Respirator Program Requirements:

How Does Your Program Measure Up?

The findings of the National Institute for Occupational Safety and Health (NIOSH)/Bureau of Labor Statistics (BLS) *Survey of Respirator Use and Practices*[1] raise sobering questions regarding respirator usage practices within U.S. industry as compared to Occupational Safety and Health (OSHA) regulations[2] and NIOSH recommendations.[3]

This article focuses on information from the survey for companies in Standard Industrial Classification (SIC) 17, *Construction—Special Trade Contractors*,[4] which includes many members of the Society for Protective Coatings (SSPC). The report also describes findings from focus groups (conducted by NIOSH and the SSPC) regarding respiratory protection.[5] From this information you will gain an understanding of (a) respiratory usage practices in companies such as yours, and how the practices compare to OSHA regulations and NIOSH recommendations, and (b) where your company stands with regard to respiratory protection.

If after reviewing the OSHA regulations, NIOSH recommendations, and findings in this article, you find your respiratory protection program lacking in certain respects, you may wish to make contact with the parties listed below in the "Recommendations."

Respirators should never be dismantled on the work site, where they can be contaminated.

Survey of Respirator Use and Practices: Construction Industry

In late 1998, NIOSH and the BLS began a project to enquire into respirator use in U.S. private industry entitled *Survey of Respirator Use and Practices*. The purpose of this survey was to determine the patterns and extent of respirator use, and the degree to which respirator use is consistent with OSHA regulations and NIOSH recommendations. The survey collected data on the types of respiratory protection used, the types

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of fit tests used, and the substances that prompt respiratory protection, among other topics. A questionnaire was developed during 2000 and 2001. In August of 2001 BLS mailed questionnaires to 40,002 establishments that were statistically representative of U.S. private industry.

The survey findings have been summarized in a NIOSH/BLS publication, *Respirator Usage in Private Sector Firms, 2001*.[1] The survey data provide nationwide estimates of respirator use and practices by industry division, 2-digit SIC level within each industry division, and establishment employment size group as measured by the number of employees.

Limitations of Findings

All mail-out questionnaires entail the risk of misinterpretation by the respondent. NIOSH and BLS tried to control misinterpretation by thoroughly testing the questionnaire at small, medium, and large establishments. The questionnaire directed that the person most knowledgeable regarding the respirator program was to complete the questionnaire. However, there is no guarantee that the questionnaire was indeed placed before the most appropriate person.

Findings

The construction industry (of which *Special Trade Contractors* is a part) is estimated to have one of the higher rates of respirator use: 9.6% of all construction establishments required respirator use during the 12 months prior to the completion of the questionnaire. This is more than twice the rate of respirator use for all private industry establishments, 4.5%, as shown in Table 1. Overall, 8.9% of all construction employees were required to use respirators during that period.

Special Trade Contractors (firms) have a slightly lower overall percentage of respirator use than construction establishments as a whole (9.4% compared to 9.6%), but employees in this group are more likely to use respirators than construction employees as a whole (10.0% compared to 8.9%). *Special Trade Contractor* employees have a slightly higher percentage of air-supplied respirator use than construction employees as a whole (1.9% compared to 1.4%). "Air-supplied" respirators include "airline respirators" such as those used for abrasive blasting operations (Fig. 1). The top ten substances (by number of establishments) that prompted construction establishments to use air-supplied respirators (Fig. 2) were:

- hydrogen sulfide,
- silica dust,
- paint vapors,
- carbon monoxide,
- chlorine,
- acid gas (such as sulfur dioxide),
- lead,
- oxygen deficiency,
- solvents, and
- other dust.

Potential Respirator Program Inadequacies

Estimates of the extent to which respirator programs are potentially inadequate, as measured against program features that are either required by OSHA or recommended by NIOSH, are summarized in Table 2. Each of the features associated with the inadequacies is an important part of an effective respirator program. Without those features, the overall quality of respiratory protection for an establishment's employees may suffer.

Table 2 includes the following findings for *Special Trade Contractors'* establishments with required respirator use:

- 87% did not have a written change-out schedule for air-purifying gas/vapor filters (vs. 78% for all private industry);
- 78% did not have written procedures to periodically evaluate the effectiveness of respirators use, or didn't know if such procedures existed (vs. 64% for all private industry);
- 69% did not have a written respirator program adopted by management to determine how respirators are used (vs. 66% for all private industry);
- 60% did not have a written program for maintaining respirators, or didn't know if such procedures existed (vs. 50% for all private industry);
- 57% did not assess employees' medical fitness to wear respirators (vs. 51% for all private industry); and
- 53% did not provide training regarding the need, use, limitations, and capabilities of respirators (vs. 41% for all private industry).

NIOSH-SSPC Focus Groups

In addition to the survey described above, NIOSH used a series of focus groups to obtain information directly from construction industry employers whose employees use respirators. Focus groups are discussions among small groups of persons (typically six to eight) who are led by a moderator through discussion topics using pre-defined questions.[6]

Recruitment of Focus Group Participants

The SSPC recruited company safety personnel or management staff from SSPC

employer (contractor) members to participate in six focus groups conducted between May and November of 2000. Each focus group included representatives from six to eight different respirator-using SSPC industrial coatings contractor member companies, all categorized as being part of SIC 172, *Painting and Paper Hanging.* The six groups included three that were composed of management or supervisory-level representatives from companies that employ union workers, and another three focus groups that were composed of representatives from companies that employ non-union workers. Each company representative was required to be knowledgeable about the respirator use and inhalation hazards encountered by their company's workers. The focus groups were organized by SSPC in conjunction with other meetings being attended by the company representatives. NIOSH conducted the focus groups in Pittsburgh, Houston, Baltimore, and Nashville.

Focus Group Topics

The participants voluntarily responded to questions such as:

- Are the workers predominantly union or non-union?
- What type/s of work is/are most often performed by the company?
- Is there a person to oversee the respirator program?
- Are the workers fit tested to wear respirators?
- Which substances of health significance do workers encounter on the job?
- Which substances prompt respirator use?
- Which types of respirators are used?
- What are the barriers to respirator use?

Table 1: Number and Percent of Establishments and Employees Using Respirators During the 12 Months Prior to the 2001 Survey, by Industry

Industry	Establishments		Employees	
	Number	Percent	Number	Percent
Private industry	281,776	4.5	3,303,414	3.1
Agriculture, forestry, and fishing	13,186	9.4	101,778	5.8
Mining	3,493	11.7	53,984	9.9
Construction	64,172	9.6	590,987	8.9
Air-purifying respirators	60,012	9.0	566,909	8.5
Air-supplied respirators	10,546	1.6	96,637	1.4
General building contractors	19,009	9.6	106,492	6.9
Heavy construction, except building	4,744	12.4	57,851	6.6
Special trade contractors	40,418	9.4	426,645	10.0
Air-purifying respirators	38,380	8.9	408,084	9.6
Air-supplied respirators	8,117	1.9	80,991	1.9
Manufacturing	48,556	12.8	882,475	4.8
Transportation and public utilities	10,351	3.7	189,867	2.8
Wholesale trade	31,238	5.2	182,922	2.6
Retail trade	16,948	1.3	118,200	0.5
Finance, insurance, and real estate	4,202	0.7	22,911	0.3
Services	89,629	4.0	1,160,289	3.2

Reference: U.S. Bureau of Labor Statistics/National Institute for Occupational Safety and Health (NIOSH): *Respirator Usage in Private Sector Firms, 2001.* Washington, DC: BLS, 2003.

Limitations of Focus Group Findings

The focus group findings are relevant to *Special Trade Contractors*, but not necessarily representative of that industry group (due to the small and selective nature of the study and the voluntary nature of recruitment into the study). The focus group participants represented approximately 40 companies out of 485,625 *Special Trade Contractors* establishments nationwide in 2001.[7] Despite these limitations, the focus groups do provide insights into barriers to respirator use and indicators for possible intervention.

Focus Group Findings

Participants reported the following information about their companies:

- the size of the companies ranged from 6 to 900 employees, with a median size of 50 employees;
- respirators were used extensively during abrasive blasting and coating operations on bridges, refineries, large tanks, ships, and other structures;
- the companies worked in 31 states and Washington, D.C.; and
- almost all of the participants reported

that their company assigned a person to oversee respirator use and conduct fit testing for tight-fitting respirator wearers.

Exposure to Health-Related Substances

Participants reported that their companies' workers encountered the following health-related substances (in alphabetical order):

- acid gas,
- arsenic,
- asbestos,
- carbon monoxide,
- hydrogen sulfide,
- lead,
- mineral slag and other abrasives,
- oxygen deficiency,
- paint vapors,
- silica, and
- welding fumes.

Participants reported that respiratory protection was the primary means of control for all of the health-related substances encountered at the worksite.

Perceived Barriers to Effective Respirator Use

The focus group discussions identified several perceived barriers (in the opinion of the participants) to effective respirator use. These barriers have been classified by the authors into three groups: 1) administrative, 2) design, and 3) economic. This classification is not mutually exclusive, in that some barriers could fall into more than one group.

Perceived Administrative Barriers to Effective Respirator Use

- Employers reported that it is "hard to get workers to wear respirators."
- Maintenance of records for training and fit testing is difficult and time consuming.
- Maintenance and storage of respirators under the conditions of the project sites is difficult (need better storage than a plastic bag and a secure area because respirators may be stolen).
- Air monitoring for airborne levels of toxic contaminants is difficult at small jobs because the job is typically complete before the monitoring results are in. Air monitoring to determine cartridge change-out schedules is difficult because of the different types of paints used.
- Workers' use of tobacco products (can result in removal of the respirator).
- Facial hair (NIOSH recommends that no respirator should be used when facial hair interferes with the face seal.)[3]
- Enforcement of rules related to wearing of respirators can result in more frequent worker turnover.
- A change in job sites may require new fit tests.

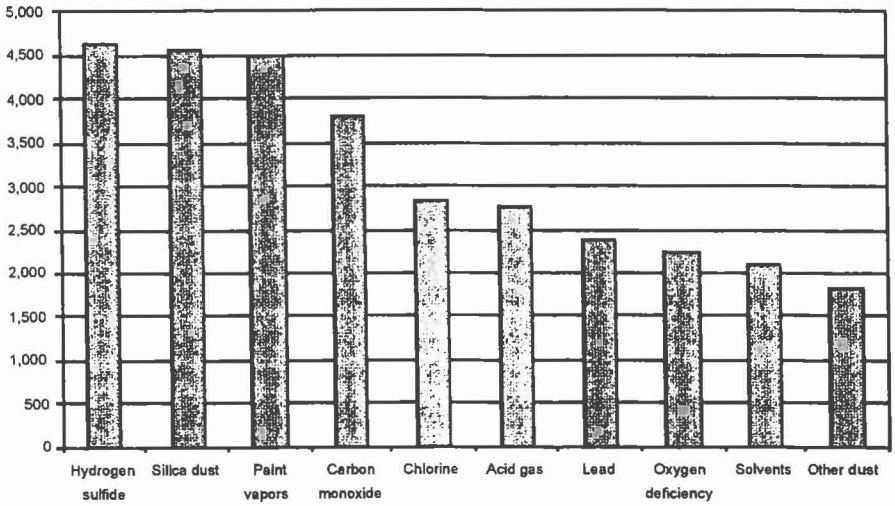


Fig. 2: Number of Construction Establishments Using Air-supplied Respirators to Protect Employees Against Indicated Substances

Perceived Respirator Design Barriers to Effective Respirator Use

- Interference with eye protection
- Reduced peripheral vision with supplied-air hoods/helmets
- Incompatibility with high temperatures and humidity
- Weight of supplied-air hoses
- Lack of interchangeability between different brands of supplied-air hoses
- Lack of end-of-service-life indicators for changing cartridges
- Difficulty in entering and exiting containment structures—forcing some workers to wear half-face respirators under supplied-air hoods
- Straps are annoyingly tight
- Communications problems— respirator speakers often don't work, necessitating exit from containment for instruction and communication

Perceived Economic Barriers to Effective Respirator Use

- Administration and evaluation of questionnaires for fitness to wear respirators, as well as physical exams, are costly and entail time away from work.
- OSHA respirator regulations are perceived as written for large factories with medical personnel on site, which is not the case for small construction and painting contractors.

Recommendations to Track Respirator Use

In addition to information regarding barriers to respirator use, the focus group participants recommended that NIOSH visit job sites, observe respirator use, and meet with key personnel for the purpose of respirator use surveillance. The participants recommended that NIOSH periodically update respirator use information by contacting a variety of parties including trade associations, government organizations, insurance companies, safety organizations, and labor unions.

Comparing SSPC Focus Group and National Survey Findings

The NIOSH/SSPC focus groups were undertaken independently of the nationwide *Survey of Respirator Use and Practices*, and their findings were not intended for comparison. Also, the companies in the focus groups are classified under SIC 172 - *Painting and Paper Hanging* within SIC 17 *Construction—Special Trade Contractors*,[4] while the nationwide *Survey of Respirator Use and Practices* cannot report findings to the 3-digit SIC digit level. Still, when examining the findings of the two studies, there are interesting consistencies.

Of the top ten substances that prompt respirator use for the construction industry (SICs 15, 16, 17), as estimated by the nationwide *Survey of Respirator Use and Practices*, six were also reported by the focus group participants (carbon monoxide, hydrogen sulfide, lead, oxygen deficiency, paint vapors, and silica). Furthermore, the focus group participants reported a number of barriers to effective respirator use that are consistent with the high percentages of establishments with indicators of potentially inadequate respiratory protection programs among the *Special Trade Contractors*, as estimated by the nationwide *Survey of Respirator Use and Practices*. (See Table 2 and discussion above in the "Potential Respirator Program Inadequacies" section of this report.)

Where Do YOU Stand?

- Do you have a trained respirator program administrator?
- Do you have a written program for maintaining respirators?
- Do you fit test wearers of tight-fitting respirators?
- Do you assess employees' medical fitness to wear respirators?
- Do you have a written respirator program adopted by management to determine how respirators are used?
- Do you provide training regarding the need, use, limitations, and capabilities of respirators?
- Do you have written procedures to periodically evaluate the effectiveness of respirators used at your establishment?
- Are your airline respirator couplings incompatible with other gas systems at your establishment?
- Do you use the manufacturer user's instructions to adjust the airflow for airline respirators?
- Do you have a written change-out schedule for air-purifying gas/vapor filters?
- Do you use dust masks (filtering-facepiece respirators) only to protect against dusts, but not gases or vapors?

Unless you can answer "yes" to each of the above questions, you may need to do some work to improve your standing with respect to OSHA regulations.

Needed: Improved Respiratory Protection Programs

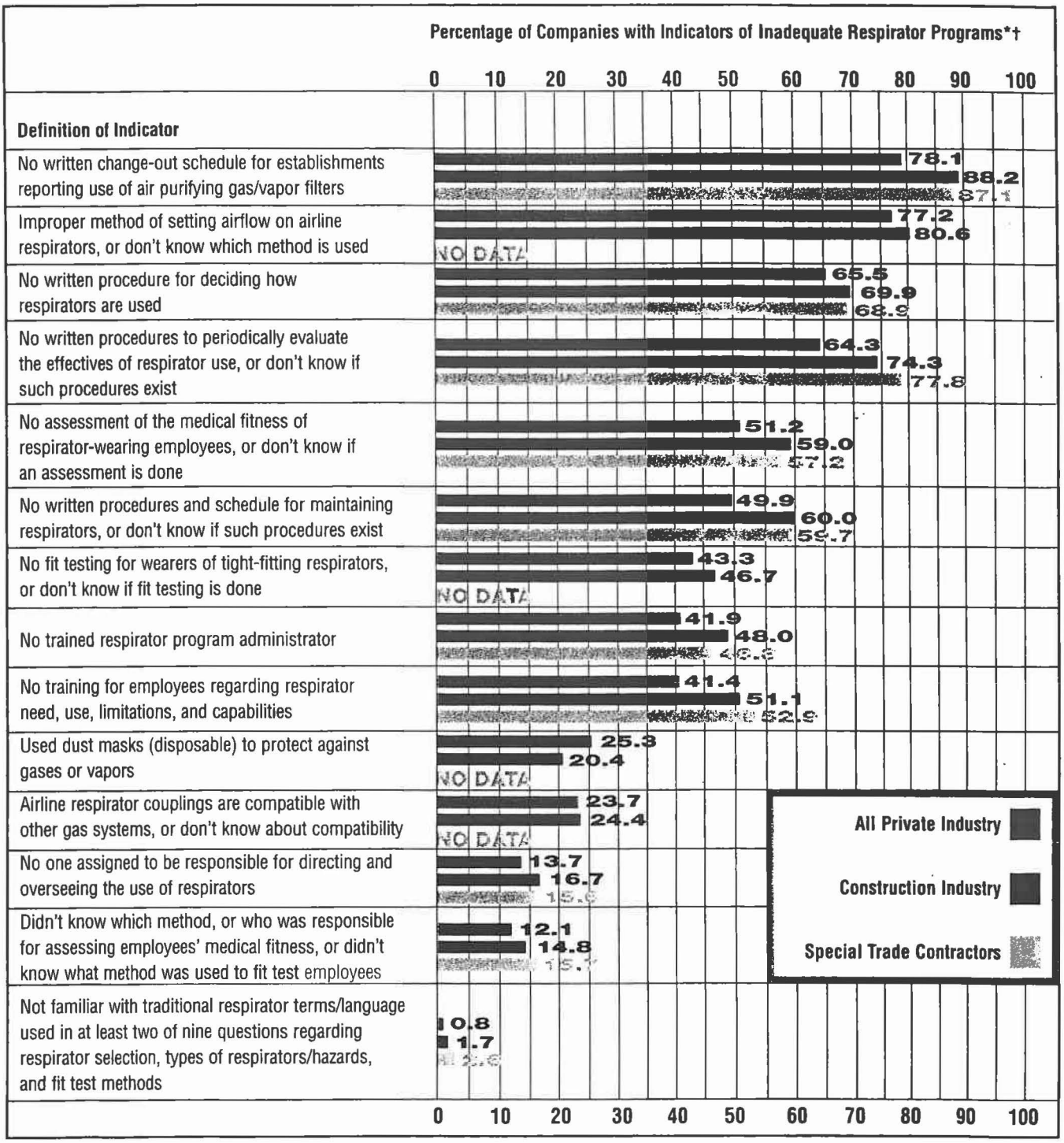
It is no surprise that respirators are used extensively among employees of SSPC contractor member companies, since the companies are frequently engaged in abrasive blasting and spray painting. The real question is whether the respirator use is as effective and as extensive as it should be. The survey data for *Special Trade Contractors*, in particular, indicates that there is a widespread need for improvement of respiratory protection programs. This conclusion is also evident in OSHA enforcement data.

From October 2002 through September 2003, *Special Trade Contractors* received the largest number of OSHA citations (552) of all industries for violations of the respiratory protection standard.[8] It is the obligation of all SSPC members to consider where their respiratory protection programs stand with respect to the OSHA requirements.

The real impact of inadequate respiratory protection is measured in part by the number of employees who are working at establishments with potentially inadequate programs. The nationwide survey data gathered by NIOSH and BLS indicate that approximately 26,000 establishments and 277,000 employees using respirators within the *Special Trade Contractors* industry have five or more indicators of a potentially inadequate respiratory protection program.

Clearly, there are problems that face SSPC member companies, as listed under "Focus Group Findings." Those problems present a challenge to the effective use of respirators and demand further work by all parties involved, including NIOSH. Those problems demand heightened vigilance of respirator use under the difficult circumstances of the construction workplace.

Table 2: Selected Indicators of Potentially Inadequate Respiratory Protection Programs with Percentage* Occurrence Among Respirator-Using Establishments in Private Industry, Construction Industry, and Special Trade Contractors (SIC 17)



* A higher percentage indicates that more establishments have the respective indicator of a potentially inadequate respiratory protection program. A lower percentage is better.

† "No data" means data gathered does not meet BLS publication guidelines and so is not presented here.

Source: Bureau of Labor Statistics, U.S. Department of Labor, Surveillance of Programs Using Respirators Database

Recommendations

Findings from the NIOSH/BLS Survey and from the Focus Groups indicate a clear need for better respiratory protection programs in the *Special Trade Contractors* industry group. Employers who suspect their respiratory protection program is in need of improvement should consider contacting OSHA's free confidential consultation service available for small businesses in every state. OSHA also has a "Small Entity Compliance Guide for the Respiratory Protection Standard" available at the OSHA web site: www.osha.gov. Another resource is the American Industrial Hygiene Association list of consultants at: www.aiha.org.

The focus group study indicates that both workers and employers need to be considered when developing respirator use interventions.

Additional work by organizations such as NIOSH, ANSI, OSHA, and respirator manufacturers is needed to do the following.

- Identify interventions that would assist employers, especially small businesses, and employees in improving the effectiveness of respirator use (for example, develop tools to educate both employers and employees about proper respirator use and programs to change the culture, where necessary, in the way respirators are used)
- Select and evaluate interventions that are tailored for specific workplaces
- Modify respirator designs to reduce applicable perceived barriers to respirator use previously listed

It should be noted that the findings and conclusions in this report are those of the authors and do not necessarily represent the views of the NIOSH.

References

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