Respiratory Protection Program

I. Purpose

The purpose of this program is to follow the regulations regarding the use of respirators at Montana Tech as stated in the Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.134. See Appendix A for definitions.

II. General

A. The respective departments at Montana Tech shall provide respirators when deemed necessary to protect the health of the employee. Employee protection through the use of engineering controls, well designed work practices, the substitution of lower-toxicity materials, or some combination of these shall be emphasized before respirator usage.

B. Respirator use will be required only after the respective department and the Environmental, Health & Safety (EHS) office has determined that no other control method is feasible. See Appendix B for the Hazard Assessment Form. If an employee dons a respirator, the respective department is responsible for compliance with all components of the Respiratory Protection Program and will bear the associated costs.

C. All personnel required to wear a respirator must pass an initial medical evaluation prior to using a respirator. The EHS office will coordinate the evaluations, with the respective departments covering the cost for the medical evaluation. See Appendix C for information on the medical evaluation.

D. Employees must comply with the requirements of the Respiratory Protection Program. Employees are responsible for proper use and maintenance of respirators in accordance with training received. Refer to Section IV on Training and Appendix D on Care and Maintenance of Respirators. See Appendix E on Respirator Selection.

E. Training and fit testing for respirator use will be conducted annually or as necessary by the EHS office. See Appendix F for Fitting a Respirator and Procedures.

F. EHS office is responsible for implementation, training, and record keeping for

this program.

III. Availability of Respirators

A. Respirators must be supplied by the respective departments at no cost to the employee. The department may decide whether to issue each employee his/her own respirator or to issue on an "as needed basis" with the respirators returned after the task is completed.

B. The departmental PI/contact is responsible for respiratory program oversight in their respective departments, and will ensure, through coordination/consultation with EHS, that the appropriate respirators and cartridges are issued to employees.

IV. Training of Employees

A. Prior to fit testing, each employee who will be issued a respirator will be trained by the EHS office in the proper use and maintenance of the respirator. Training shall be administered at least annually or as necessary.

B. Employee training may be somewhat different for each respirator user depending on the hazard, but all training will include the following information:

1. The need for respiratory protection and how improper fit, usage, or maintenance can compromise the protective effect of the respirator;
2. An explanation of why engineering controls are not being applied or are not adequate and what effort is being made to reduce or eliminate the need for respirators;
3. An explanation of why a particular type of respirator has been selected for a specific respiratory hazard;
4. An explanation of the operation, capabilities and limitations of the respirator selected;
5. The nature, extent, and effects of respiratory hazards in the workplace;
6. How to inspect and don the respirator and check the seals. This includes a requirement that a fit check shall be done each time the respirator is donned or adjusted (positive and negative pressure test);
7. How to maintain and store the respirator;
8. How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions;

9. How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators; and
10. The general requirements of the regulations.

V. Record Keeping

The following records must be maintained for the Respiratory Protection Program. The records will be kept in the EHS Office; confidentiality will be maintained.

A. Completed medical clearance document
B. Employee respirator fit testing records
C. Employee training records
D. The specific types and models of respirators in use at the facility

VI. Respirator Program Evaluation

A. The EHS office will monitor the effectiveness of this program.
B. Appropriate changes to the Respiratory Protection Program will be made as necessary.

Reviewed: 2024

Appendix A: Definitions

Air purifying respirator – a respirator which is designed to remove air contaminants (i.e. dust, fumes, mists, gases, vapors, or aerosols) from the ambient air or air surrounding the respirator

Assigned protection factor (APF) – the number assigned by NIOSH to indicate the capability of a respirator to afford a certain degree of protection in terms of fit and filter/cartridge penetration

Cartridge – the element of a gas and vapor or particulate air-purifying respirator which contains the sorbent, filter and /or catalyst which removed specific contaminates from air drawn through it

Employee exposure – exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection

Negative pressure respirator – a respirator in which the air pressure inside the face piece is positive during exhalation in relation to the outside air pressure, and negative during inhalation in relation to the outside air pressure

Positive pressure respirator – an atmosphere-supplying respirator which is designed so that air pressure inside the face piece is positive in relation to the outside air pressure during inhalation and exhalation

Qualitative fit test – an assessment of the adequacy of respirator fit by determining whether or not an individual wearing the respirator can detect the odor, taste, or irritation of a contaminant introduced into the vicinity of the wearer's head

Appendix B: Hazard Assessment

As required by 29 CFR 1910.134, the following must be included in a hazard assessment to determine the appropriate respiratory protection:

- The nature of the hazard
- The physical and chemical properties of the air contaminant
- The adverse health effects of the respiratory hazards
- The relevant hazardous exposure level
- The results of workplace sampling of airborne concentrations of contaminants
- The nature of the work operation or process
- The period of time respiratory protection will be worn by employees during the work shift
- The work activities of the employees and the potential stress of these work conditions on employees wearing the respirators
- Fit test results
- Warning properties of the hazardous chemical
- The physical characteristics, functional capabilities, and limitations of the various types of respirators

Form on following page.

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Employee Name:	Department:

1. What hazard is present that would require the use of a respirator?

2. What are the physical and chemical properties of the contaminant?
   a. Appearance/state: (i.e. liquid, solid, color, etc.):
   b. Odor threshold: c. Flash point:
   d. Explosion limits: e. Specific gravity:
   f. Vapor pressure: g. Vapor density:

3. What is the warning sign(s) of this contaminant (i.e. eye irritation, smell, etc.?)

4. What is the potential health effect from exposure to this contaminant?
   a. Acute:
   b. Chronic:
   c. Target organs:

5. What are the exposure limits for this contaminant?
   OSHA PEL: TLV:

6. Results of air sampling for this contaminant (if applicable):

7. What is the nature of the process or operation that requires the use of a respirator?

8. How long will the employee be required to use the respirator during the work shift?

9. What type of work activity(ies) will the employee be engaged in while wearing the respirator?

10. What are potential stressors from these work activity(ies) (i.e. heat stress, cold stress, etc.?)

11. Has employee been fit tested? ☐ Yes ☐ No

12. What type(s) of respirator(s) is the employee allowed to wear based on fit testing?

13. Bases on the above information, what type(s) of respirator(s) can the employee wear to protect themselves from the identified hazard?

Appendix C: Medical Evaluation

A. Using a respirator may place a physiological burden on employees. The burden will vary with the type of respirator worn, the job, and workplace conditions in which the respirator is used, and the medical status of the employee. The respective departments at Montana Tech shall provide for a medical evaluation to determine the employee's ability to use a respirator before the employee is fit tested or required to use the respirator in the workplace. EHS will assist the departments in providing for the required medical evaluations. Montana Tech may discontinue an employee's medical evaluation when the employee is no longer required to use a respirator.

B. Montana Tech shall identify a licensed health care professional (LHCP) to perform medical evaluations using the medical questionnaire. If an employee's initial medical evaluation demonstrates the need for a follow-up medical examination, the respective department at Montana Tech shall ensure a follow-up medical examination is provided. The follow-up medical examination shall include any medical tests, consultations, or diagnostic procedures the LHCP deems necessary to make a final determination.

C. The EHS office of Montana Tech shall obtain a written recommendation from the LHCP regarding the employee's ability to use the respirator. This will include any limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used. It will also include the need, if any, for follow-up medical evaluations.

D. This medical evaluation will be provided before the employee is fit tested or dons a respirator. The respective departments at Montana Tech shall provide additional medical evaluations under the following conditions:
    a. An employee reports medical signs or symptoms that are related to the ability to use a respirator;
    b. The LHCP, supervisor, or respiratory program administrator indicates the employee needs to be re-evaluated;
    c. Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicated a need for employee re-evaluation; or
    d. A change in workplace conditions that may result in a substantial increase in the physiological burden placed on an employee.

E. Records of all medical clearances for respirator use shall become a part of the employee's respirator file kept in the EHS office. These records are confidential, and will be maintained for at least 30 years after the employee's termination in accordance with 29 Code of Federal Regulations (CFR) 1910.20(d)(1)(l). The medical questionnaire and the results of any medical exams will be maintained by the medical facility. If the medical facility performing the medical evaluations changes, the records shall be transferred to the new facility.

Appendix D: Care and Maintenance of Respirators

A. The employee is responsible for the cleanliness and maintenance of his/her own respirator, and will ensure that it is ready for use when needed.
B. All equipment must be inspected by the employee before and after each use. Respirators will be inspected for the following:
    a. Tightness of connections
    b. Conditions of face piece
    c. Condition of head bands
    d. Condition of cartridges
    e. Condition of valves
    f. Pliability of rubber or elastomer parts
    g. Deterioration of rubber or elastomer parts
C. Any problems with the respirator should be reported to the employee's immediate supervisor.
D. Routinely used respirators issued for the exclusive use of an employee shall be cleaned and disinfected as often as necessary to be maintained in a sanitary condition. Routinely used respirators issued to more than one employee shall be cleaned and disinfected after each use. To clean and disinfect, carry out the following procedures:
    a. Remove the air purifying elements (cartridges, filters) from the respirator. They should never be washed and disinfected.
    b. Immerse the respirator in a warm (110°F (43°C) maximum) aqueous solution with a mild detergent or cleaner recommended by manufacturer. The respirator face piece and parts may be scrubbed gently with a soft brush.
    c. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two (2) minutes in one of the following ways:
        i. A solution of approximately one (1) milliliter (mL) of laundry bleach to one (1) liter (L) of water at 110°F; or
        ii. A solution of approximately 0.8 mL of tincture of iodine (50 parts per million (ppm) iodine) to one (1) L of water at 110°F.
    d. After washing, rinse thoroughly with warm water (110°F) and allow to air dry or dry with clean, lintless cloth.
    e. After the respirator is completely dry, inspect for defects, attach the air purifying element, and store in a clean plastic bag, a container with a lid, etc.

f. Do not hang respirators on the wall; always store in plastic bag or container. The face piece and exhalation valve must be in a normal position to prevent abnormal set of elastomer parts. All respirators shall be stored in a manner that protects them from damage, dust, sunlight, extreme temperatures, excessive moisture, or damaging chemicals.
g. If any part of the respirator is unacceptable, replace that part or the entire respirator before use.

Appendix E: Respirator Selection

A. Respirators shall be selected following a hazard assessment conducted jointly by EHS and the respective department. See Appendix B for hazard assessment requirements.
B. Only NIOSH/MSHA approved respirators have been chosen for use in this program. EHS and the respective department together will determine which respirator is appropriate for each situation.
C. Where elastomeric face piece respirators are to be used, Montana Tech shall provide a sufficient selection of respirators so the respirator is acceptable to, and correctly fits, the user.
D. The concentration of any contaminant must not exceed the respirator's maximum use concentration (MUC.) The MUC is calculated by multiplying the respirator's assigned protection factor (APF) by the OSHA permissible exposure limit (PEL) for the contaminant in question; therefore, MUC = APF x PEL. See below for assigned protection factors.
E. Air purifying high efficiency respirators and disposable dust/mist masks have the following limitations that must be taken into consideration when selecting a respirator:
    a. Cannot be used in oxygen deficient areas (less than 19.5% oxygen by volume);
    b. Cannot be used in immediately dangerous to life or health (IDLH) concentrations;
    c. Cannot be used for protection against gases and vapors with poor warning properties unless equipped with an end-of-service life indicator;
    d. Half-face respirators offer no eye protection and may require the use of safety goggles or a full-face respirator.
F. Unless properly trained and fit tested, Montana Tech employees shall not don a supplied air respirator. When dangerous atmospheres are encountered in normal operations or in emergencies, the fire department or other appropriate personnel shall be called to respond.
G. If a properly trained Montana Tech employee dons a supplied air respirator:
    a. Breathing air quality shall meet the requirements of specification for Grade D as described in Compressed Gas Association Commodity Specification G-7.1-1989.
    b. In IDLH or oxygen-deficient areas, at least one additional person must be present as a standby. This person must have communication (visual, voice, or signal line) with workers at all times.

Table 1: Assigned Protection Factors				
Type of Respirator[1, 2]	Half-face Includes disposable half mask, ¼ mask, & half mask with elastomeric face pieces	Full-face	Helmet/Hood	Loose-fitting face piece
Air purifying (APR)	10	50	-	-
Supplied-Air Demand Mode Continuous flow mode Pressure Demand	 10 50 50	 50 1,000 1,000	 - 25/1,000[3] -	 - 25 -
SCBA Demand mode Pressure-demand mode	 10 -	 50 10,000	 50 10,000	 - -

[1] Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.

[2] The assigned protection factors in Table 1 are only effective when the employer implements a continuing, effective respirator program as required by this section (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.

[3] The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.

Appendix F: Fitting a Respirator and Procedures

A. Proper fitting of respirators is essential of employees are to receive the protection for which this program is designed. Each employee required to wear a respirator will be fit-tested by EHS.
    a. If a quantitative fit test is used, a fit factor that is at least 10 times greater than the assigned protection factor of a negative-pressure respirator shall be obtained before that respirator is assigned to an individual (i.e. for a half-mask negative pressure respirator, a fit factor of 100 (APF 10 x 10) is required.)
    b. If a qualitative test is used, only validated protocols will be used.
    c. A respirator fit test will be carried out for each wearer prior to initial use and at least once every twelve months thereafter.
    d. These tests shall be documented.
    e. Fit test records shall be retained until the next fit test is administered.
    f. Fit testing will be done while the employee is wearing any protective equipment, such as safety glasses, goggles, face shield, welding helmet, etc., that will be worn during work activities and could interfere with the fit.
B. In order to ensure a good face seal each time a respirator is worn, the following must be observed:
    a. The respirator and straps must be in place and worn in the appropriate position. To adjust head bands, pull the free ends tight until a comfortable fit is obtained. All straps shall be secure. The respirator should not be over tightened so as to be uncomfortable on the face.
    b. To adjust face piece properly, simply position chin firmly in cup and manually shift mask until the most comfortable position is located. Make final adjustments in the head band and do not break the nasal seal.
    c. Facial hair must not interfere with the face seal, since proper fit cannot be assured. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, or long sideburns which cross the respirator sealing surface. Other conditions that may prevent adequate face-to=face piece seal include absence of one or both dentures, or temple bars on glasses (when wearing full face respirators.)
    d. Proper fit must be checked each time the respirator is worn. This is accomplished by performing a negative and positive fit check as described in the next section.

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Fit Testing Procedures

Definitions:

Approved respirator: a respirator that has been tested and found to meet minimum performance standards set by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH.)

Chamber: Non-ventilated enclosure area (hood) placed over the employee's head to perform the fit testing.

Clean shaven: no facial hair is allowed between the face and the sealing surface of the respirator or facial hair that interferes with the value of the respirator.

Negative-pressure test: a test of the deal of a respirator facepiece to a subject's face that is performed both prior to the fit-test and prior to use of the respirator in the working environment. To perform the negative-pressure test, the subject should cover the filter cartridges with his/her hands or with plastic film and inhale. The mask should collapse against the subject's face and remain collapsed for 10 seconds.

Positive-pressure test: a test of the seal of a respirator facepiece to a subject's face that is performed both prior to the fit-test and prior to the use of the respirator in the working environment. To perform a positive-pressure test, the subject should cover the exhalation valve and exhale; a slight pressure buildup should be felt inside the mask with no evidence of outward leakage.

Sampling Equipment:

Depending on whether one is doing a qualitative or quantitative fit test, the following equipment may be used:

- Approved negative pressure respirator
- Organic vapor cartridges (for isoamyl test)
- HEPA cartridges (for irritant smoke test)
- Isopropyl alcohol
- Isoamyl acetate (IAA)
- Irritant smoke tube
- Chamber
- Portacount for quantitative fit-test

Procedure:

A. Medical approval must be on file as described in Section II of the written program, before fit testing can proceed.
B. Respirator fitting: the individual and/or the department, with input from EHS if requested, will select the most comfortable and appropriate respirator. Personal assessment includes:
    - Chin properly placed
    - Position of mask on nose
    - Strap tension
    - Fit across nose bridge
    - Room for safety glasses
    - Distance from nose to chin
    - Room to talk
    - Tendency to slip
    - Cheeks filled out
    - Self-observation in mirror
    - Adequate time for assessment
C. The employee must perform positive and negative pressure fit checks prior to fit testing and prior to each use.
D. The employee must wear the respirator and cartridges for 10 minutes before entering the chamber if using isoamyl acetate or saccharin.
E. When using isoamyl acetate, the ampule shall be broken and placed in the chamber for two (2) minutes prior to beginning test exercise.
F. When using irritant smoke, break both ends of the tube, and attach the tube to the bulb, or break the ampule in the center of the tube, depending on which device is being used. Before administering the test, a sensitivity check must be done by administering one puff no closer than three (3) feet and have employee waft the smoke to themselves. Advise the employee that the smoke can be irritating to the eyes, and instruct the employee to keep his/her eyes closed during the test.
G. The following exercises shall be sequentially performed for both isoamyl and irritant smoke:
    - Breathing normal
    - Breathing deep and regular
    - Turing head side-to-side
    - Nodding head up and down
    - Talking aloud (read Rainbow Passage)

- Jog in place
- Touch toes
- Breath normal again

H. If at any time during the test the employee detects the banana-like odor if IAA or smells or tastes irritant smoke, the employee shall quickly exit the test area to avoid olfactory fatigue.

I. If a person cannot be fitted with the half-mask respirator, recheck the fit or try a different size, or if necessary, include a full facepiece model in the selection process.

J. Persons who have successfully passed this fit test may be assigned the use of the tested respirator in atmospheres with up to 10 times the PEL of airborne contaminants.