I. **Accepted Fit Test Protocols**

The Program Administrator, or qualified designee, shall complete fit testing in accordance with the OSHA-accepted fit testing procedures described in the Wyoming Department of Workforce Services, Chapter 9, Subpart I, 1910.134, Appendix A.

The test subject shall be offered a respirator from a sufficient number of respirator models and sizes so that it is acceptable to, and correctly fits the user.

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

The test subject will be presented with a respirator to try. Each respirator represents a different size and shape, and multiple respirators might be tried before selecting one to proceed with fit testing. If fitted and used properly, the chosen respirator will provide adequate protection.

Each respirator tried and deemed inadequate will be cleaned after each subject.

The most comfortable respirator will be donned and fit testing will commence. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the respirator several times and to adjust the straps each time to become adept at setting proper tension on the straps.

Assessment of comfort shall include a review of the following points with the test subject, allowing him/her adequate time to determine the comfort of the respirator:

- Position of the respirator on the nose;
- Room for eye protection;
- Room to talk; and
- Respirator position on face and cheeks.

The following criteria shall be used to help determine the adequacy of the respirator fit:

- Chin properly placed;
- Adequate strap tension (not overly tightened);
- Fit across bridge of nose;
- Of proper size to span distance from nose to chin;
- Tendency of respirator to slip; and
- Self-observation in mirror to evaluate fit and respirator position.

The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in Appendix D of this document, or those recommended by the respirator manufacturer which provide equivalent protection. Another face piece shall be selected and retested if the test subject fails the user seal check tests.
Respiratory Protection

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

If the test subject exhibits difficulty breathing during the tests, he/she shall be referred back to the physician or other licensed health care professional (PLHCP), as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties. A respirator will not be issued until medical approval has been obtained.

If the test subject finds the fit of the respirator unacceptable, he/she shall be given the opportunity to select a different respirator and to be retested.

Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject’s responsibilities during the test procedure. The description of the process shall include an explanation of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least five minutes before the start of the fit test.

Test subjects must perform the following test exercises for all fit testing methods, both qualitative and quantitative. The test conductor must ensure that test subjects perform the exercises correctly in an appropriate environment in the following manner:

**Normal breathing:** In a normal standing/sitting position, without talking, the subject shall breathe normally.

**Deep breathing:** In a normal sitting or standing position, the subject shall breathe slowly and deeply, without talking, taking caution so as not to hyperventilate.

**Turning head side to side:** Sitting down or standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale on each side.

**Moving head up and down:** Sitting or standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in both up and down positions (i.e., when looking toward the ceiling).

**Talking:** The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor by reading a provided poem. The subject can read from a prepared text, count backward from 100, or recite a memorized poem or song.

Rainbow Passage

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

**Bending at the waist:** From a normal standing position, test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.

**Normal breathing:** Subject will return to sitting position and, without talking, resume normal breathing.

Each test exercise shall be performed for one minute. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the fit test. If at any time it has become unacceptable,
another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

II. Qualitative Fit Test (QLFT) Protocols

UW shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order prior to use. UW shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

A. Bitrex™ (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol

The Bitrex (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

Bitrex Solution Taste Threshold Screening Procedure

The Bitrex taste threshold screening, performed without wearing a respirator, is intended to determine whether the test subject can detect the bitter taste of Bitrex. During taste threshold screening, as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly is adequate. The test enclosure shall have a ¾-inch (1.9 cm) hole in front of the test subject’s nose and mouth area to accommodate the nebulizer nozzle.

1. The test subject may not eat, drink (except plain water), smoke or chew gum for at least 15 minutes prior to both the taste threshold screening procedure or the fit testing procedure. If test subject consumes anything sweet before the screening or fit test, it may affect his/her ability to taste the Bitrex testing solution.

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

3. Using a DeVilbiss Model 40 Inhalation Medication Nebulizer, or equivalent, the test conductor shall spray the taste threshold check solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

4. The threshold check solution is prepared by adding 13.5 mg of Bitrex to 100 mL of 5% salt (NaCl) solution in distilled water. To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.

5. An initial 10 squeezes are repeated rapidly and then the test subject is asked whether the Bitrex can be tasted. If the test subject reports tasting the bitter taste during the 10 squeezes, the screening test is completed.

6. If the first response is negative, 10 more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the second set of 10 squeezes, the screening test is completed.
7. If the second response is negative, 10 more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the third set of 10 squeezes, the screening test is completed.

8. The test conductor will take note of the number of squeezes required to solicit a taste response. If the Bitrex is not tasted after 30 squeezes, the test subject is unable to taste Bitrex and may not perform the Bitrex fit test.

9. If a taste response is elicited, the test subject shall be asked to take note of the taste for reference during the fit test.

10. Correct use of the nebulizer means that approximately 1 mL of liquid is used at a time in the nebulizer body. The nebulizer shall be thoroughly rinsed in water, shaken to dry and refilled at least each morning and afternoon or at least every four hours.

Bitrex Solution Aerosol Fit Test Procedure

1. The test subject shall don the same enclosure while wearing the respirator selected. The respirator shall be properly adjusted and equipped with any type particulate filter(s).

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

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

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

5. The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test. A minimum of 10 squeezes is required. After generating the aerosol, the test subject shall be instructed to perform the fit test exercises outlined previously in this Appendix.

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

7. If the taste of Bitrex is detected, the respirator fit is deemed unsatisfactory and the fit test is failed. A different make, model or size of respirator shall be tried and the entire testing procedure is repeated (both taste threshold screening and fit testing).
Respiratory Protection

III. Quantitative Fit Test (QNFT) Protocols

A. PortaCount Fit Test Procedure

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

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

3. The following conditions for the adequacy of the respirator fit shall be checked:
   a. Chin properly placed;
   b. Adequate strap tension – not overly tightened;
   c. Fit across bridge of nose;
   d. Of proper size to span distance from nose to chin;
   e. Tendency of the respirator to slip; and
   f. Self-observation in a mirror to evaluate fit and respirator position.

4. The test subject shall then perform a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting face piece, another size of the same model respirator, or another make, model, or size respirator should be tried.

5. Follow the manufacturer’s instructions for operating the PortaCount and proceed with the fit test. These instructions include:
   a. Setting up test equipment as outlined in the PortaCount manual. Conduct daily checks to insure PortaCount is working. Attach PortaCount sampling device to respirator (an adapter is available). Attach HEPA filters to respirator.
   b. Having test subject don respirator and perform user seal checks.

6. Perform daily checks on the PortaCount while you explain the following:
   a. What the daily checks are for;
   b. What the fit test procedures are and time duration for each;
   c. The fit factor is required for their particular respirator.

7. If daily checks are passed, begin fit test exercises as previously detailed in this Appendix.
   a. Normal breathing (60 seconds)
   b. Deep breathing (60 seconds)
   c. Turning head side to side (60 seconds)
   d. Moving head up and down (60 seconds)
   e. Talking (Rainbow passage - 60 seconds)
   f. Bending over or jogging in place (60 seconds)
   g. Grimace (30 seconds)
h. Normal breathing (60 seconds)

8. Upon completion of the fit test, the PortaCount calculates individual fit factors from each exercise and then averages each fit factor to determine the overall fit factor.

9. A fit test report is then generated by the PortaCount and shall be signed by both the test subject and the test conductor. A copy of the fit test report shall be provided to the employee and their Supervisor. The Program Administrator shall also retain a copy.