

APPENDIX F

RESPIRATOR SELECTION SPECIFIC WORKSITE PROCEDURE

Respirators will be selected according to the following procedure:

1. SELECTION

Respirator selection involves reviewing each operation to (a) determine what hazards may be present (hazard determination) and (b) select which type or class of respirators can offer adequate protection.

2. HAZARD DETERMINATION STEPS

The nature of the hazard shall be determined as follows:

- a) If the potential for an oxygen-deficient environment exists, measure the oxygen content,
- b) Determine what contaminant(s) may be present in the workplace,
- c) Determine whether there is a published Threshold Limit Value, Permissible Exposure Limit, or any other available exposure limit or estimate of toxicity for the contaminant(s). Determine if the IDLH concentration for the contaminant is available,
- d) Determine if there is a comprehensive health standard (e.g. lead, asbestos) for the contaminant(s). If so, there may be specific respirators required that would influence the selection process,
- e) Determine the physical state of the contaminant. Determine if vapor pressure of the aerosol is significant at the maximum expected temperature of the work environment,
- f) Measure or estimate the concentration of the contaminant(s),
- g) Determine whether the contaminant(s) present can be absorbed through the skin, produce skin sensitization, or be irritating or corrosive to the eyes or skin,
- h) Determine for a gas or vapor contaminant(s) if a known odor, taste, or irritation concentration exists,

Determine for a gas or vapor contaminant(s):

If a chemical cartridge with an end-of-service-life indicator (ESLI) exists, or
If service life data exists for chemical cartridges that might be used.

3. SELECTION STEPS

The proper respirator shall be selected as follows:

- a) If there is an oxygen-deficient atmosphere, the type of respirator selected depends on the partial pressure (altitude) and concentration of oxygen and the concentration of the other contaminant(s) that may be present; go to (f) and 3.1.1 through 3.1.2;
- b) If unable to determine what potentially hazardous contaminant may be present, the atmosphere shall be considered IDLH; go to 3.1;

- c) If no exposure limit or guideline is available, and estimates of the toxicity cannot be made, the atmosphere shall be considered IDLH; go to 3.1;
- d) If the exposure level cannot be identified or reasonably estimated, the atmosphere shall be considered IDLH; go to 3.1;
- e) If a specific standard exists for the contaminant, consider those guidelines/requirements;
- f) If the measured or estimated concentration of the contaminant(s) is considered IDLH; go to 3.1;
- g) Divide the measured or estimated concentration of each contaminant by the exposure limit or guideline to obtain a hazard ratio. When two or more substances are present, consider if there is a synergistic or combined effect of exposure rather than considering each substance individually. Select a respirator from among those with an assigned protection factor greater than the value of the hazard ratio, as listed in Table 1. If an air-purifying respirator is under consideration, continue with (h);
- h) If the contaminant(s) is a gas or vapor only, go to (m).
- i) If the contaminant is an aerosol; and a specific regulation or regulatory policy does not require a NIOSH Class 100 filter, select a NIOSH Class 95 filter. Go to step (j);
- j) If the contaminant is an oil or oil mist is present in the air, or if the presence of oil is unknown, go to (k). If no oil is present, go to (l);
- k) If the filter will be used for more than 8 hours or for more than 200 mg of loading, select a respirator with a NIOSH Type P filter. If not, a respirator with either a NIOSH Type R or P filter is acceptable
- l) If no oil mist is present, select a respirator with either NIOSH Type N, R, or P filters;

Note: A powered air-purifying respirator with an appropriate APF and a high efficiency filter may be selected in lieu of particulate respirators selected using steps (i) through (l).

- m) If the contaminant is a gas or vapor, select an airline respirator unless:
 - 1) An air-purifying respirator with an end-of-service-life indicator for the contaminant is available or,
 - 2) A change schedule based on service life information or other objective data is implemented to ensure that canisters and cartridges are changed before the end of their service life.

3.1 SELECTION OF RESPIRATORS FOR ATMOSPHERES IMMEDIATELY DANGEROUS TO LIFE OR HEALTH, FOR USE IN CONFINED SPACES, OR REDUCED-PRESSURE ATMOSPHERES

3.1.1 RESPIRATORS FOR USE UNDER IDLH CONDITIONS AT NORMAL ATMOSPHERIC CONDITIONS

The required respiratory protection for IDLH conditions caused by the presence of toxic materials or a reduced percentage of oxygen as described in conditions (a), (b), or (c) in 3.1.2 is a:

- Positive-pressure SCBA (with a service of 30 min or more) or
- A combination of a supplied-air respirator with auxiliary SCBA. If the SCBA is 5, 10 or 15 min in service life, the airline mode must be used for entry into the atmosphere.

3.1.2 ATMOSPHERES IMMEDIATELY DANGEROUS TO LIFE OR HEALTH

A location is considered IDLH when:

- a) it is an atmosphere known or suspected to have concentrations above the IDLH level, or
- b) it is a confined space that contains less than the normal 20.9% oxygen, unless the source of the oxygen reduction is understood and controlled, or
- c) oxygen content is below 19.5%. Exception: If the employer demonstrates that under all foreseeable conditions, the oxygen concentration can be maintained within the ranges specified in the following table (i.e., for the altitudes set out in the table), then any atmosphere-supplying respirator (airline or SCBA) may be used.

Oxygen deficient atmospheres for which the employer may rely on any atmosphere-supplying respirators

Altitude (ft.)	(%O ₂)
< 3,001	16.0 - 19.5
3,001 - 4,000	16.4 - 19.5
4,001 - 5,000	17.1 - 19.5
5,001 - 6,000	17.8 - 19.5
6,001 - 7,000	18.5 - 19.5
7,001 - 8,000*	19.3 - 19.5

* Above 8,000 feet the exception does not apply. Oxygen enriched breathing air must be supplied above 14,000 feet.

TABLE 1 - ASSIGNED PROTECTION FACTORS FOR RESPIRATOR SELECTION

RESPIRATORY INLET COVERING

TYPE OF RESPIRATOR	Half Mask (1)	Full Facepiece
Air purifying	10	50
Atmosphere supplying		
SCBA (demand) (2)	10	50
Airline (demand)	10	50

RESPIRATORY INLET COVERING

TYPE OF RESPIRATOR	Half Mask	Full Face	Helmet/Hood	Loose-fitting Facepiece
Powered air purifying	50	1000(3)	1000(3)	25
Atmosphere supplying:				
• Airline-				
- pressure demand	50	1000	-	-
- continuous flow	50	1000	1000	25
• Self-contained breathing apparatus				
- pressure demand open/closed circuit	-	(4)	-	-

- (1) Includes quarter-masks, disposable half-masks, and half-masks with elastomeric face pieces.
- (2) Demand SCBA shall not be used for emergency situations such as fire fighting.
- (3) Protection factors listed are for high-efficiency filters and sorbents (cartridges and canisters). With dust filters, an assigned protection factor of 100 is to be used due to the limitations of the filter.
- (4) Although positive-pressure respirators are currently regarded as providing the highest level of respiratory protection, a limited number of recent simulated workplace studies concluded that all users may not achieve protection factors of 10,000. Based on this limited data, a definitive assigned protection factor could not be listed for positive-pressure SCBAs. For emergency planning purposes, where hazardous concentrations can be estimated, an assigned protection factor of no higher than 10,000 should be used.

NOTE: Assigned protection factors are not applicable for escape respirators. For combination respirators, e.g. airline respirators equipped with an air-purifying filter, the mode of operation in use will dictate the assigned protection factor to be applied.