training

1) Cite (k)(1) for deficiencies in the training content.
2) Cite (k)(3) if no training has been provided)
3) Cite (k)(5) if re-training is not conducted annually or when needed)
4) **Do not** cite (k)(6) for voluntary use; cite (c)(2)(i) if employees did not receive the information in Appendix 4)

1910.134(l) Program Evaluation

1) If an employer does not have an evaluation procedure and there are no current deficiencies, no citation will be issued pursuant to CPL 2.111.
2) If an employer does not have an evaluation procedure and there are deficiencies in the program, cite (a)(2).

1910.134(m) Recordkeeping

1) If the employer has done the medical evaluations but no record was maintained, no citation shall be issued pursuant to CPL 2.111.
2) If the employer has done fit testing but no records were maintained, no citation shall be issued pursuant to CPL 2.111.
3) Deliberate, blatant or other egregious violations of recordkeeping requirements may be cited. Consult with supervisor.

_____

James Krueger, Director MNOSHA Compliance
For the MNOSHA Management Team

Distribution: OSHA Compliance and WSC Director

Attachments: Appendix A - Change Schedules
Appendix B - Selection of Respirators/Hazard Evaluation/Change Schedules
Appendix C - Procedures for Interior Structural Firefighting
Appendix D - Additional Information for Exposures Exceeding ACGIH TLVs or NIOSH REL
Appendix E - Assigned Protection Factors for Certain Supplied Air Respirators (abrasive blasting; lead in construction; pharmaceutical industry)

NOTICE: Minnesota OSHA Directives are used exclusively by MNOSHA personnel to assist in the administration of the OSHA program and in the proper interpretation and application of occupational safety and health statutes, regulations, and standards. They are not legally binding declarations and they are subject to revision or deletion at any time without notice.

**Appendix A**

CHANGE SCHEDULES

If a cartridge/canister air purifying respirator for the protection against gases and vapors does not have an ESLI, then the employer must implement a cartridge/canister change schedule based on objective information that will ensure the cartridges/canisters are changed before the end of their service life. The purpose of a change schedule is to establish the time period for replacing respirator cartridges and canisters; this is critical to preventing contaminants from respirator breakthrough, and thereby over-exposing workers. Data and information relied upon to establish the schedule must be included in the respirator program. The requirements for several of OSHA's chemical specific standards already address this issue and have been retained. These include:

| Chemical | Standard | Change Schedule |
|---|---|---|
| Acrylonitrile | 1910.1045(h)(2)(ii) | end-of-service life or beginning of shift (whichever occurs first) |
| Benzene | 1910.1028(g)(2)(ii) | end-of-service life or beginning of shift (whichever occurs first) |
| Butadiene | 1910.1051(h)(2)(ii) | every 1, 2, or 4 hours dependent on concentration according to Table 1, and beginning of each shift |
| Formaldehyde | 1910.1048(g)(2)(ii) | for cartridges, every 3 hours or end of shift (whichever is sooner)<br>for canisters, every 2 or 4 hours according to the schedule in (g)(3)(iv) |
| Vinyl chloride | 1910.1017(g)(3)(ii) | end-of-service life or end of shift in which they are first used (whichever occurs first) |
| Methylene chloride | 1910.1052(g)(2)(ii) | canisters may only be used for emergency escape and must be replaced after use |

Change schedules for all other gases and vapors must be established and implemented by the employer. OSHA has stated in the preamble to the final rule that the employer is not required to research and analyze experimental breakthrough data, but may obtain information from sources who have expertise and knowledge that can help the employer to develop reasonable change schedules. New or existing objective data could be presented in a variety of formats and from a number of different sources.

The new standard prohibits the use of warning properties as the sole basis for determining change schedules. However respirator users should be trained to understand that abnormal odor or irritation is evidence that respirator cartridges need to be replaced. Where an effective change schedule is implemented, air-purifying gas and vapor respirators may be used for hazardous chemicals, including those with few or no warning properties.

There are a number of factors that influence the service life of a cartridge. Some of the more significant factors include: the contaminant's chemical properties, temperature, humidity, contaminant concentration, work rate (breathing rate) of the respirator user, variability of respirator cartridges between manufacturers, and the presence of multiple contaminants.

Inspection Guidelines for Change Schedules

To ensure fair and reasonable enforcement of this provision, the following guidelines are presented to assist the OSHI in determining compliance with this provision. The OSHI should assess the "Good Faith" efforts of the employer on a case by case basis and contact their OMT Director for guidance, as necessary.

a. Availability of Objective Data: Ascertain if there are sources of objective data for the particular make and model of the respirator cartridge/canister and if this data is sufficient to implement change schedules. Typical sources would include: respirator manufacturers, industry organizations, trade associations, professional societies, chemical manufacturers (MSDS), academic institutions, and ad hoc committees. The OSHI should determine if the employer has access to adequate information to comply with this provision. For a list of some options that employers may use in developing their change schedules, refer to Appendix A of this directive.

b. Use of Inappropriate Respirator Cartridge/canister: Determine if the air purifying respirator is appropriate for the contaminant present in the workplace. In some cases, the breakthrough time may be so rapid (minutes) that air purifying respirators are not feasible and supplied air respirators should be used. OSHIs should consult respirator manufacturers and other reference material for this information.

c. Change Schedules For Mixtures: Establishing cartridge service life for mixtures of contaminants is a complex task and one that requires considerable professional judgment to create a reasonable change schedule. Cartridge service life for mixtures is best determined using experimental methods. Change schedules are very difficult to develop for mixtures using predictive mathematical models.

   The change schedule for a mixture should be based on reasonable assumptions that include a margin of safety for the worker wearing the respirator. Where the individual compounds in the mixture have similar breakthrough times (i.e. within one order of magnitude), service life of the cartridge should be established assuming the mixture stream behaves as a pure system of the most rapidly migrating component or compound with the shortest breakthrough time (i.e., sum up the concentration of the components). Where the individual compounds in the mixture vary by 2 orders of magnitude or greater, the service life may be based on the contaminant with the shortest breakthrough time. OSHA believes that an approach such as this reflects good health and safety practice where neither objective nor experimental data is available for the mixture.

   OSHA believes that change schedule information will become more available to the respirator user community and will evolve in quality.

   The OSHI should review the written respiratory protection program to ensure that it describes the information and data relied upon, the basis for the canister and cartridge change schedule, and the basis for reliance on the data, as required by the standard. Again, OSHIs should exercise judgment in evaluating mathematical models, rules of thumb, experimental data, use of analogous chemical structures, and other reasoned approaches.

d. Chemical Contaminant Migration: OSHI's should be aware that some contaminants have a tendency to migrate through cartridge/canister sorbent material during periods of storage or non-use. This is characteristic of the contaminant-carbon bed interaction for organic chemicals with boiling points below 65 °C and would predictably shorten breakthrough times. In cases where respirators are used for multiple days this could present an additional exposure to the respirator user. Where contaminant migration is possible, respirator cartridges/canisters should be changed after every work shift where exposure occurs unless the employer has specific objective data to the contrary (desorption studies) showing the performance of the cartridge in the conditions and schedule of use/non-use found in the workplace.

A brief description of some currently available approaches or methods for respirator cartridge change schedules is presented below. This is not intended to be an exhaustive list, but a summary of some reasonable methods that an employer may take in creating a change schedule. No matter which method is used, the employer must maintain any data used in making their decision as part of their program.

**Manufacturers Objective Data:** Respirator cartridge model-specific objective data that is available from the manufacturer or through a distributor may be used to establish change schedules. Objective data may be presented in tabular or graphical format or simply provided verbally over a manufacturer's telephone help line. Some manufacturers have developed elaborate computer programs available on the Internet that provide the necessary objective data to the user.

**Experimental Methods:** Experimental breakthrough-time data from a laboratory based on worst case testing of simulated workplace conditions. This method can provide fairly accurate service life data compared to other available methods.

**Mathematical Predictive Modeling:** One tool that has demonstrated value is the use of mathematical modeling based on predictive equations. These models are typically complex and require considerable expertise to apply. They also require some proprietary information from the respirator manufacturer. OSHA fully supports the further development and validation of these models. The agency believes that respirator manufacturers may be in the best position to apply them to their products.

**Analogous Chemical Structures:** Employer would rely on service life values from other chemicals having analogous chemical structure to the contaminant under evaluation for breakthrough. Or in some cases a chemical with known migration may reasonably be anticipated to act as a surrogate for a similar chemical that would have less rapid migration (e.g., an employer could assume that a heavier, less volatile compound than another in the same chemical series that had been tested for breakthrough would breakthrough no faster than the latter compound, such as benzene versus toluene.) The use of this method requires a substantial amount of judgment and assumption of similar chemical properties. The use of analogous chemical structures should be infallible as long as objective data or information for lower molecular weight compounds is used to predict the breakthrough times for higher molecular weight analogues containing only additional methyl or phenyl groups. Data from higher molecular weight groups should not be used to predict the behavior of analogous substances with lower molecular weight. This approach relies heavily on experimental data and expert analysis. This method may be less accurate than others and should be used only when better information is not available.

**Workplace Simulations:** Unvalidated methods exist or are under development where the respirator cartridge is tested in the workplace in "real time" and under actual conditions of use. Simple designs have been informally described to the agency. Workplace air during representative conditions is drawn over the cartridge at a rate approximating normal breathing at a higher work rate. An air sampling/analytic device would be placed on the other side of the filter to measure the time of breakthrough. Employers could incorporate this type of testing into their air monitoring program using sampling strategies established in their workplace. In theory, these approaches should be an accurate method for determining change schedules and could accommodate fluctuating conditions of humidity, concentration, etc., to allow less conservative schedules that utilize a larger fraction of the true service life.

**Rules of Thumb:** Experimental work can allow for a generalization or "rule of thumb" that broadly defines the service life of cartridges exposed to chemicals. One such Rule of Thumb for estimating organic vapor cartridge service life is found in chapter 36 of the AIHA publication "The Occupational Environment – Its Evaluation and Control." This “Rule of Thumb” suggests that:

- If a chemical's boiling point is >70 C and the concentration is less than 200 ppm you can expect a service life of 8 hours at a normal work rate.
- Service life is inversely proportional to work rate.
- Reducing concentration by a factor of ten will increase service life by a factor of five.
- Humidity above 85% will reduce service life by 50%.

These generalizations should only be used in concert with one of the other methods of predicting service life for specific contaminants.

See the following sites for more information:

http://www.osha.gov/SLTC/etools/respiratory/change_schedule.html

Manufacturers' Websites* with service life calculators on-line

3M:

http://extra8.3m.com/SLSWeb/home.html?region=AMERICA%25C2%25AEIId=20&langCode=EN&countryName=United%2520States (log in as a guest)

MSA: http://webapps.msanet.com/ResponseGuide/Home.aspx

North: http://ezguide.northsafety.com/help/html/esLifeMain.aspx (ezGuide)

(*mention of any website or manufacturer is not an endorsement of the product or information)

**Appendix B**

**Selection of Respirators/Hazard Evaluation/Change Schedules 1910.134(d)**

**Selection and Hazard Evaluation**

The employer is required to select and provide an appropriate respirator (NIOSH certified) based on the respiratory hazard(s) present in the workplace.

The employer must identify hazardous airborne contaminants that employees may inhale and make a reasonable estimate of employee exposures in determining the appropriate respirator for employees to use.

Employers also are required to identify hazards as a result of changes in the workplace such as a change in equipment, process, products, or control measures or employee health complaints that could result in new exposures.

The employer must examine the workplace and determine if the quantity, circumstances, and use of the hazardous chemicals require further evaluation for respiratory hazards. MSDSs contain information such as physical and chemical characteristics and hazards, primary route(s) of entry, and generally applicable control measures. Some MSDSs include some recommendations on appropriate respiratory protection.

For those chemicals that do present a potential respiratory hazard, employers can contact the process equipment manufacturer for additional information on predicted exposure levels and methods to further control worker exposure.

Oxygen deficient atmospheres and those atmospheres that are unknown or cannot be estimated must be treated as IDLH environments.

Although the most reliable and accurate method to determine exposure is to conduct personal air monitoring, it is not explicitly required by the respirator standard. However, certain substance specific standards do require monitoring. When monitoring is not explicitly required, it may be possible to use other means to estimate workplace exposures. Acceptable means include:

- Use of objective data - this is the use of data obtained from industry studies, trade associations, or from tests conducted by chemical manufacturers which demonstrate that air contaminants cannot be released in the workplace in airborne concentrations that are IDLH. The objective data shall represent the highest contaminant exposures likely to occur under reasonably foreseeable conditions of processing, use, or handling. The employer must document the use of objective data as part of their written program. Where objective data are used in the workplace to determine employee exposure, the data must have been obtained under conditions which closely resemble the process, types of materials, control methods, work practices, and environmental conditions.

- Application of mathematical approaches - the preamble to the final rule states that employers can use data on the physical and chemical properties of air contaminants, combined with information on room dimensions, air exchange rates, contaminant release rates, and other pertinent data including exposure patterns and work practices to estimate the maximum exposure that could be anticipated in the workplace. Their use should be limited to situations where workplace factors, such as contaminant release and ventilation system performance, are fairly constant over the work shift and predictable. The results should incorporate reasonable safety factors and be interpreted conservatively. OSHIs must exercise a great deal of professional judgment in concluding if the mathematical approach provides appropriate guidance. (e.g., The methylene chloride standard forbids the use of APR's for protection against methylene chloride and would supersede any model which predicts a changeout time for this chemical.)

The potential for emergency situations must be assessed. Respirators may be needed for escape as well as emergency response. Spill response also must be assessed for respiratory protection needs.

The OSHI should determine if the respirators selected are appropriate for the situations in which the employees may use them, including routine use, maintenance tasks, spill response, emergency response and emergency escape.

The OSHI should also investigate, through routine employee interviews, what actions the employer has taken to re-evaluate employee exposure when employees have made health complaints to determine if appropriate action has been taken to address a respiratory hazard.

N/R/P Particulate Filter Respirators that are required to be used in the workplace must be NIOSH-approved and appropriate for the hazard. Part 84 respirators with an "N" designation should not be used in work settings where oil aerosols are generated, while those with an "R" designation should be used for only one shift when oil is present. Respirators with a "P" designation may be used for more than one work shift, even when oil is present. Employers must follow respirator manufacturer's recommendations.

**Air-purifying Respirators for Protection Against Gases and Vapors in Atmospheres That Are Not IDLH**

If a cartridge/canister air purifying respirator for the protection against gases and vapors does not have an ESLI, then the employer must implement a cartridge/canister change schedule based on objective information that will ensure the cartridges/canisters are changed before the end of their service life. See Appendix A for further discussion of Change Schedules.

**Appendix C**

**Procedures for Interior Structural Firefighting, 1910.134(g)(4)**

This section applies to private sector workers engaged in firefighting, including those working in industrial fire brigades and private incorporated fire companies, and to public sector firefighters.

The provision is limited to workers performing an interior attack on an interior structural fire. In Subpart L (1910.155), OSHA has defined "interior structural firefighting" to mean: "the physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures which are beyond the incipient stage." This is firefighting to control or extinguish a fire in an advanced stage of burning, producing large amounts of smoke, heat and toxic products of combustion. Firefighter exposure during this activity is extremely hazardous. The atmosphere is considered IDLH and the use of Self Contained Breathing Apparatus is required. By contrast, incipient stage firefighting involves the control or extinguishment of a fire in the initial or beginning stage, using portable fire extinguishers or small hose lines without the need for personal protective equipment. It is the incident commander's responsibility, based on training and experience, to judge whether a fire is an interior structural fire, and how it will be attacked.

OSHA has discussed this provision in a number of documents.

a. Summarized below are some key points from those documents.

1. There must always be at least two firefighters stationed outside during interior structural firefighting, and they must be trained, equipped and prepared to enter if necessary to rescue the firefighters inside. However, the incident commander has the responsibility and flexibility to determine when more than two outside firefighters are necessary given the circumstances of the fire. The two-in/two-out rule does not require an arithmetic progression for every firefighter inside, i.e. the rule should not be interpreted as 4-in-4-out, 8-in-8-out, etc.

2. It is important that the OSHI recognize that life-saving activities in interior structural firefighting are not precluded by the standard. There is an explicit exemption in the standard that if life is in jeopardy, firefighters have the discretion to perform the rescue, and the "two-in/two-out" requirement is waived. There is no violation of the standard under such life-saving rescue circumstances.

3. The two-in/two-out provision is not intended as a staffing requirement. It does not require fire departments to hire additional firefighters; it does not require four-person fire companies; it does not require four persons on a fire truck. Most fire departments have more than four firefighters and can assemble the numbers required on the scene by waiting for others to arrive. During this time the fire may be attacked only from the outside, sizing-up operations may occur, and emergency rescue necessary to save lives may take place as discussed above. The "two-in/two-out" rule is a worker safety practice requirement, not a staffing requirement.

4. The standard allows one of the standby firefighters to have other duties such as serving as the incident commander, safety officer, or operator of fire apparatus. However, one of the outside firefighters must actively monitor the status of the inside firefighters and may not be assigned additional duties. The second outside firefighter may be involved in a wide variety of activities. Both of the outside personnel must be able to provide support and assistance to the two interior firefighters; any assignment of additional duties for one of the outside firefighters must be weighed against the potential for interference with this requirement. Proper assignment of firefighting activities at an interior structural fire must be determined on a case-by-case basis and is dependent on the existing firefighting

situation. Compliance will always depend on consideration of all the worksite variables and conditions, and the judgment of the incident commander is critical in meeting this performance standard.

5. The two firefighters (buddies) entering an IDLH atmosphere to perform interior structural firefighting must maintain visual or voice communication at all times. Electronic methods of communication such as the use of radios shall not be substituted for direct visual contact between the team members in the danger area. However, reliable electronic communication devices are not prohibited and certainly have value in augmenting communication and may be used to communicate between inside team members and outside standby personnel.

6. For further explanation refer to the preamble of the Respiratory Protection standard (vol. 63, No. 5, 1245-1248) and the Respirator Question and Answer document (August 3, 1998). Both documents can be found at federal OSHA's Homepage - www.osha.gov.

b. Inspection Guidelines - Section (g)(4) includes the requirements of (g)(3). The first and critical step in evaluating an employer's response using the two-in/two-out rule is to determine if there was interior structural firefighting activity. This determination will require consideration of the factors existing at the time of the firefighting action and the basis for the Incident Commander's finding. OSHIs should seek expert opinion from other authorities such as a state or local fire marshal or other fire protection professionals and should thoroughly interview affected personnel to document the violation.

c. Citation Guidelines - If the OSHI's investigation reveals that the two-in/two-out rule was not followed during an incident which occurred within the past six months, the OSHI should cite (g)(4)(i) or (g)(4)(ii). If adequate communication is not maintained between the team inside and the standby personnel located outside the IDLH, (g)(3)(ii) should be cited.

**Appendix D**

Additional Information for Exposures Exceeding ACGIH TLVs or NIOSH RELs

Exposures to levels of air contaminants which exceed ACGIH Threshold Limit Values (TLVs) or NIOSH recommended exposure limits (RELs), but which have no OSHA PEL, and which are considered to be serious exposure hazards, should be considered for general duty citations. Guidelines on citing general duty can be found in the FCM Chapter IV.

General duty shall not normally be used to impose a stricter requirement than that required by the standard. For example, if the standard provides for a permissible exposure limit (PEL) of 5 ppm, even if data establishes that a 3 ppm level is a recognized hazard, general duty shall not be used to require that the 3 ppm level be achieved unless the limits are based on different health effects. If the standard has only a time-weighted average permissible exposure limit and the hazard involves exposure above a recognized ceiling level, the health OMT Director shall consult with the attorney general's office.

NOTE: An exception to this rule may apply if it can be documented that "an employer knows a particular safety or health standard is inadequate to protect his workers against the specific hazard it is intended to address." Such cases shall be subject to pre-citation review.

General duty violations should be cited so as to cover all aspects of a serious hazard for which no standard exists.

**Appendix E**

## Assigned Protection Factors for Certain SAR and PAPR

Federal OSHA has issued several letters of interpretation and memoranda allowing the increase of assigned protection factors (APF) for certain respirators when used in specific industries and a fully implemented respiratory protection program is in place. These interpretations are applicable in Minnesota.

It is important to note the qualifications and limitations specified in each letter of interpretation or memorandum. The respirators must be used in compliance with the manufacturer's specifications, including pressures, flows, hose size and length, number and types of couplings. The interpretations apply only to the industries identified.

Standard Interpretations (attached):

| | |
|---|---|
| August 30, 1995 | Memorandum – Enforcement Policy Change for Respiratory Protection Required for Abrasive Blasting Under the Interim Final Rule for Lead in construction, 29 CFR 1926.62 *(re Bullard Model 77 and Model 88)* |
| March 31, 1997 | Memorandum – Additional Enforcement Policy Change for Respiratory Protection Required for Abrasive Blasting Under the Interim Final Rule for Lead in Construction, 29 CFR 1926.62 *(re CLEMCO Apollo 20 and Apollo 60)* |
| December 8, 1998 | Enforcement policy for abrasive-blasting respiratory protection under the Lead in Construction Interim Final Rule *(re 3M Model 8100)* |
| May 30, 2002 | Memorandum – Enforcement Policy Change for Respiratory Protection For Select Respirators for Use in the Pharmaceutical Industry *(re certain 3M, Racal (now 3M), MSA, North and Bullard SAR and PAPR)* |

NOTE: these Standards of Interpretation are current as of 01/15/15; and serve as evidence the manufacturer has testing data showing performance at protection factors ≥ 1000.

August 30, 1995

MEMORANDUM FOR: REGIONAL ADMINISTRATORS

FROM: JOHN B. MILES, JR., Director
Directorate of Compliance Programs

SUBJECT: Enforcement Policy Change for Respiratory Protection Required for Abrasive Blasting Under the Interim Final Rule for Lead in Construction, 29 CFR 1926.62

This memorandum provides specific enforcement policy for respiratory protection required in abrasive blasting operations under the Interim Final Rule for Lead in Construction, 29 CFR 1926.62 (hereafter called the "Lead in Construction Standard"). Three points are especially important in this regard. First, the change only applies to 1926.62. Second, the change only affects enforcement actions involving the Type-CE respirators used in abrasive blasting that are manufactured by the E.D. Bullard Company, Models 77 and 88. Third, the change is an interim one, pending a final determination by OSHA of the proper protection factor to be assigned to this class of respirators.

Based upon the 1987 Respirator Decision Logic developed by the National Institute of Occupational Safety and Health ("NIOSH"), OSHA in the Lead in Construction Standard designated an APF of 25 times the permissible exposure limit ("PEL") for this Type-CE, continuous-flow, loose fitting, atmosphere-supplying, airline abrasive blast respirator (hood or helmet). With that assigned protection factor ("APF"), this type of respirator would be acceptable for use only where airborne lead concentrations are less than or equal to 25 times the PEL of 50 ug/m(3), which is 1250 ug/m(3).

In a March 29th, 1994, letter to Assistant Secretary Joseph A. Dear, the E.D. Bullard Company indicated that it believed the Agency had erred in assigning an APF as low as 25 to these two models. Bullard maintained that its respirators provide much greater protection and sought to have the APF in the Lead in Construction Standard elevated to 1000.

OSHA agreed to provide Bullard with the relief sought only if Bullard contracted with an acceptable third party to design, monitor, and interpret the results of a simulated workplace study of these models under a test protocol approved by OSHA. As a condition for granting that relief the Agency required that the results of the study demonstrate that the abrasive blast respirators achieve, at a minimum, a protection factor rating of at least 20,000 and maintain positive pressure throughout the testing.

Bullard contracted with Lawrence Livermore National Laboratory ("LLNL") which designed, conducted, and interpreted the results of the simulated workplace study based on the OSHA-approved protocol. In that test the two Bullard abrasive blast respirators achieved a minimum protection factor of 40,000 and maintained positive pressure throughout the testing.

Based upon the simulated workplace evidence, OSHA recognizes that a protection factor greater than 25 is appropriate for the Bullard abrasive blast respirators, Model 77 (TC-19C-84) and Model 88 (TC-19C-293).

The simulated workplace study carried out by LLNL indicates that, if used properly, these respirators are acceptable for exposures to lead that are less than or equal to 1000 times the PEL (50,000 ug/m(3)). However, other data and at least one field study indicate that in practice in the workplace these respirators may provide considerably less protection than indicated by the simulation study when they are used in ways that do not conform to the manufacturer's specifications (e.g., the air supply hose is too

long, the hose diameter is incorrect and/or the manufacturers specified pressure is not maintained) or in ways that do not comply with the requirements of paragraphs [(c),(g),(h) and (i)] of 1910.134 (e.g., the respirator is not inspected frequently enough for possible deterioration), which are incorporated by reference in the Lead in Construction Standard, [1926.62(f)(2)(i)].

Respirators will provide less protection than they are capable of when used improperly. Examples of improper respirator usage include the donning and doffing of respirators while still in containment or disconnecting the air hose prior to leaving the exposure area. What is unusual in connection with these respirators is the extreme conditions under which they may be used in construction activities. Typically, abrasive blast respirators are used at very high levels of exposure (e.g., in the thousands of or tens of thousands of ug/m(3) and are subject to substantial and at times rapid deterioration due to damage caused by the high-speed, abrasive material used in the blasting. Also, at times these respirators will be used near the limits of their protective capability. Consequently, workers wearing these respirators in abrasive blasting operations may be subjected to acute toxic exposures if the respirators do not perform properly. It is imperative, therefore, that these respirators be properly used. Performance consonant with the assigned protection factor can only be assured when they are properly used.

For these reasons, OSHA will adopt a two-pronged approach in its enforcement policy with regard to these respirators.

First, the two Bullard models will be treated by OSHA as if they had an APF of 1000. Effective immediately for abrasive blasting operations covered under the Interim Final Rule for Lead in Construction, the Bullard Type-CE respirators, Model 77 (TC-19C-84) and Model 88 (TC-19C-293) are acceptable in abrasive blasting atmospheres where the airborne level does not exceed 50,000 ug/m(3) (1000 times the PEL) of lead in air.

Second, OSHA will be very strict in assuring that these respirators are used only in accordance with the manufacturer's specifications and in accordance with the requirements of 1926.62. Refer to the attached Bullard Instruction Manual for the Model 77 and 88 respirators. (During compliance activities, CSHO's shall determine that Bullard respirators consist of the appropriate components, such as correctly sized air supply hoses and hose length and that the required pressure range is maintained.) If the respirator is not used in compliance with the manufacturers' specifications and with 29 CFR 1926.62, CSHO's will document the respiratory deficiencies. Violations related to documented deficiencies in the respirator will be cited.

With the assistance of the Industrial Safety Equipment Association ("ISEA"), other respirator manufacturers of Type-CE, continuous-flow, abrasive blast respirators covered by the Lead in Construction Standard have been contacted to provide them with an equal opportunity to obtain the same relief that Bullard has been afforded by participating in a similar study.

If you should have any further questions concerning this matter, please feel free to contact the Office of Health Compliance Assistance at (202) 219-8036.

Enclosure

(For 88 Series Airline Respirator Instruction Manual, see printed copy)
(For 77/46 Series Supplied-Air Respirator Instruction Manual, see printed copy)

March 31, 1997

MEMORANDUM FOR: REGIONAL ADMINISTRATORS
STATE DESIGNEES

FROM: JOHN B. MILES, JR., DIRECTOR
DIRECTORATE OF COMPLIANCE PROGRAMS

SUBJECT: Additional Enforcement Policy Change for Respiratory Protection Required for Abrasive Blasting Under the Interim Final Rule for Lead in Construction, 29 CFR 1926.62

This memorandum provides specific enforcement policy for respiratory protection required in abrasive-blasting operations under the Interim Final Rule for Lead in Construction, 29 CFR 1926.62 (hereafter called the "Lead in Construction Standard"). Three points are especially important in this regard. First, the change only applies to 29 CFR 1926.62. Second, the change only affects enforcement actions involving the Type-CE respirators used in abrasive-blasting that are manufactured by the CLEMCO Industries Corporation, notably the models designated as the Apollo 20 and Apollo 60. Third, the change is an interim one, pending a final determination by the Occupational Safety and Health Administration (OSHA) of the proper protection factor to be assigned to this class of respirators consequent to a forthcoming rulemaking on assigned protection factors (APF). Pending that determination, Regional Administrators shall ensure that the following policy is implemented. State designees are encouraged to adopt a similar enforcement policy for respiratory protection under 29 CFR 1926.62.

Based upon the 1987 Respirator Decision Logic developed by the National Institute of Occupational Safety and Health (NIOSH), OSHA in the Lead in Construction Standard designated an APF of 25 times the permissible exposure (PEL) for this Type-CE, continuous-flow, loose-fitting, atmosphere-supplying, airline abrasive-blast respirator (hood or helmet). With that assigned protection factor, this type of respirator would be acceptable for use only where airborne lead concentrations are less than or equal to 25 times the PEL of 50 ug/m(3), which is 1250 ug/m(3).

In a October 1, 1996, letter to OSHA, the CLEMCO Industries Corporation provided documentation showing that their two models of continuous flow airline respirators achieved a higher protection factor than the APF of 25 as currently assigned. CLEMCO maintained that its respirators provide much greater protection and sought to have the APF under the Lead in Construction Standard (29 CFR 1926.62) elevated to 1000.

CLEMCO contracted with an acceptable independent third party to design, monitor, and interpret the results of a simulated workplace study of the Apollo models under a test protocol that had been approved by OSHA. As a condition for granting relief, the Agency required that the results of the study demonstrate that the abrasive-blast respirators achieve, at a minimum, a protection factor rating of at least 20,000, and maintain positive pressure throughout the testing.

CLEMCO contracted with Los Alamos National Laboratory which designed, conducted, and interpreted the results of a study based on the OSHA-approved protocol. In the test, the two CLEMCO abrasive-blast respirators achieved a minimum protection factor of greater than 20,000, and maintained positive pressure throughout the testing.

OSHA recognizes that a protection factor greater than 25 is appropriate for the CLEMCO abrasive blast respirators, Models Apollo 20 and Apollo 60. The simulated workplace study carried out by the Los Alamos National Laboratory indicates that, if used properly, these respirators are acceptable for exposures to lead that are less than or equal to 1000 times the PEL (50,000 ug/m(3)). However, other data, and at least one field study, indicate that in the workplace these respirators may provide

considerably less protection than indicated by the simulation study. Protection is degraded when the respirators are used in ways that do not conform to the manufacturer's specifications (e.g., the air supply hose is too long, the hose diameter is incorrect and/or the manufacturer's specified pressure is not maintained), or in ways that do not comply with the requirements of paragraphs [(c), (g), (h), and (i)] of 29 CFR 1910.134 (e.g., the respirator is not inspected frequently enough for possible deterioration), which are incorporated by reference in the Lead in Construction Standard, [29 CFR 1926.62(f)(2)(i)].

Respirators will provide less protection than their design capability when used improperly. Examples of improper respirator use include the donning and doffing of respirators while employees are still in containment, or if they disconnect the air hose prior to leaving the exposure area. What is unusual in connection with these respirators is the extreme conditions under which they may be used in construction activities. Typically, abrasive blast respirators are used at very high levels of exposure and are subject to substantial and, at times, rapid deterioration due to damage caused by the high-speed, abrasive material used in the blasting. Also, at times, these respirators will sometimes be used near the limits of their protective capability. Consequently, workers using these respirators in abrasive-blasting operations may be subject to acute toxic exposures if the respirators do not perform properly. It is imperative, therefore, that these respirators be properly used.

For these reasons, OSHA will adopt the following approach in its enforcement policy with regard to these respirators:

First, the two CLEMCO models will be treated by OSHA as if they had an APF of 1000. Effective immediately for abrasive-blasting operations covered under the Interim Final Rule for Lead in Construction, the CLEMCO Type-CE respirators, Models Apollo 20 and Apollo 60 are acceptable in abrasive-blasting atmospheres where the airborne level does not exceed 50,000 ug/m(3) (1000 times the PEL) of lead in air.

Second, OSHA will be very strict in assuring that these respirators are used only in accordance with the requirements of 29 CFR 1926.62. During compliance activities, CSHO's shall determine that CLEMCO respirators consist of the appropriate components, such as correctly sized air supply hoses and hose length, and that the required pressure range is maintained. Refer to the attached CLEMCO Instruction Manual for Apollo 20 and Apollo 60 respirators. If the respirator is not used in compliance with the manufacturer's specifications and with 29 CFR 1926.62, CSHO's will document the respiratory deficiencies. Violations related to documented deficiencies in the respirator will be cited.
Third, relief for these two models applies only to lead in construction. The APF of 1000 does not apply to other air contaminants.

OSHA is now working on the development of a final generic respiratory protection standard (29 CFR 1910.134). The APFs for all respirator classes are being reviewed in this rulemaking process. Decisions regarding APFs will be made as part of this rulemaking. These decisions will be based on the comments, data, and testimony in the rulemaking record. OSHA will review this and other information to determine if an APF of 1000 should be assigned to the class of respirators addressed in this memorandum. The relief being granted to CLEMCO, therefore, is interim relief only. Decisions in OSHA's final revised Respiratory Protection rule will supersede this decision and may reflect an APF different than 1000.

If you should have any further questions concerning this matter, please feel free to contact the Office of Health Compliance Assistance at (202) 219-8036.

Standard Interpretations
12/08/1998 - Enforcement policy for abrasive-blasting respiratory protection under the Lead in Construction Interim Final Rule.

This memorandum provides specific enforcement policy for respiratory protection required in abrasive-blasting operations under the Interim Final Rule for Lead in Construction, 29 CFR 1926.62 (hereafter called the "Lead in Construction Standard"). Three points are especially important in this regard. First, the change only applies to 29 CFR 1926.62. Second, the change only affects enforcement actions involving the Type-CE respirator used in abrasive-blasting that is manufactured by 3M as the Model 8100 Abrasive Blast Helmet. Third, the change is an interim one, pending a final determination by the Occupational Safety and Health Administration (OSHA) of the proper protection factor to be assigned to this class of respirators consequent to a forthcoming rulemaking on assigned protection factors (APF). Pending that determination, Regional Administrators shall ensure that the following policy is implemented. State designees are encouraged to adopt a similar enforcement policy for respiratory protection under 29 CFR 1926.62.

Based upon the 1987 Respirator Decision Logic developed by the National Institute of Occupational Safety and Health (NIOSH), OSHA in the Lead in Construction Standard designated an APF of 25 times the permissible exposure (PEL) for all Type-CE, continuous-flow, loose-fitting, atmosphere-supplying, airline abrasive-blast respirators (hood or helmet). With that assigned protection factor, this type of respirator would be acceptable for use only where airborne lead concentrations are less than or equal to 25 times the PEL of 50 ug/m(3), which is 1250 ug/m(3).

In a August 7, 1998, letter to OSHA, 3M Occupational Health and Safety Division provided documentation showing that their continuous flow Model 8100 Abrasive Blast Helmet achieved a considerably higher protection factor than the APF of 25 as currently assigned. 3M maintained that its respirator provides much greater protection and sought to have the APF under the Lead in Construction Standard (29 CFR 1926.62) elevated to 1000.

3M contracted with an acceptable independent third party to design, monitor, and interpret the results of a simulated workplace study of the Model 8100 under a test protocol that had been approved by OSHA. As a condition for granting relief, the Agency required that the results of the study demonstrate that the abrasive-blast respirator achieve, at a minimum, a protection factor rating of at least 20,000, and maintain positive pressure throughout the testing.

3M contracted with Los Alamos National Laboratory which designed, conducted, and interpreted the results of a study based on the OSHA-approved protocol. In the test, the Model 8100 respirator achieved a minimum protection factor of greater than 20,000, and maintained positive pressure throughout the testing.

OSHA recognizes that a protection factor greater than 25 is appropriate for the 3M Abrasive Blast Helmet, Model 8100. The simulated workplace study carried out by the Los Alamos National Laboratory indicates that, if used properly, this respirator is acceptable for exposures to lead that are less than or equal to 1000 times the PEL (50,000 ug/m(3)). However, other data, and at least one field study, indicate that in the workplace these respirators may provide considerably less protection than indicated by the simulation study. Protection is degraded when the respirators are used in ways that do not conform to the manufacturer's specifications (e.g., the air supply hose is too long, the hose diameter is incorrect and/or the manufacturer's specified pressure is not maintained), or in ways that do not comply with the requirements of 29 CFR 1910.134 (e.g., the respirator is not inspected frequently enough for possible deterioration), which are incorporated by reference in the Lead in Construction Standard, 29 CFR 1926.62(f)(4).

Respirators will provide less protection than their design capability when used improperly. Examples of improper respirator use include the donning and doffing of respirators while employees are still in containment, or if they disconnect the air hose prior to leaving the exposure area. What is unusual in

connection with these respirators is the extreme conditions under which they may be used in construction activities. Typically, abrasive blast respirators are used at very high levels of exposure and are subject to substantial and, at times, rapid deterioration due to damage caused by the high-speed, abrasive material used in the blasting. Also, at times, these respirators will sometimes be used near the limits of their protective capability. Consequently, workers using these respirators in abrasive- blasting operations may be subject to acute toxic exposures if the respirators do not perform properly. It is imperative, therefore, that these respirators be properly used.

For these reasons, OSHA will adopt the following approach in its enforcement policy with regard to these respirators:

First, this 3M model will be treated by OSHA as if it had an APF of 1000. Effective immediately for abrasive-blasting operations covered under the Interim Final Rule for Lead in Construction, the 3M Model 8100 Abrasive Blast Respirator is acceptable in abrasive-blasting atmospheres where the airborne level does not exceed 50,000 ug/m(3) (1000 times the PEL) of lead n air.

Second, OSHA will be very strict in assuring that this respirator is used only in accordance with the requirements of 29 CFR 1926.62. During compliance activities, CSHO's shall determine that all 3M respirators consist of the appropriate components, such as correctly sized air supply hoses and hose length, and that the required pressure range is maintained. If the respirator is not used in compliance with the manufacturer's specifications and with 29 CFR 1926.62, CSHO's will document the respiratory deficiencies. Violations related to documented deficiencies in the respirator will be cited.

Third, relief for this model applies only to lead in construction. The APF of 1000 does not apply to other air contaminants.

OSHA is now reviewing literature and comments for assigned protection factors for the inclusion in the revised respiratory protection standard 29 CFR 1910.134. OSHA will determine if an APF of 1000 should be assigned to the class of respirators addressed in this memorandum. The relief being granted to 3M, therefore, is interim relief only. Decisions in OSHA's final revised Respiratory Protection rule will supersede this decision and may reflect an APF different than 1000.

If you should have any further questions concerning this matter, please feel free to contact the Office of Health Compliance Assistance at (202) 693-2190.

May 30, 2002

MEMORANDUM FOR: REGIONAL ADMINISTRATORS

FROM: RICHARD E. FAIRFAX, DIRECTOR
[DIRECTORATE OF ENFORCEMENT PROGRAMS]

THROUGH: R. DAVIS LAYNE
DEPUTY ASSISTANT SECRETARY

SUBJECT: Enforcement Policy Change for Respiratory Protection For Select Respirators for Use in the Pharmaceutical Industry

This memorandum provides specific enforcement policy for respirator use in the Pharmaceutical Industry (SICs 2833 and 2834). Three points are especially important in this regard. First, the change only applies to the protection from particulates in the pharmaceutical industry. Second, the change only affects the nine respirators listed below. Third, the change is an interim change only, pending a final determination by OSHA of the proper protection factor to be assigned to these classes of respirators as part of the current respiratory protection standard rulemaking of 29 CFR 1910.134.

Based upon the 1987 Respirator Decision Logic developed by the National Institute for Occupational Safety and Health (NIOSH), an Assigned Protection Factor (APF) of 25 for continuous-flow, loose fitting respirators (hood or helmet) has been enforced by OSHA. In January 1998, OSHA revised its respiratory protection standard, but reserved modifications to the APFs for future rulemaking.

In 1996, during the respirator rulemaking process, the pharmaceutical industry members of Organization Resources Counselors, Inc. (ORC) approached OSHA about their need for a respirator with a higher protection factor to protect against biologically active compounds that pose a risk at orders of magnitude below aerosol levels typically found in OSHA PELs. ORC contracted with Lawrence Livermore National Laboratory (LLNL) to design, conduct, and interpret the results of a simulated workplace study. The study tested both Supplied Air Respirators (SARs) and Powered Air Purifying Respirators (PAPRs) against an airborne particulate. In that test most of the respirators achieved a minimum protection factor of 10,000 and maintained positive pressure inside the respirator throughout the testing.

The simulated workplace study carried out by LLNL incorporated work procedures and body positions normally encountered by employees in the pharmaceutical industry. The study indicated that, if used properly and when equipped with the accessories mentioned below, these respirators are generally acceptable for exposures to particulates that are less than or equal to 1000 times their respective PELs. However, other studies have also indicated that in practice in the workplace, respirators may provide considerably less protection than indicated by a simulation study when they are used in ways that do not conform to the manufacturer's specifications (e.g., the air supply hose is too long, the hose diameter is incorrect and/or the manufacturer's specified pressure is not maintained) or in workplace situations where the requirements of 1910.134 are not being met.

Based upon the simulated workplace evidence, OSHA recognizes that a protection factor greater than 25 is appropriate for these respirators when used and equipped as tested. The following respirators (with the accessories indicated) will be treated by OSHA as if they had an APF of 1000 for use in the pharmaceutical industry for protection against particulates:

**Powered-Air Purifying Respirators (PAPRs)**

- 3M Whitecap helmet (TC-21C-670) with chinstrap and GVP-100 blower (hard plastic helmet with bib)
- 3M Snapcap hood (TC-21C-671) with chinstrap and GVP-100 blower (Tyvek hood with bib)
- 3M (formerly Racal) BE-5 (TC-21C-277) (clear PVC hood with bib)
- 3M (formerly Racal) BE-10 (TC-21C-480) (polycoated Tyvek hood with bib and head suspension)

**Supplied-Air Respirators (SARs)**

- 3M Whitecap helmet(TC-19C-069) with chinstrap (hard plastic helmet with bib)
- 3M Snapcap hood (TC-19C-069) with chinstrap (Tyvek hood with bib)
- MSA VERSA-Hood (TC-19C-224) with #5-613-1 direct hose connection for 3/8" hose system (Tyvek hood)
- North Model 85301 TB (TC-19C-350) (Tyvek hood with ratchet head suspension and bib)
- Bullard CC 20TIC (TC-19C-154, Type C) with 20 RT suspension and 20 NC nylon chinstrap (Tyvek hood with bib).

These respirators will only be considered to have an APF of 1000 when used properly. For example, most have bibs which must be tucked into outer clothing to ensure proper protection. Improper respirator use also includes the donning and doffing of respirators while still in containment areas or disconnecting the air hose prior to leaving the exposure area. Workers wearing these respirators may be subjected to acute toxic exposures if the respirators do not perform properly. It is imperative, therefore, that these respirators be properly used; protection consonant with the interim assigned protection factor can only be assured when they are properly used.

For these reasons, employers must ensure that these respirators are used only in accordance with the manufacturer's specifications, that the respirator is functioning properly, that the users are properly fitted and trained, and that the employer has implemented a continuing, effective respiratory protection program as specified by 29 CFR 1910.134. Documented deficiencies related to the respirator or the respiratory protection program should be cited.

If you should have any further questions concerning this matter, please feel free to contact the [Office of Health Enforcement] at (202) 693-2190.