RESPIRATORY PROTECTIVE PROGRAM

GENERAL

The intent of this written program is to define the company rules now in effect regarding the use of respirator masks for personal protection against airborne contaminants.

The regulations contained herein are not optional for the employee. The company considers this policy mandatory and a condition of employment for each individual.

Program Administrator

Marc Rickert, Company Project Manager, is the Administrator of the Company Respirator Program. He shall make an appraisal of the effectiveness of the Respirator Program at least annually and take appropriate measures to correct any deficiencies.

Limitations for Respirator Wearers

Before performing work requiring the use of a respirator, the employee shall be required to take a physical exam, including bioassay, and obtain a qualified doctor's determination that he/she is physiologically and psychologically able to perform the work while using the appropriate type of respirator. Physical exams shall be repeated annually to confirm continued suitability to work with a respirator.

Availability of Respirators

Each employee that requires a respirator will be issued one at the company's expense with replacement parts, cartridges and filters upon request.

Use of Respirators

Each employee shall wear an approved respirator, properly fitted at all times when there is a possibility of exposure to airborne contaminants.

Selection of Respirators

Only NIOSH/MSA approved respirators have been chosen for use in this program. The choice between these respirators is dependent upon the airborne contaminant present, the HAZARDOUS operations performed, and on the basis of comfort and ease of obtaining a proper individual fit. (Refer to charts at the back of this program.) The company will provide these respirators, maintaining a supply in the NWAS shop. The useful life of each respirator will depend mainly on the employee's job duties and the actual time the unit is in use. Approved respirators shall not be modified by any Company personnel.

In general, respirator selection is based on using the highest protection available until air-monitoring data shows that a lesser respirator may be used.

Through historical data, we have established the following respirator selection criteria for asbestos abatement work only:

1. Preparation and final cleanup – half face dual cartridge HEPA filter
2. Glove bag operations – PAPR Powered Air Purifying Respirator
3. Non-friable materials – half face dual cartridge HEPA filter
4. Friable materials other than pipe lagging, done in negative air isolation – full face continuous flow airline respirators with HEPA filter escape or bottled air backup as per contract requirements.

Respirators used by NWAS Inc.:

1. Half face – North 7700
2. Full Face – North 7600
3. PAPR – RACAL 3M – Powered Air Purifying Respirators

Training of Employees

Each respirator user will be shown and trained how to use and maintain the respirator based on this respirator use and maintenance program.

Employee's proof of the training and instruction received shall consist of the following, in addition to the training and instruction received, the respirator user must have read, understand and be able to apply the contents of this respirator program in daily use, care and safekeeping of the said respirator.

To ensure the availability of this respirator program at all times, copies of the same shall be distributed as follows:

1. 1 copy – to be posted on the shop bulletin board
2. 1 copy – to be kept in the office file
3. 1 copy – to be given to respirator user

Monitoring Respirator Use and Evaluation Hazard

Project supervisory personnel shall periodically monitor the use of respirators to ensure that they are worn properly.

The project supervisor shall be responsible for appropriate surveillance of work area conditions and degree of employee exposure or stress, and use appropriate air-monitoring protocol to assure proper respirator protection on a continuous basis.

Fitting of Respirators

Proper fitting of respirators is essential if employees are to receive the protection for which this program is designed. Air that passes around the edges of the respirator, rather than through it, is not filtered air. In order to ensure a good face seal, the following rules must be observed:

1. The respirator and straps must be in place and worn in the appropriate position. To adjust headbands, pull the free ends tight until a comfortable fit is obtained. All straps shall be secure.
2. To adjust the face piece properly, simply position chin firmly in the chin cup and manually shift rubber mask until the most comfortable position is located. Make final adjustments in the headband and do not break the nasal seal. Modification to the respirator or straps shall not be made.
3. Proper fit must be checked each time that the respirator is worn according to the manufacturer's instructions. Respirators shall not be worn when projections under the face piece prevent a good face seal.

Note: Such conditions are growth of beard, sideburns, and temple piece of glasses or skullcaps that project under the face piece. Contact lenses will not be allowed when using irritant fume tests for half face respirators due to the increased risk of eye damage.

4. The fitted respirator will be fit tested using irritant fume tests for half face respirators and quantitative fit tests will be performed for full face respirators.

Maintenance of Respirators

Respirators should be inspected for proper operation before each use, cleaned after each day's use, and placed in the container provided for this purpose. Each respirator stored for emergency use or rescue shall be inspected at least once a month.

At the end of each week (or more often, if needed), respirators in continuous use, should be completely cleaned and disinfected. By carrying out the following procedures:

1. Remove the air-purifying elements from the respirator. Air-purifying elements must never be washed and disinfected.
2. Immerse the respirator in a warm (140°-160°) aqueous solution of a germicidal detergent. The respirator face piece and parts may be scrubbed gently with a cloth or soft brush. Make sure that all foreign matter is removed from all surfaces of the rubber exhalation valve flap and plastic exhalation valve seats.
3. After washing and disinfecting the respirator, rinse the same with clean, warm (140°-160°) water and then allow the respirator to dry.
4. After the respirator is dry, attach the air-purifying elements.
5. Store the respirator in the container provided for the purpose.

Any malfunctioning respirator shall be turned in for repair.

After normal use, respirator shall not be hung on nails on the wall, but must be stored in provided container to protect against dust, sunlight excessive heat, extreme cold, excessive moisture, damaging chemicals and physical damage.

After inspection, cleaning and necessary repair, or after each day's use, the respirator shall be stored in the container provided for the purpose. In storing the respirator, the face piece and exhalation valve must be in a normal position so as to prevent the abnormal set of elastomer parts during storage.

Each worker assigned to use a respirator shall maintain and routinely inspect it before and after each use. Respirator will be inspected monthly by the job foreman to assure that it is kept clean and in satisfactory working condition.

Respirator inspection shall include:

1. Tightness of connections
2. Condition of face piece
3. Condition of headbands
4. Condition of cartridges
5. Condition of valves
6. Rubber or elastomer for pliability
7. Rubber or elastomer for deterioration

Note: Stretching and manipulating rubber or elastomer parts with a messaging action will keep them pliable and flexible and prevent them from taking a set during storage.

Worn out parts should be replaced immediately.

Using a respirator isn't a matter of just slipping the device over the face and breathing.

It's a critical piece of equipment, designed to keep lethal gases and fibers out of your lungs. You can help a respirator protect your respiratory system by:

- inspecting the respirator properly each time you intend to wear it
- changing the filters or cartridges if they have been used
- checking the fit on your face to assure that the respirator has a chance to work properly
- following an appropriate use procedure carefully

Possible Hazards – air-line Respirators

Air-supplied respirators that are supplied by oil lubricated compressors can malfunction and send carbon monoxide gasses into the airflow. These systems must have a carbon monoxide alarm to warn users. Carbon monoxide displaces oxygen in the blood, providing less oxygen to the coronary arteries -- for this reason a person with ischemic heart disease, angina or a history of heart attack should not use these types of respiratory systems.

RESPIRATORY PROTECTIVE EQUIPMENT

It is essential that respiratory protective equipment be properly fitted to the employee when it is issued. All the care that went into the design and manufacture of a respirator to maximize protection will not protect the wearer fully if there is an improper match between face piece and wearer, or improper wearing practices.

Type of Fitting-Tests

There are two types of fitting-tests: qualitative and quantitative tests. Qualitative tests are fast usually simple, but not as accurate an indicator of improper fit as the quantitative test. Quantitative fit tests are required for all full face respirators.

Two other qualitative fit-checks, the positive pressure fit-check and the negative pressure fit-check, can be used as a quick check of the fit of the respirator face piece before beginning or during work in the hazardous atmosphere. These tests are not a substitute for thorough qualitative or quantitative fit testing.

Frequency of Fitting-Tests

Fitting-tests should be repeated at appropriate intervals, particularly when there is a change in the wearer's physical status -- such as growth of facial hair or change in face contours. Formal fit tests shall be repeated at least every year as a minimum.

Special Problems in Respirator Fitting:

Facial hair lying between the sealing surface of a respirator face piece and the wearer's skin will prevent a good seal. Items such as beards and sideburns can prevent satisfactory sealing. The sealing problem is especially critical when non-powered air-purifying respirators are used. The negative pressure developed in the face piece of these respirators during inhalation can lead to leakage of contaminant into the face piece when there is a poor seal. Some atmosphere supplying respirators of the air-line type, due to their mode of operation, can also lead to leakage at the sealing surface. Therefore, individuals who have stubble (even a days growth may permit excessive leakage of contaminant), a mustache, sideburns or a beard that passes between the skin and the sealing surface will not be allowed to wear a respirator.

Corrective lenses that have temple bars or straps must not be used when a full-face piece respirator is worn since the bars or straps could pass through the face piece to face seal. Manufacturers of

respiratory protective equipment can provide kits for installing eyeglasses in their respirator face pieces. These glasses or lenses must be mounted by a qualified individual to ensure proper fitting.

Contact lenses should not be worn while wearing a respirator, especially in a highly contaminated atmosphere. A properly fitted respirator (primarily a full-face piece respirator) may stretch the skin around the eyes, thus increasing the possibility that the contact lens will fall out. Also, contaminants may get underneath the contact lens and cause severe discomfort. The user's first reaction would be to remove the face piece to remedy the situation -- which could be fatal in a lethal environment.

Respirator Fit-Tests

The proper fitting of respiratory protective equipment requires the use of some type of fit-test. The fit test is needed to determine a proper match between the face piece of the respirator and face of the wearer.

Test Atmospheres:

Regulations require that the user be allowed to test the face piece to face seal of the respirator and wear it in the test atmosphere. The test atmosphere amounts to an enclosure in which (1) the user can enter with the equipment on and (2) a "test" contaminant (of low toxicity) can be placed. A qualitative fit-test enclosure consisting of a plastic bag, several hangers, and some cotton will be used.

Test Methods:

There are two types of tests: qualitative tests and quantitative tests. The use of one or both types of tests depends on, the severity and extent of the respiratory hazard. During any fitting-test, the respirator head straps must be as comfortable as possible. Tightening the straps will sometimes reduce face piece leakage, but the wearer may be unable to tolerate the respirator for any length of time.

1. Qualitative tests: Qualitative tests are fast, require no complicated expensive equipment, and are easily performed.
    A. Irritant Smoke Test (see diagram A)

        The irritant smoke test is used widely in testing the face piece fit of particular filter respirators widely in testing the face piece fit of particular filter respirators. This test can be used for both air-purifying and atmosphere-supplying respirators. The test substance is an irritant (stannic chloride or titanium tetrachloride) which is available commercially in sealed glass tubes. When the tube ends are broken and air passed through them (usually with a squeeze bulb), a dense irritating smoke is emitted. In this test, the user steps into the enclosure and the irritant smoke is "sprayed" into the test hole. If the user detects any of the irritant smoke, it means a defective fit, and adjustments or replacement of the respirator is required. The irritant smoke test must be performed with caution because the aerosol is highly irritating to the eyes, skin and mucous membrane. As a qualitative means of determining respirator fit, this test has a distinct advantage in that the wearer usually reacts involuntarily to leakage by coughing or sneezing. The likelihood of giving a false indication of proper fit is reduced.

    B. Negative Pressure Check (see diagram B)

This check (and the positive pressure check) are not a substitute for formal fit tests and should be used only as a very gross determination of fit. The wearer should use this check just before entering the hazardous atmosphere. In this check, the user closes off the inlet of the canister, cartridge(s), or filter(s)

by covering with the palms or squeezing the breathing tube so that it does not pass air; inhales gently so that the face piece collapses slightly; and holds breath for about 10 seconds.

If the face piece remains slightly collapsed and no inward leakage is detected, the respirator is probably tight enough.

Although this check is simple, it has severe drawbacks; primarily that the wearer must handle the respirator after it has supposedly been positioned on his/her face. This handling can modify the face piece seal.

C. Positive Pressure Check

This check, similar to the negative pressure check, is conducted by closing off the exhalation valve and exhaling gently into the face piece. The fit is considered satisfactory if slight positive pressure can be built up inside the face piece with out any evidence of outward leakage. For some respirators, this method requires that the wearer remove the exhalation valve cover; this often disturbs the respirator fit even more than does the negative pressure test. Therefore, this check should be used sparingly if it requires removing and replacing a valve cover. The check is easy for respirators whose valve cover has a single small port that can be closed by the palm or finger.

2. Quantitative Tests: Quantitative respirator performance tests involve placing the wearer in an atmosphere containing an easily detectable, relatively non-toxic gas, vapor, or aerosol. The atmosphere inside the respirator is sampled continuously through a probe in the respiratory-inlet covering. The leakage is expressed as a percentage of the test atmosphere outside the respirator, called "percent of penetration" The greatest advantage of a quantitative test is that it indicates respirator fit fit-tests will be used when face piece leakage must be minimized for work in highly toxic atmospheres or those immediately dangerous to life or health. Each test respirator must be equipped with a sampling prove to allow continual removal of an air sample from the face piece so the same face piece cannot be worn in actual service, since the test orifice negates the approval of the respirator.

Portacount Respirator Fit Tester: A state-of-the-art quantitative fit test device is currently used by Respiratory Consultants Inc. Pat Jorgensen (253) 272-6728.

SUGGESTED RESPIRATOR SELECTION FOR PROTECTION AGAINST <u>LEAD</u> WHEN PROPERLY FITTED FOR USE AND PROPERLY MAINTAINED

Respirator Selection	Protection Factor	Maximum airborne lead concentration outside the respirator to maintain exposure inside the respirator below 0.05 MG/M³
High efficiency cartridge Filter type (half-mask)	10	0.5 MG/M
High efficiency cartridge Filter type (full face mask)	50	2.5 MG/M
Powered-air purifying (PAPR)	1000	50.0 MG/M
Type C continuous-flow Supplied air (full face or hood type)	2000*	100.0 MG/M

*2000 is minimum individual protection factors are usually higher based on quantitative fit testing.

SUGGESTED RESPIRATOR SELCETION FOR PROTECTION AGAINS <u>ASBESTOS</u> WHEN PROPERLY FITTED FOR USE AND PRPERLY MAINTAINED

Respirator Selection	Protection Factor	Maximum airborne lead concentration outside the respirator to maintain exposure inside the respirator below 0.01 fibers/cc
High efficiency cartridge Filter type (half-mask)	10	(10x0.01) 0.1 fibers/cc
High efficiency cartridge Filter type (full face mask)	50	(50x0.01) 0.5 fibers/cc
Powered-air purifying (PAPR)	100	(100x0.01) 1.0 fibers/cc
Type C continuous-flow Supplied air full face*	100*	(100x0.01) 10.0 fibers/cc
	To over 1000	(1000x0.01) 10.0 fibers/cc

- Required by WISHA for all friable removal operations except pipe insulation removal.
- Protection factor of 100 is minimum – actual protection factor to be determined by quantitative fit testing normally will over 1000.

Example: Personal air sampling indicates the asbestos fiber concentration outside the mask is 0.8 f/cc (8-hour, time weighted average). Then:

$$\text{Protection Factor Needed} = \frac{0.8 \text{ f/cc outside mask}}{0.01 \text{ f/cc desired inside mask}}$$

Protection Factor Needed = 80

By going to the table, any respirator with a protection factor above 350 should maintain the fiber concentration inside the mask below 0.01 f/cc.

Example: The employer may also use the protection factor formula to estimate concentrations inside the mask if the personal sampling results are available. If a worker's personal sample for an 8-hour workday was 2.7 fibers/cc and he wore a full face supplied-air respirator with a protection factor of 1000, what is his estimated exposure inside the mask?

$$\text{Conc. in the mask} = \frac{\text{Conc. outside mask}}{\text{Protection factor of mask}}$$

$$\text{Conc. in the mask} = \frac{2.7 \text{ f/cc (8-hour, TWA)}}{1000}$$

Conc. in the mask = 0.003 f/cc (8-hour, TWA

Accordingly, if the worker wore the respirator properly fitted and maintained, his exposure would be below. 0.01 f/cc (8-hour, TWA).

It should be noted that protection factors should only be used when the respirator is properly fitted, maintained, and used as intended. It should also be noted that protection factors for a specific model (and size) of respirator will be determined for each employee by quantitative fit-testing; to pass the test the protection factor must be at least 1000. This is discussed in the fit-testing par of this section.

DIAGRAM A

DIAGRAM B

SUGGESTED RESPIRATOR SELECTION FROM PROTECTION AGAINST LEAD WHEN PROPERLY FITTED FOR USE AND PROPERLY MAINTAINED

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Powered-air purifying (PAPR)	1000	50.0 MG/M
Type C continuous-flow Supplied air (full face or hood type)	2000*	100.0 MG/M

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Respirator Selection	Protection Factor	Maximum airborne lead concentration outside the respirator to maintain exposure inside the respirator below 0.01 fibers/cc
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QUALITATIVE RESPIRATOR FIT TEST RECORD

DATE OF TEST:_____

NAME OF PERSON TESTED:_____

NAME OF TEST OPERATOR:_____

MAKE AND MODEL OF RESPIRATOR:_____

DESCRIPTION OF TEST: GASTEC SMOKE TESTER

A) RESPIRATOR IS DONNED AND SPRAPS ADJUSTED

B) VISUAL CHECK IS MADE TO ENSURE TIGHT FIT AROUND FACIAL CONTOURS.

C) EXHALATION/INHALATION TESTS ARE PREFORMED.

D) SENSIDYNE SMOKE IS USED TO CHECK FIT. PROPER FIT IS OBTAINED IF THE SUBJECT IS NOT MADE TO COUGH BY SMOKE PLUME.

- POSITIVE TEST RESULTS CONFIRMED:

PERSON TESTED:_____

TEST OPERATOR:_____

QUALITATIVE RESPIRATOR FIT TEST RECORD

DATE OF TEST:_____

NAME OF PERSON TESTED:_____

NAME OF TEST OPERATOR:_____

MAKE AND MODEL OF RESPIRATOR:_____

RESPIRATOR SIZE:_____

DESCTRITION OF TEST:

PORTACOUNT QUANTITATIVE FIT TEST TESTED WITH IAR SUPPLY DISCONNECTED AS A NEGATIVE PRESSURE RESPIRATOR IN ACCORDANCE WITH WAC: 296-62-07715 (5)(b).

ATTACH RESULTS FROM PRINT-OUT BELOW:

EMPLOYEE ACKNOWLEDGEMENT:

I acknowledge that I have received training in the safe and proper use and maintenance of this respirator.

DATE:_____ EMPLOYEE SIGNATURE:_____

WAC 296-62-07715

TABLE 1- RESPIRATORY PROTECTION FOR TREMOLITE, ANTHOPHYLLITE, AND ACTINOLITE FIBERS

Concentration of Tremolite, Anthophylite, Actinolite, or a Combination of these Minerals	Required Respirator*
Not in excess of 1 f/cc	1. Half-mask, air purifying respirator equipped with high-efficiency cartridge filters. **
Not in excess of 5 f/cc.	1. Full face piece air-purifying respirator equipped with high-efficiency filters.
Not in excess of 10 f/cc.	1. Any powered air-purifying respirator equipped with high-efficiency filters. 2. Any supplied-air respirator operated in continuous flow mode.
Not in excess of 100 f/cc.	1. Full face piece supplied-air respirator operated in pressure demand mode.
Greater than 100 f/cc. Or unknown concentration	1. Full face piece supplied-air respirator operated in pressure demand mode equipped with either an auxiliary positive pressure self-contained breathing apparatus or a HEPA filter. 2. Full face piece positive-pressure self-contained breathing apparatus (SCBA).

Note: * Respirators assigned for higher environmental concentrations may be used a lower concentrations.

** A high-efficiency filter means a filter that is capable of trapping and retaining at least 99.97 percent of all monodispersed particles of 0.3 micrometers mean aerodynamic diameter or larger.

(Statutory Authority: Chapter 49.17 RWC.87-24-051 (Order 87-24). 296-62-07761, filed 11/30/87/)

COMPARISON of WASHINGTON AND FEDERAL ASBESTOS STANDARDS

ITEM	FEDERAL	WASHINGTON
1. SCOPE	Separate rules for construction and general industry	One rule which applies to construction and general industry
2. TWA/8hr PEL and 30 min EXCURSION LIMIT	0.1 fibers/cc 1.0 f/cc- 30 min	0.1 fibers/cc 1.0 f/cc- 30 min
3. COMPETENT PERSON(SUPERVISOR)	EPA course or equivalent training required	EPA course of course approved by L&I, must also be Washington State Certified worker
4. SMALL SCALE-SHORT DURATION	Not specifically defined by size but likely limited to repair and maintenance activities	Same Appendix J mandatory on small jobs
5. PROTECTIVE CLOTHING	Required when exceed PEL	-Required when exceed PEL -Emergencies -Required in Regulated Area -Required when glove-bagging
6. IDENTIFICATION	Employer shall determine presence of asbestos containing materials	Employer/Owner shall determine presence of asbestos containing materials-good faith estimate
7. NEGATIVE PRESSURE ENCLOSURES	Where feasible except small scale-short duration jobs	Where feasible except during glove bag techniques. 4 air changes per hour & .02 in H_2O
8. AIR MONITORING a) 8 hr TWA	Daily in regulated area, full-shift, breathing zone	Daily in regulated area, full shift, breathing zone
b) Excursion	30 min	30 min
c) Initial monitoring	Required, but may use prior data if closely resembling prior work	Required, but may use prior data if same work place and not in negative pressure enc.
d) Area monitoring	None required	Periodic outside negative pressure enclosure at HEPA exhaust and decon entrance
e) Air monitoring person	No requirement	Proficient Person
f) Termination of sampling	When statistically below PEL -or-when all employees in the regulated area have supplied air respirators in positive pressure mode	Pressure demand respirators equipped with auxiliary HEPA or SCBA in negative pressure enclosure
g) Flow rates -25 mm filter -37 mm filter** **may only be used with written justification in both states	 0.5-2.5 1pm 1.0-2.5 1pm	 0.5-4.0 1pm 1.0-4.0 1pm
h) Clearance samples	None required	Below PEL Pre-abatement samples whichever is lower

9. CLEAN-UP	No specific mention	All surfaces must be locked down with encapsulate
10. Respirators a) Required	Above PEL Emergencies	Above PEL Emergencies all regulate areas during glove-bag
b) Selection	Table 1 based on 8 hr TWA	Table 1 based on TWA levels
c) Special Rqmts.	None	Pressure demand/continuous flow with escape for all renovation, removal or demo of friable ACM. -inside neg. pressure except pipe insulation -dry removal must use PD
11. FIT TESTING		
a) Qualitative	Only allowed for half-mask	Only allowed for half-mask
b) Quantitative	All other negative pressure respirators	All other negative pressure respirators including supplied air with HEPA backup
12. TAKING SHOWERS	No mention how	Employee must get fully wetted including face and hair prior to respirator removal
13.WASTE LOAD OUT	No mention	2-chamber air lock separate from decon
14.HOUSEKEEPING	No mention of bag thickness or dragging	6 mil bags No dragging bags
15. TRAINING	Initial assignment and annually	Annual Washington Certification and Renewal
16. DETERIORATION	No mention in construction standard, however identification required in general industry code	All damaged or deteriorated asbestos must be repaired, enclosed, encapsulated, or removed

For further information on Respiratory Protection, please refer to WAC 296-842.

<u>Respirator Program Evaluation</u>

An appraisal of the effectiveness of the Respirator Program shall be carried out at least annually by the program administrator.