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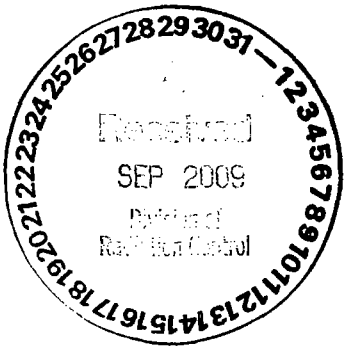


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**VIA PDF AND FEDERAL EXPRESS**

September 28, 2009

Mr. Dane Finerfrock, Executive Secretary
Utah Radiation Control Board
Utah Department of Environmental Quality
168 North 1950 West
P.O. Box 144810
Salt Lake City, UT 84114-4810

Dear Mr. Finerfrock:

**Re: Renewal Application for Radioactive Materials License (RML) No. UT1900479: Health Physics Interrogatories – Round 2; and Engineering Comment Interrogatories – Round 1**

Reference is made to our letter of August 14, 2009 in response to the Executive Secretary's correspondence of July 2, 2009 with attached Health Physics and Engineering Comment Interrogatories.

As contemplated by our response to Health Physics Interrogatory Statement No. 12, enclosed please find a draft revised Respiratory Protection Program for the White Mesa Mill, together with a marked version showing the proposed changes to the Program.

If you should have any questions or require additional information, please contact the undersigned.

Yours very truly,

**DENISON MINES (USA) CORP.**

By:

David C. Frydenlund
Vice President, Regulatory Affairs and Counsel

cc: Ron F. Hochstein
Harold R. Roberts
Steven D. Landau
David E. Turk

Draft Date: September 28, 2009

# RESPIRATORY PROTECTION PROGRAM

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# RESPIRATORY PROTECTION PROGRAM

## 1. APPLICABILITY

This Respiratory Protection Program sets out the Mill's procedures regarding:

- selection, fitting, issuance, maintenance, and testing of respirators, including testing for operability immediately prior to each use; supervision and training of personnel; monitoring, including air sampling and bioassays; and record keeping; and
- Determination by a physician that the individual user is medically fit to use the respiratory protection equipment.

### 1.1 Respiratory Protection Policy

The Respiratory Protection Program is established for the Mill to protect its workers from occupational exposure to harmful concentrations of radioactive and/or toxic materials in the air.

As noted in United States Nuclear Regulatory Commission ("NRC") Regulatory Guide 8.15, "it is widely recognized among safety professionals that the use of respiratory protection devices in the workplace can impose physiological and psychological stresses on workers, obstruct their vision, hinder their movements, and make effective communications difficult. These factors increase the risk of physical injury to respirator wearers that, in many cases, far exceeds any potential risk associated with the inhalation of a small quantity of airborne radioactive material." Therefore, process or engineering controls should be used to the extent practical to control the concentration of radioactive material in air, and the use of respiratory protection devices should be contemplated only after other measures to limit intake have been considered.

The following is the Mill's policy with respect to respiratory protection:

a) Process or other engineering controls will be used whenever feasible to reduce the need for use of respirators;

b) For work in areas in which respirators must be routinely used to reduce exposures, standard operating procedures ("SOP's") will detail use of respiratory protection. Non-routine use of respirators will be performed under Radiation Work Permits. Self Contained Breathing Apparatus ("SCBA") respirators will only be used for evacuation and emergency response situations;

c) Due to the added physical stress of working while using a respirator, work periods will be alternated with rest periods; and

d) Respirators will not be issued to workers unless they are to be used.

Respirators are provided to workers for their personal protection and the proper use of respirators in areas in which such protection is required is a condition of their employment. Violating the established rules for respirator use may result in disciplinary action up to and including dismissal.

## 1.2 Supervisory Positions and Responsibilities

In general, the Mill Manager is responsible for providing the equipment and resources necessary for the successful implementation of this Respiratory Protection Program and for facilitating the application of engineering controls to reduce the need for the use of respiratory protection devices.

The Mill's Radiation Safety Officer ("RSO") has primary responsibility for implementation and oversight of all aspects of the respiratory protection program, including supervisory and technical responsibilities. The RSO is assisted by one or more Radiation Technicians or other Radiation Safety Department staff.

The Mill Manager and the RSO will coordinate efforts to use, to the extent practical, procedures and engineering controls based on sound protection principles to maintain radiation exposures as low as reasonably achievable ("ALARA").

### 1.2.1 Radiation Safety Officer

The RSO is responsible for the implementation and direct control of the respiratory protection program. The RSO's responsibilities include:

a) Supervision of respirator selection procedures;

b) Establishment of training sessions about respiratory equipment for workers;

c) Establishment of a continuing program of cleaning and inspecting the equipment;

d) Designation of proper storage areas for respiratory equipment;

e) Establishment of issuance and accounting procedures for uses of respiratory equipment;

f) Establishment of medical screening programs and procedures for workers assigned to wear respiratory equipment;

g) Establishment of a periodic inspection schedule of those work places/conditions requiring respiratory equipment to determine exposure and/or changing situations; and

h) A continuing evaluation of the above aspects to ensure their continued functions and effectiveness.

1.2.2 Radiation Technicians and Other Radiation Safety Department Staff

In administering the program, the RSO will be assisted by one or more Radiation Technicians, who may perform supervisory and technical functions, as determined by the RSO, and one or more other members of the Radiation Safety Department Staff, who may perform technical functions. Each such individual must have adequate training to undertake his or her assigned responsibilities, as determined by the RSO.

1.2.3 Respirator Program Administrator

The RSO is the Respiratory Program Administrator. However, the RSO may appoint a Radiation Technician as Respirator Program Administrator, in his stead, to administer the program under the direction and supervision of the RSO.

1.2.4 Training and Re-Training Requirements

The RSO and any Radiation Technician will be required to have satisfied the requirements for those positions as set out in NRC Reg. Guide 8.31 and to be current in their refresher training as set out in that Reg. Guide. Any other member of the Radiation Safety Department who has been given technical responsibilities under this program will have adequate training in order to undertake those responsibilities, as determined by the RSO. Each Radiation Technician will also have completed the training specified in Section 2.2 below.

1.2.5 Qualifications for Appointment

The RSO and, if so appointed by the RSO, one or more Radiation Technicians, will have supervisory responsibility and may also have direct responsibility for various technical aspects of this program. Such individuals will meet the requirements for the position of RSO and Radiation Technician as set out in NRC Reg. Guide 8.31, and will have completed the training specified in Section 2.2 below.

Any other members of the Radiation Safety Department who perform technical functions under this program will have the qualifications and training required to perform the function, as determined by the RSO.

## 1.3 Policy Regarding Facial Hair (Face to Facepiece Seal Integrity)

Anything in the face-to-facepiece seal area of a tight-fitting respirator that is under the control of the respirator user is prohibited. Materials in this area might interfere with the seal of the respirator, might prevent proper exhalation valve function, or might impair the operation of a facepiece-mounted air regulator. Leakage of air into the mask will nullify the purpose of the respiratory device.

The list of prohibited materials includes (but is not necessarily limited to) facial hair of any kind (e.g., beards, mustaches and long sideburns) in the seal area (the worker must be clean-shaven), hair from the head intruding into the seal area, cosmetics, spectacle temple

bars, protective clothing, and equipment. A respirator wearer is not required to shave more than once during each 12-hour period.

The policy of the Mill concerning facial hair is:

> As a condition of employment, those workers who may at any time be required to wear a respirator as part of their employment, will not have any facial hair or other features that will restrict the proper fitting of a respiratory device.

## 1.4 Physiological or Psychological Limitations to Respirator Use

This Section describes physiological and psychological (including emotional) factors, which may limit an individual's ability to wear or work in a respirator. Any questions or problems concerning respirators or their use, such as the types described in this Section, should be addressed to the RSO.

### 1.4.1 Physiological Limitations

As described below in Section 3.1, medical qualification will be required of each worker that might be using a respirator in his or her normal work duties. This is necessary to evaluate the individual's limitations to wearing respirator devices. A licensed physician will perform the medical evaluation and will determine if the individual user is medically fit to use the respiratory protection equipment. The physician will report on any physiological factors that may limit an individual's ability to wear a respirator.

### 1.4.2 Psychological Limitations

Mental factors must also be taken into consideration when workers are required to wear respirators. Some individuals become claustrophobic when wearing a respirator. These individuals should not be required to wear respirators if the condition is severe enough to cause panic.

### 1.4.3 Other Factors

Other factors, which may cause problems in respirator sealing, must be considered when performing fit testing. These may include such factors as facial structure, scars, skin creases, or dentures.

## 1.5 Equipment

Only National Institute for Occupational Safety and Health ("NIOSH") tested and certified and Mine Safety and Health Administration ("MSHA") approved respiratory protection devices will be used at the Mill. In addition, these devices must be used, maintained, and stored in such a manner that they are not modified and are in like-new condition at the time of issue. A reasonable amount of wear that does not affect performance is acceptable.

The Mill will provide adequate equipment or material, as necessary to supplement respiratory protective equipment, to reduce the likelihood that respirator use might contribute to workplace accidents or injury. Examples of such equipment are:

- Spectacle adapters;
- Voice amplification equipment; and
- Material or equipment to prevent or reduce fogging of respirator lenses.

Safety or protective equipment used in conjunction with respirators should not interfere with the proper fit or operation of the respirator. Manufacturer-supplied equipment (e.g., welder's shields, communications devices) specified on the approved subassemblies list for the respirator may be used in accordance with the manufacturer's instructions. Equipment or devices supplied by a company other than the respirator manufacturer may be used as long as they do not alter the form, fit, or function of the respirator. Any such device that attaches to or requires penetration of the respiratory inlet covering is likely to void the NIOSH approval for the device and should not be used.

## 2. PROCEDURES FOR RESPIRATOR USE

### 2.1 Supervision of the Program, Including Program Audits

This Respiratory Protection Program is administered by the RSO. Quarterly ALARA Reports from the RSO are sent to members of the ALARA Committee. The effectiveness of the Respiratory Protection Program is reviewed and exposure data evaluated during annual ALARA audits.

### 2.2 Training and Minimum Qualifications of Respiratory Protection Program Supervisors and Implementing Personnel

A supervisor, that is, a person who has the responsibility of overseeing the work activities of one or more persons who must wear respirators, shall be given adequate training to ensure the proper use of respirators. Supervisor training shall include but shall not necessarily be limited to the following subjects:

a) Basic respiratory protection practices;

b) Nature and extent of respiratory hazards to which persons under his/her supervision may be exposed;

c) Principles and criteria of selecting respirators;

d) Training of respirator wearers;

e) Issuance of respirators;

f) Inspection of respirators;

g) Use of respirators, including monitoring their use;

h) Maintenance and storage of respirators; and

i) Regulations concerning respirator use.

## 2.3 Training of Respirator Users

Each worker who may wear a respirator will be required to receive training for the proper use of the device, including the requirement for each user to inspect and perform a user seal check on a respirator each time it is donned. The required training for all potential respirator users is found in Addendum 9 of the Mill's Training Manual, SOP Book 13. Such training shall cover the topics necessary to ensure that each trainee will:

a) Be informed of the hazard to which the respirator wearer may be exposed, the effects of contaminants on the wearer if the respirator is not worn properly, and the capabilities and limitations of each device that may be used;

b) Be shown how spectacle adapters, communications equipment, and other equipment that will be used directly in conjunction with the respirator are to be attached and operated properly;

c) Be able to demonstrate competency in donning, using, and removing each type of respiratory protective device that may be used;

d) Be instructed in how to inspect each type of respiratory protective device that may be used and be instructed to perform such an inspection before donning any device;

e) Be instructed in how to perform a user seal check on face-sealing devices and be instructed to perform this user seal check each time this type of device is donned;

f) Be informed that any respirator user may leave the work area at any time for relief from respirator use in the event of equipment malfunction, physical or psychological distress, procedural or communications failure, significant deterioration of operating conditions, or any other condition that might necessitate such relief; and

g) Be advised that in case of respirator malfunction or wearer distress, the respirator may be removed as the respirator user exits the airborne contamination area.

## 2.4 Fit Testing

2.4.1 General

Fit testing must be performed for all face sealing respirators, even if they will be used in a positive pressure mode in the field. The worker should be fit-tested with the same make, model, style and size of respirator that will be used in the field.

Each person being fit-tested should already have been trained in how to properly don, and perform a user seal check on, a face-sealing respirator. Therefore, during the test, no person (including the person administering the fit-test) should assist or coach fit-test subjects who are not obtaining a satisfactory facepiece seal.

Qualitative fit-testing and quantitative fit testing must be accomplished with the face piece operating in the negative pressure mode, regardless of the mode of operation in which it will be used in the field.

Filters used during fit-testing should be at least 99.97% efficient, even if less efficient filters will be used in the work place. The fit-test is intended to measure only face-to-facepiece leakage, so filter efficiency on the test respirator should be as high as possible.

During training or operation, perceptible outward leakage of breathing gas from the face-to-facepiece seal area of any SCBA is unacceptable, and the wearer should not be permitted to continue to use the device. Such leakage will quickly deplete the available breathing gas and if used in an emergency could easily place the wearer in jeopardy.

### 2.4.2 Frequency of Testing and Re-testing

Fit testing must be performed annually for every worker who is required to wear a respiratory protective device.

Retesting should be performed before the next respirator use when the RSO has knowledge that a potential respirator wearer, since the last fit-test, has had:

a) A weight change of 10% or more;

b) Significant facial injury or scarring in the area of the facepiece seal;

c) Significant dental changes (e.g., multiple extractions without prosthesis or acquisition of new dentures;

d) Reconstructive or cosmetic surgery in the area of the facepiece seal; or

e) Any other condition that might change the fit of a face-sealing respirator.

The Mill will advise respirator users of these retest criteria either during general training sessions or during initial fit-testing, and will advise users to advise the RSO of any of the foregoing circumstances.

### 2.4.3 Quantitative Fit Testing

#### *2.4.3.1 General*

Quantitative fit testing is acceptable for testing all face-sealing devices.

If quantitative fit testing is used to test facepieces that will be operated in the negative pressure mode in the field (e.g., full face respirators), an overall fit factor of at least 10 times the assigned protection factor ("APF") should be demonstrated. Requiring that the overall fit factor meets the acceptance criterion means that the fit factor for one or more of the individual test exercises might be less than the acceptance criterion, but a satisfactory overall fit-test can still be achieved.

If quantitative fit testing is used to test facepieces that in the field will be operated only in a positive pressure mode, an overall fit factor of at least 500 (not 500 times the APF) should be demonstrated with the facepiece operating in negative pressure mode. Face sealing devices that operate in a positive pressure mode are powered air purifying respirators ("PAPRs") and SCBA.

During all quantitative fit-tests, the sample point inside the facepiece should be midway between the mouth and the nose of the test subject.

#### *2.4.3.2 Quantitative Fit Testing Procedure*

Quantitative fit testing measurements will be performed in accordance with 29 CFR 1910.134 using the FitTester 3000, or equivalent, as follows:

a) Input the worker's name, style of respirator and size;

b) Select "perform fit test" – the computer will walk you through a series of five tests;

c) During the testing program, the computer will evaluate the worker;

d) If there is a failure during any test, the worker will adjust the respirator and try again;

e) If after several attempts to pass a test and the worker still fails, try a different size respirator;

f) Once the worker passes each of the five tests, a document will be printed certifying the successful completion of the examination;

g) The document will then be signed by both the worker and the facilitator of the examination; and

h) The document will then be filed with the worker's other Safety documents in the Radiation Safety Department.

## 2.4.4 Qualitative Fit Testing

### *2.4.4.1 General*

While no numerical measure of facepiece leakage is directly obtained from qualitative fit-testing protocols, they are designed and validated quantitatively. NRC Reg. Guide 8.15 requires that a qualitative fit test must be capable of verifying a fit factor of 10 times the APF for full face (negative pressure) respirators and a fit factor of 500 (not 500 times the APF) for PAPR and SCBA (positive pressure) respirators. Currently, qualitative fit testing methods are only capable of verifying a fit factor of 100. Therefore, qualitative fit testing methods are only appropriate for respirators having an APF of 10 (such as half face respirators), and are not capable of verifying a fit factor of 500 (i.e., 10x50) needed for full face respirators, or 500 for PAPRs and SCBA. However, the use of qualitative fit-testing in conjunction with (but not in lieu of) the quantitative fit testing procedures described above is considered to be advisable and is performed at the Mill. It is recognized that only credit for an APF of 10 will be taken based on the qualitative fit test alone, even though the APF is higher for the device.

### *2.4.4.2 Qualitative Fit Testing Procedure*

Qualitative fit testing measurements will be performed in accordance with 29 CFR 1910.134 using an MSA ventilation smoke tube, Part No. 5645 or equivalent, aspirator bulb. Steps for respirator issuance fit testing are as follows:

a) Respirators equipped with high-efficiency filters will be used for this test (red/green filters);

b) Both ends are broken on an MSA ventilation smoke tube. One end is inserted into the tube connected to the positive pressure of a two-way aspirator bulb and the other end covered by a ½ inch length of tygon, surgical or rubber tubing. The test aerosol is generated by squeezing the aspirator bulb;

c) The test subject will don the respirator and a visual inspection of the facepiece to face seal made by the tester. An obvious leak in the facepiece to face seal shall be reason to abort the test and record the mask as unsatisfactory. Expression of discomfort created by the mask shall also be reason to abort the test;

d) The smoke will be generated in all areas surrounding the mask. The smoke is not harmful however it is sufficiently irritating that if there is a leak in the seal of the mask, it will be discovered immediately; and

e) Any indication of detection of the smoke by the test subject during fitting indicates a failure of that respirator. If leakage is detected the facepiece to face seal shall be visually inspected for obvious leakage. If any doubt about the condition of the respirator or the filter exists, another like respirator shall be tested to ensure the leakage was due to the facepiece to face seal.

*2.4.4.3 Irritant Smoke*

Only stannic chloride smoke tubes, such as the MSA ventilation smoke tube, Part No. 5645, will be used. Similar tubes that generate smoke of a different chemical composition may not be sufficiently irritating to the test subject to be sensed at low concentrations. Smoke tubes that use chemicals other than stannic chloride are not acceptable

If irritant smoke is used as the challenge aerosol during qualitative fit-testing, the RSO must take steps to protect the person administering the test from repeated exposures to the irritant smoke. These steps could include using a containment chamber around the head and torso of the fit-test subject to contain the smoke, providing the test area with a ventilation or air filtration system, performing the test outdoors, assigning a respiratory protection device to the person performing the fit-testing, or other measures. The fit-test protocol will also be performed to limit the test subject's exposure, especially when performing the sensitivity screening checks that determine whether the test subject can detect the irritant smoke.

## 2.5 Selecting Respirators

2.5.1 General

Respirator selection will be determined by the type of environment in which the worker will be working. The concentration of oxygen and the type and concentration of hazardous contaminants in the work area atmosphere must be considered during the selection process.

2.5.2 Types of Respirators Available for Use at the Mill

Three types of respiratory protection are used at the Mill. These are:

a) full face respirators (which are air purifying respirators);

b) PAPRs (which are air purifying respirators); and

c) SCBAs (which are supplied air respirators). The SCBA devices used at the Mill are full face respirators with an attached hose mechanism that draws air from a compressed air tank worn on the back of the worker. The Mill does not use supplied air hoods or supplied air suits.

The Mill does not use half face or quarter face respirators. Dust masks may be used occasionally at the Mill, for protection against non-radioactive dust, but such masks are not part of the respiratory protection program.

One model of respirator from one manufacturer is adequate, so long as different sizes of facepieces are available and adequate fit factors are obtained for greater than 99% of test subjects who are free of facial characteristics that preclude an adequate respirator fit. For

individuals who achieve a fit factor >500 with a negative-pressure full facepiece but who are unable to achieve a fit factor 10 times the APF, consideration will be given to assigning a positive pressure face-sealing device or to a device for which a face seal is not necessary if the individual will be put into a work situation where the use of a respirator may be necessary.

### 2.5.3 Application of Assigned Protection Factors

The APF for each of the three types or respirators in use at the Mill are as follows:

- Full face respirators have an APF of 50;
- PAPR respirators have an APF of 1,000;
- SCBAs have an APF of 10,000.

Use of the APF assumes that:

- The respirator user has been trained to properly don the device;
- The user has been satisfactorily fit-tested;
- The user properly performs a user seal check to ensure that there is no gross seal leakage; and
- The respirator performs properly.

APFs are to be used for selecting a specific type of respirator to be used in the performance of a specific task, to keep the total effective dose equivalent ("TEDE") of exposed workers ALARA, and to be applied in the derived air concentration ("DAC")/hour calculation to determine the dose from exposure to air particulate. Using APFs to estimate intake and then dose, in conjunction with air survey data and the application of the applicable DAC, is the method of choice for determining the intake and dose for workers at the Mill. Bioassay measurements are taken in order to corroborate such calculations (see Section 2.13.3 below for a summary of the Mill's bioassay program).

In estimating the dose to individuals from intake of airborne radioactive materials, the concentration of radioactive material in the air that is inhaled when respirators are worn is initially assumed to be the ambient concentration in air without respiratory protection, divided by the assigned protection factor. If the dose is later found to be greater than the estimated dose, the corrected value must be used. If the dose is later found to be less than the estimated dose, the corrected value may be used.

### 2.5.4 Survey Program

A survey program that is adequate to identify potential respiratory hazards, to permit selection of the proper respiratory protection method and to evaluate actual or suspected intakes is contained in Section 2.0 of the Mill's Radiation Protection Manual SOP PBL-RP-2, and described in part in Section 2.13 below.

## 2.5.5 Procedures to be Followed When Selecting a Respirator

### *2.5.5.1 General*

Prior to selecting a specific type of respirator, the work environment must be thoroughly evaluated for respiratory hazards. The following questions must then be answered:

a) What are the hazards the worker will be exposed to?

b) What are the contaminants and their concentration?

c) Are there any contaminants in the workplace environment that may damage or irritate the eyes, nose, or skin?

   (i) Yes – a full-face style is recommended;

d) Is the oxygen concentration in the workplace atmosphere between 19.5% to 23%?

   (i) Yes – combination cartridges will be used if the concentration of the contaminant is within the acceptable limits for the cartridge;
   (ii) No – The workplace or area may only be entered if the $O_2$ concentration is between 19.5 and 23%. The workplace environment will be remediated (i.e., ventilated) by safety engineering controls such that the oxygen concentration falls between these limits before it may be entered;

e) Do the contaminant concentrations in the work environment exceed the limits listed for the combination cartridge being used?

   (i) Yes –Modify the air contaminant concentration by safety engineering measures;
   (ii) No – combination cartridges may be used if oxygen concentration is between 19.5% and 23%.

Limitations appropriate to the type and mode of use of the respirator will also be considered. When selecting respiratory devices provision will be made for vision correction (see Section 2.15), adequate communication (see Section 2.14), low temperature work environments (see Section 2.16), and the concurrent use of other safety or radiological protection equipment. Equipment will be used in such a way as not to interfere with the proper operation of the respirator

### *2.5.1.1 Air Purifying Respirators*

The inventory of air purifying respirators will consist of full face and PAPR units.

There is only one type of air purifying respirator cartridge used for air contaminants for the full-face respirators. This is a red/green GME-H universal cartridge, which is

normally effective for removing all air contaminants and atmospheric hazards, and is approved by NIOSH for use under the following conditions:

a) Organic Vapors – less than 1,000 ppm;

b) Pesticides;

c) Mists of Paints, Lacquers, and Enamels;

d) Dust – less than 0.5 $mg/m^3$ (99.97% efficient against all particulate aerosols including oil-based aerosols);

e) Fumes – less than 0.5 $mg/m^3$;

f) Mists – less than 0.5 $mg/m^3$;

g) Chlorine;

h) Hydrogen chloride;

i) Sulfur dioxide;

j) Ammonia;

k) Methylamine;

l) Chlorine dioxide;

m) Hydrogen sulfide (escape only);

n) Formaldehyde; and

o) Hydrogen fluoride.

The PAPR units are not designed for areas that may come in contact with chemical mists or high humidity. The PAPR units use an Optifilter XL Filter Assembly HE that is only good for dusty environments. These units are ideal for the packaging enclosure, Yellowcake Dryers, Ore Storage, and Tails.

The PAPRs must have the battery fully charged prior to usage. The battery charge on each unit will last approximately eight continuous working hours. All maintenance and cleaning techniques utilized with the full-face respirators will be used for the PAPR units.

*2.5.1.2 SCBA and Supplied Air Apparatus*

SCBA will only be used for evacuation or emergency purposes. The Mill does not use supplied air apparatus.

SCBA will be appropriate for use in emergency situations when the length of the work will not exceed 20 minutes.

If at any time the atmosphere contains materials that might be corrosive to the worker or respiratory device, the area will be evacuated. The area must be ventilated until the corrosive materials fall to a safe level before work may resume.

## 2.6 Maintaining Breathing Air Quality

The quality of air delivered to all SCBA and supplied-air respirators shall meet the requirements for Grade D air for breathing air systems as defined in Compressed Gas Association (CGA) publication G-7.1, "Commodity Specifications for Air." 1997 ed. And included in 29 CFR 1910.134(i)(1)(ii)(A) through (E), (2007). Grade D quality breathing air criteria include: oxygen content (volume/volume) of 19.5 to 23.5%; hydrocarbon (condensed) content of 5 $mg/m^3$ of air or less; carbon monoxide (CO) content of 10 ppm or less; carbon dioxide content of 1,000 ppm or less; and the lack of a noticeable odor.

The Mill obtains the air for its SCBA devices from the local fire department The Mill does not have its own breathing air supply system. The local fire department is the only nearby facility that can refill the oxygen bottles for the SCBA. The local fire department is certified for such activities by the State of Utah Fire Marshall.

## 2.7 Seal Tests

Each respirator wearer must perform both the Positive-Pressure and Negative-Pressure seal checks, set out below, each time a face-sealing respirator is used (which includes any time a face shield is removed or the seal is broken and re-donned). A user seal check is performed immediately prior to exposure to ensure that the respirator is properly seated on the face.

a) Positive-Pressure Check

Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

b) Negative-Pressure Check

Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

It should be noted that a user seal test is not a substitute for a fit test. See Section 2.4 above for the fit test requirements.

## 2.8 Inventory Control and Issuance of Respiratory Protection Equipment

Mill Radiation Safety Staff shall maintain positive control over the issuance of respiratory protection devices, such that persons not authorized to wear such devices are effectively prevented from obtaining them. To this end, the following procedures will be followed:

a) Respirators will not be issued to workers unless they are to be used;

b) Storage cabinets that will be used for routine respirator issuance will be located in the respirator cleaning facility. Only persons authorized to use respirators are to access the storage cabinets;

c) When a worker needs a clean respirator, he or she will obtain one from the storage location where clean respirators are packaged and kept. After obtaining a clean respirator, the worker will enter the pertinent information on the log sheet that is kept in the cabinet with the clean respirators;

d) When a used respirator is exchanged for a clean unit, the dirty respirator will be placed in the receptacle provided for such use;

e) All workers who wear a respirator must exchange their respirators daily; and

f) Workers that need to be issued a PAPR unit will need to see the RSO or his designee to be checked out on the proper usage of the unit. All PAPR's are inventoried and only key operators or Radiation Work Permit ("RWP") individuals will be issued one of these units.

Personnel who issue respirators must ensure that each person issued a respirator has been medically screened (see Section 3.1), trained (see Section 2.3) and fit-tested (see Section 2.4) within the period prescribed.

Persons may only be issued respirators for which they have been fit-tested (i.e., same make, model, style and size).

## 2.9 Storage of Respiratory Protection Equipment

When in storage and not available for use, respirators and component parts of respiratory protection devices will be stored in such a way as to prevent damage to such components and devices. The following procedures shall be followed:

a) Respirators shall be stored in a manner sufficient to protect the device against dust, sunlight, extreme cold, excessive moisture, or damaging chemicals;

b) The cleaned respirators will be stored in cabinets in the respirator cleaning facility outside the safety department. The respirators will be stored in layers with the facepieces and exhalation valves in a more or less normal position to prevent the rubber or plastic from cracking;

c) When respirators are not being used, they must be stored in the plastic bags in which they were issued. Dirty respirators will be placed in receptacles located in the respirator storage room. They will be gathered from these locations for cleaning and repairs;

d) All respirator users must exchange their respirators daily;

e) The cabinets containing emergency respirators will be located in areas that are readily accessible and in areas in which a hazard may arise. Emergency cabinets are located on the north side of the Mill building outside of the SAG Mill doors, outside the SX on the north wall, on the south end of SX on the fire cabinet and at the fire hose station at the front gate. All workers should be made aware of these locations; and

f) The cabinets will not be locked, but they will have seals attached to the hasps. The seals will prevent workers from using the respirators for routine use, but will allow emergency access. During emergencies, the seal will be broken and a respirator may be selected in a matter of seconds.

## 2.10 Maintenance, Repair, Testing, and Quality Assurance of Respiratory Protection Equipment

### 2.10.1 Maintenance and Repair

Respirators and component parts will be maintained and repaired only by persons specifically trained to perform this work. Repairs and maintenance will be performed in accordance with the procedures detailed below. Parts used for repairs will be purchased only from the manufacturer of the unit being repaired or from their agents.

Each used respirator must be disassembled before cleaning; the cartridges must be removed and discarded and any hoses or regulators must be removed and washed separately. Some of the units have elastic head straps; these should also be removed and washed separately.

### 2.10.2 Cleaning

Mill staff will decontaminate and disinfect respirators and associated equipment in accordance with the manufacturer's instructions, paying particular attention to the cleaning or sanitizing agents used and to the maximum temperature of the water used for cleaning, to avoid degradation of the respirator. Chemical residues should not be hazardous or irritating to the user. Radiological limits for re-use of respirators after they have been cleaned and sanitized have been established at the Mill and are set out in Section 2.10.3.1 below.

For full face respirators, PAPRs and SCBAs, the respirators will be cleaned and rinsed in a commercially available dishwasher. The radiation and safety staff will perform cleaning and washing of respirators. The respirators will be washed and then aired dried.

### 2.10.3 Inspection and Testing of Respirators

Inspections of all respiratory devices will be conducted as set out below. Under no circumstances will a device that is known to be defective be used.

#### *2.10.3.1 General*

Respirator facepieces that are routinely available for issue will be visually inspected at least every month or in accordance with manufacturer's instructions. If such devices are stored in clear plastic bags, they should be handled and examined, but need not be removed from the bags for the inspection as long as the inspector can determine that the device is ready for issue.

Equipment used in conjunction with facepiece respirators (e.g., belt- or facepiece-mounted air regulators, air-supply hoses, portable distribution manifolds) will be inventoried and functionally tested periodically or prior to use.

Repair and replacement parts for respiratory protection devices will be inventoried and inspected periodically. The goal is to ensure that there are sufficient functional parts available to support the respiratory protection program when it is operating at full capacity.

Devices in storage will be inspected quarterly and before they are made available for issue. Equipment stored for periods of a year of more will be re-cleaned annually to ensure that they are in good condition in case they are needed unexpectedly.

Each reassembled respirator must be inspected for radiation contamination before it is used. An instrument survey or a swipe test may be conducted to determine if any item is contaminated. The equipment check must indicate levels of less than 100 dpm/100 $cm^2$ of alpha radiation or 1,000 dpm/100 $cm^2$ of beta-gamma radiation to be serviceable. If repeated washings do not decrease contamination to acceptable levels, that item must be disposed of.

Freshly cleaned and inspected respirators will be placed in plastic bags and sealed (see Section 2.10.3.1). The individual who serviced the respirator shall write the date on each bag and initial it to indicate the work has been done properly.

The following conditions should be checked during any type of inspection:

#### *2.10.3.2 Air Purifying Respirators*

Routinely used air purifying respirators (full face respirators and PAPRs) should be checked as follows before and after each use.

a) Examine the facepiece for:

(i) Excessive dirt;
(ii) Cracks, tears, holes, or distortion from improper storage;
(iii) Inflexibility (stretch and massage to restore flexibility);
(iv) Cracked or badly scratched lenses in full facepieces;
(v) Incorrectly mounted full facepiece lens or broken, or missing mounting clips; and
(vi) Cracked or broken air purifying element holder(s), badly worked threads, or missing gasket(s), if required;

b) Examine the head straps or head harness for:

(i) Breaks;
(ii) Loss of elasticity;
(iii) Broken or malfunctioning buckles and attachments; and
(iv) Full facepieces only – excessively worn serrations on the head harness which might permit slippage;

c) Examine the exhalation valve for the following after removing its cover:

(i) Foreign material such as detergent residue, dust particles, or human hair under the valve seat;
(ii) Cracks, tears, or distortion in the valve material;
(iii) Improper insertion of the valve body in the facepiece;
(iv) Cracks, breaks, or chips in the valve body, particularly in the sealing surface;
(v) Missing or defective valve cover; and
(vi) Improper installation of the valve in the valve body;

d) Examine the air purifying elements for:

(i) Incorrect installation, loose connections, missing or warn gaskets, or cross-threading in holder; and
(ii) Cracks or dents in outside case of filter, cartridge, or canister;

e) If the device has a corrugated breathing tube, examine it for:

(i) Broken or missing end connectors;
(ii) Missing or loose hose clamps; and
(iii) Deterioration (determined by stretching the tube and looking for cracks);

f) Examine the harness of a front or back mounted gas mask for:

(i) Damage or wear to the canister holder which may prevent its being held securely in place; and
(ii) Broken harness straps or fastenings; and

g) Blower mechanism on the PAPR units only:

(i) Damage to the outer casing of the blower unit will result in the replacement of the blower; and
(ii) Missing or broken pins that connect the blower to the battery pack will result in replacing of damaged pieces.

*2.10.3.3 Supplied Air Respirators*

The following shall be checked:

a) If the device has a tight fitting facepiece, use the procedures outlined above for air purifying respirators; and

b) Examine the air supply for:

(i) Integrity and good condition of air supply lines and hoses including attachments and end fittings; and
(ii) Correct operation and condition of all regulators, valves, or other air flow regulators.

A visual inspection of the SCBAs shall be performed monthly, and a thorough examination shall be performed two or three times per year. See Section 2.10.3.5 below.

Breathing air cylinders, including SCBA cylinders, must be tested as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR 173 and 178). Each breathing air cylinder will be permanently and legibly marked "Breathing Air" or "Compressed Air".

*2.10.3.4 Re-use of Respirator Filters*

Respirator filters can be re-used by the same person on the same day without being re-tested, as long as contamination control is adequate and the filters do not appear to be damaged. Filters to be re-used during the same day should not have any apparent damage and should meet the Mill's criteria for residual contamination, set out in Section 2.10.3.1. Filters will be discarded after each day's use.

*2.10.3.5 Respirators Used for Emergency Use*

Respirators specifically designated for emergency use are visually inspected once per month, and removed from any protective container and thoroughly examined periodically (e.g., 2 to 3 times per year). Such monthly and periodic inspections will be recorded.

2.10.4 Quality Assurance

To prevent the use of faulty or defective respiratory equipment, the following steps will be taken:

*2.10.4.1 New Equipment*

All new equipment will be thoroughly inspected before it is put into service (see Section 2.10.3 above). Only MSHA/NIOSH approved equipment will be used (see Section 1.5 above). Parts used for repairs will be purchased only from the manufacturer of the unit being repaired or their agents (see Section 2.10.1 above).

*2.10.4.2 Cleaning and Repairs*

All respiratory devices will be inspected before and after cleaning and before and after repairs are made. The inspection procedures that are to be used are listed above under Section 2.10.3.

Any replacement items that will be used for repairs will be inspected prior to assembly.

*2.10.4.3 Periodic Checks of Items in Storage*

At least once during each quarter, all of the respirators that are in storage will be checked for serviceability and to make sure that they will be ready for immediate use. See Section 2.10.3.1.

2.10.5 Service Life Limitations

If the respirator equipment manufacturer specifies a shelf life or service life limit on one or more components of a respiratory protection system the Mill will comply with the recommendations of the manufacturer. This will ensure that the device continues to operate properly and that the "like-new condition" is maintained (see Section 1.5 above).

## 2.11 Recordkeeping

Records of all required activities in this program will be kept in a manner that shows compliance with the requirements of the applicable regulations. Specifically, the following records will be kept:

a) A log sheet for issuance and return of respirators;

b) A log sheet for damaged and defective respirators and the disposal of such devices;

c) A log sheet for cleaning, issuance and release of nose cups;

d) A removable alpha survey sheet for respiratory devices; and

e) Freshly cleaned and inspected respirators will be placed in plastic bags and sealed (see Section 2.10.3.1 above). The individual who cleaned and inspected the respirator will write the date on each bag and initial it to indicate the work has been done properly.

## 2.12 Limitations on Periods of Respirator Use and Relief from Respirator Use

As noted above under Section 1.1, the NRC has noted that the use of respiratory protection devices in the workplace can impose physiological and psychological stresses on workers, obstruct their vision, hinder their movements, and make effective communications difficult. In consideration of this, a respirator wearer will be permitted to leave the work area for any respirator-related cause. Reasons which may cause a respirator wearer to leave a work area, include, but are not limited to, the following:

a) Failure of the respirator to provide adequate protection;

b) Malfunction of the respirator;

c) Detection of leakage of air contaminant into the respirator;

d) Increased resistance to breathing;

e) Severe discomfort in wearing the respirator;

f) Illness of the wearer including: sensation of dizziness, nausea, weakness, fatigue, breathing difficulty, coughing, sneezing, vomiting, fever, or chills; and

g) Claustrophobia, anxiety, or other psychological factors that may affect the wearer.

## 2.13 Monitoring, Including Air Sampling and Bioassays

### 2.13.1 Evaluation of Respiratory Hazards

Before a respiratory protective device is used, the work area must be evaluated as to the type of hazards that may be encountered. The type of respiratory protection may be selected only after the hazard has been classified.

Most areas of the Mill have been evaluated for hazards during routine work assignments. Signs will be posted in the different areas that will indicate the type of respiratory device to be used under normal conditions.

Equipment needed:

a) Oxygen and Combustible Gas Detector;

b) MSA Orion or equivalent;

c) MSA Samplair Pump Kit (or similar) with the following detector tubes:

(i) Carbon Dioxide;
(ii) Carbon Monoxide;

(iii) Sulfur Dioxide;
(iv) Ammonia;
(v) Hydrogen Sulfide;
(vi) Nitrous Oxide;
(vii) Halogen Gases (Chlorine);
(viii) Acid fumes and mists; and
(ix) Organic vapors; and

d) Detector tubes for HF and any other potential gas, as determined by the RSO.

Many environmental designs were incorporated into the Mill's construction to keep exposures to most hazards at a minimum. This environmental equipment is checked frequently to ensure that it is functioning properly.

To ensure the reliability of these controls, monthly gross alpha and radon daughters samples will be collected at numerous locations throughout the Mill. Routine samples will also be collected in the vanadium precipitation and packaging areas and analyzed for airborne vanadium.

The routine samples have already identified some areas that require respirator use at all times during normal working conditions. These areas are inside the yellowcake dryer and packaging enclosures and the vanadium dryer area and the packaging area. Other areas that may require respirator use may include, but would not be limited to, the sample bucking room, and the SAG mill.

Respirators need not be worn routinely during normal working conditions in other areas of the Mill. At these locations, usage will be determined by the hazard level or at the worker's request. Occasionally, a condition may exist that the environmental controls cannot handle. At that time, the appropriate respirator must be used until the workplace atmosphere is returned to normal.

Infrequently, maintenance work will have to be performed in areas that are not normally sampled or areas that may have questionable air quality. Prior to anyone entering one of these areas, the environment must be evaluated to determine what hazards exist.

A Safe Work Permit is issued for all work tasks that are anticipated to present unidentified or unusual hazardous environmental conditions. A Radiation Work Permit (RWP) is issued for work in unassessed areas or for nonrecurring tasks for which engineering controls are not in place or practical. The Radiation Safety Department will be responsible for the evaluation of the areas before work begins.

When the oxygen concentration is listed as potentially hazardous, a portable detector will be used to determine the exact oxygen-air mixture. NIOSH defines that air which contains less than 19.5% $O_2$ is an oxygen-deficient atmosphere, and attempting to breathe such air is considered to present a hazard that would be immediately dangerous to life and health. Any area having less than 19.5% $O_2$ will not be entered until or unless the $O_2$ concentration returns to and is maintained at a level above 19.5%. If an area is identified as having an oxygen-deficient atmosphere, the oxygen levels must be remedied by

engineering controls prior to entry by personnel. The use of a SCBA will only be for emergency escape or emergency response purposes.

Other atmospheric hazards will be identified and quantified by using air sampling equipment, such as the MSA Samplair Pump (or similar device) with detector tubes for the specific contaminant in question. The instructions must be carefully read for every test, as each type of detector tube is handled differently.

After exposure to the atmosphere, the tubes will indicate the presence and concentration of the chemical for which that tube is designed. Chemical cartridges are good only in atmospheres in which the chemical concentration is less than the limit set by the manufacturer and the oxygen concentration is equal to or greater than 19.5%. As noted above, the Mill's policy is for workers not to enter an area in which the $O_2$ level is below 19.5%, but to enter such areas only in emergency situations, such as to retrieve an injured worker, and then with the use of a SCBA.

There are many other hazards that are very obvious but are often overlooked. The following are examples:

- dust concentrations have an adverse affect on breathing and/or the comfort of the individual; and
- some substances may cause irritation to the eyes, nose, throat, etc., but may not be chemically toxic.

These and other such conditions should always be considered in evaluating respiratory hazards. If there is any doubt about the conditions within the work area, a respiratory device should be used. Always be conservative.

### 2.13.2 Breathing Zone Air Samples

Breathing zone samples are collected to determine the air contamination concentration an individual may be exposed to during the execution of his job. The respiratory protection factor is used to calculate the individual's exposure during the work task duration. The application of a respiratory protection factor assigned to the particular respiratory device is used to reduce an individual's exposure to an air contaminant concentration as determined by breathing zone sampling. Routine breathing zone samples are collected by the use of a small belt-mounted pump attached to a hose that is, in turn, attached to the person's clothing close to the head (or breathing zone). The sample is collected for a period of time that would be representative of one eight hour workday. They are collected in such a manner that the material collected will be representative of that being inhaled by the individual wearing the sampler. See Section 1.1.2 of the Mill's Radiation Protection Manual for the detailed procedures to be followed for breathing zone samples.

### 2.13.3 Bioassay Program

Evaluation of the effectiveness of the respiratory protection program will be accomplished by air sampling (described above in 2.13.2) and by the Mill Bioassay Program.

Those workers who are working in areas that require the use of respirators will submit a urine specimen for analysis on a biweekly basis. Workers who use respirators during maintenance may also be required to submit specimens after maintenance ceases. The samples will be collected from individuals who have performed maintenance tasks in atmospheres that are significantly elevated in contaminant concentration or they are working in such an area for an extended period of time.

The specimens will be analyzed for uranium content.

See Section 1.4 of the Mill's Radiation Protection Manual for the detailed procedures to be followed for bioassays.

## 2.14 Communication

Respiratory protection devices limit the wearer's ability to communicate. However, all respirator users must be able to communicate well enough to be able to work safely and to keep radiation doses ALARA. The RSO will use his judgment in determining how these goals can best be satisfied. In many situations, adequate communication can be maintained by training the respirator wearers to speak slowly and distinctly. In other situations, especially where ambient noise levels are high or where respirator wearers must communicate across long distances, voice-amplification devices or other types of systems might have to be employed.

If voice-amplification devices are attached to the respirator or require a modification of the respirator, they must be listed on the manufacturer's schedule of approved subassemblies. This ensures that the NIOSH approval for the device remains in force with the addition of the communications equipment.

After-market communications devices supplied by a company other than the respirator manufacturer may be used as long as they do not alter the form, fit, or function of the respirator. Any such after-market device that attaches to or requires penetration of the respiratory inlet covering is likely to void the NIOSH approval for the device.

## 2.15 Vision

Some types of respirators prevent the wearer from using standard spectacles or from using them properly. The ear pieces of standard spectacles pass through the seal area of full-facepiece respirators and are therefore not allowed. However, respirator users must be able to see well enough to be able to work safely and to keep radiation doses ALARA. The RSO will use his judgment in determining how these goals can best be met.

Most manufacturers of full-facepiece respirators offer a spectacle adapter kit. Non-manufacturer-supplied adapters may be acceptable if they do not interfere with the facepiece seal and if they do not cause any distortion of vision, damage the lens of the face-piece, or cause any harm to the wearer during use. Home-made adapters are not acceptable, not is it acceptable to simply tape the spectacles inside the facepiece.

## 2.16 Use of Respirators in Low Temperatures

The RSO should recognize the potential problems associated with respirator use in subfreezing environments, discussed below, and take special care when respirators are used in subfreezing temperatures.

### 2.16.1 Lens Fogging

Fogging of the inside of the respirator lens is commonly experienced in full facepiece respirators. The fogging is caused by the condensation of the moisture in exhaled breath that comes in direct contact with the inside of the lens. Most full facepiece respirators have air inlet ducts positioned to direct the inhaled air across the inside of the lens as it enters the facepiece. This clears off the accumulated condensation, but the lens fogs again during exhalation. The cooler the ambient air temperature, the less effective the lens clearing provided during inhalation. At temperatures below freezing, lens frosting can occur that will not be removed during inhalation and may eventually seriously obscure the wearer's vision. Lens fogging and frosting, therefore, can present a significant safety hazard by restricting the wearer's ability to see clearly in the work place. Some possible solutions to the fogging and frosting problem, that can be employed by the RSO in his discretion, are:

a) Nose Cup.

Most full-facepiece manufacturers provide an optional component called a nose cup. It is attached to the inside of the facepiece in such a way that it directs the stream of exhaled air directly into the exhalation valve, minimizing the amount of moist air contacting the interior of the lens.

b) Anti-Fog Applications.

Most full-facepiece manufacturers provide an anti-fog material that limits fogging when applied to the interior of the respirator lens.

c) Plastic Inserts

Thin plastic inserts that are applied to the inside of the facepiece lens to form a double-pane insulating barrier may effectively reduce fogging.

Before using commercial anti-fogging products (that are not supplied by the respirator manufacturer), the RSO should check with the respirator manufacturer regarding the compatibility of these products with their facepieces.

NIOSH requires that facepieces used with SCBA be designed to prevent lens fogging. This means that, in order to maintain the NIOSH certification of the device, a nose cup or some other method must be used when fogging might be a problem.

### 2.5.2 Exhalation Valve Freezing

Another potential problem when using any type of face-sealing respirator in subfreezing temperatures is the possibility that the exhalation valve could freeze. If the valve freezes shut, exhaled air will be exhausted through the face-to-facepiece seal area and the respirator wearer will be aware of the malfunction. In this case, the respirator will probably provide adequate protection as the wearer exits the work area.

If the valve freezes in the open position, or if ice forms on a portion of the exhalation valve seat, a path is created for contaminated ambient air to enter the respiratory inlet covering. If the device in use were a PAPR or a continuous-flow supplied-air respirator, it is likely that the respirator wearer would not be aware of the malfunction, although the internal dose consequences of this type of failure would probably be limited.

If the device in use were a pressure-demand supplied-air device (e.g., air line-supplied or SCBA), it is likely that the respirator wearer would recognize that a malfunction had occurred since air would leak out of the facepiece through the exhalation valve. Even though the wearer would continue to be adequately protected, he or she should exit the work area immediately since a respirator malfunction has occurred. If the device in use is a SCBA, the duration of the air supply will be reduced because of the loss of breathing gas from the supply cylinder.

If the device in use is operated in the negative pressure mode, it is unlikely that the respirator wearer would be aware of the malfunction. The air breathed by the wearer would, at least in part, be unfiltered ambient air entering the respiratory inlet covering through the open exhalation valve during the negative-pressure (inhalation) portion of the breathing cycle.

## 3. PROCEDURES FOR MEDICAL EVALUATIONS AND AUDITS

### 3.1 Performing and Documenting the Required Medical Evaluation

Medical qualification will be required of each worker that might be using a respirator in his or her normal work duties. This is necessary to evaluate the individual's limitations to wearing respirator devices.

### 3.1.1 The Mill's Physician

The medical evaluation will be performed by a licensed physician, selected by the RSO, to determine that the individual user is medically fit to use the respiratory protection equipment. The RSO will choose a physician with an appropriate specialty (e.g., internal medicine, industrial medicine, family practice), and the physician will be licensed to practice medicine in the United States.

### 3.1.2 Establishing and Performing the Evaluation

The medical screening process and tests and acceptance criteria will be determined by the physician and will include a medical history and will be sufficient (in the opinion of the physician) to identify any person who should not use respiratory devices for medical reasons, or who should be limited to the use of specific types of respirators. The physician will report any medical restrictions the worker has that would limit the individual's ability to use a respirator. Based on the physician's recommendations, any worker may be subject to additional or more frequent medical evaluation as deemed necessary by the physician.

ANSI Z88.6-1984, "Respirator Use – Physical Qualifications for Personnel," provides guidance that is acceptable to the NRC staff for the physician to use in determining medical fitness. The screening method may include a medical history questionnaire and spirometry testing. The physician, however, establishes the precise screening method.

The medical evaluation program should be carried out by the physician, or by a certified, medically trained individual such as a registered nurse (RN), licensed practical nurse (LPN), emergency medical technician (EMT), or someone who, in the judgment of the physician, has adequate experience education, training, and judgment to administer the screening program.

Medical evaluations performed by a physician other than the Mill's designated physician may be acceptable as long as comparable screening tests and acceptance criteria are used for screening individuals.

### 3.1.3 Timing of Medical Evaluations

The initial medical evaluation to determine a worker's fitness to use respirators must be accomplished prior to respirator fit-testing.

The worker must be re-evaluated medically every 12 months thereafter or at some other frequency established by the Mill's physician. The Mill's physician has established the following frequency for re-evaluation:

- Every five years for workers under the age of 45; and
- Every year for workers 45 years or older.

### 3.1.4 Failure to Meet the Acceptance Criteria

Individuals whose screening results fall outside the range of the criteria established by the Mill's physician may have their cases evaluated by the physician. This evaluation might consist only of a review of the written record, or it might involve a hands-on examination. In these situations, the physician might permit the individual to use one or more types of respirators judged to impose less stress, and prohibit the use of other more stressful devices. The Mill's physician may confirm the outcome of the screening by prohibiting the individual from using any respirator.

### 3.1.5 Privacy of Medical Records

Medical records and the results of medical screening tests will be kept private to the extent possible. The only information that will be transmitted from the RSO and any other respiratory program supervisory personnel to the non-supervisory personnel in the respirator department is whether or not an individual may use respirators, or which devices may be used and which may not be.

## 3.2 Maintaining TEDE ALARA and Performing ALARA Evaluations of Respiratory Protection

### 3.2.1 ALARA Evaluations

As stated in the Policy Statement in 1.0, the Mill will use, to the extent practical, procedures and engineering controls based on sound protection principles to achieve exposures to radiation ALARA, and shall limit intakes by means of engineering controls or procedures, along with the use of respirators, consistent with maintaining the TEDE ALARA.

The Mill will endeavor to limit the use of respirators to situations in which respirator use has been shown to keep TEDE ALARA. Other methods of protection against airborne radioactive material, such as the use of process or other engineering controls, limitation of exposure times, decontamination and so on, will be considered before the use of respirators.

Mill staff will perform an ALARA evaluation of the types of situations that will require the use of respirators and, if necessary, for unusual or non-recurring circumstances. As mentioned above, there are undesirable effects from the use of respiratory protection. The use of respiratory protection devices in the workplace can impose physiological and psychological stresses on workers, obstruct their vision, hinder their movements, and make effective communications difficult. These factors increase the risk of physical injury to respiratory wearers that, in many cases, far exceed any potential risk associated with the inhalation of a small quantity of airborne radioactive material. Therefore, when performing an ALARA analysis for the use of respiratory protection in any circumstances, and the results do not show a clear, obvious indication (to use or not use respirators), the RSO will use professional judgment as to whether or not to assign respirators in the circumstances.

When a specific ALARA evaluation is performed to justify the use or nonuse of respirators, the evaluation will consider the following elements:

a) The use of process and engineering controls, filtered ventilation systems, and decontamination before the use of respiratory protection devices;

b) Control of access, limitation of exposure time, and the use of other types of exposure controls before the use of respiratory protection devices, and

c) The estimated benefit.

In performing an ALARA evaluation, when deciding which respirator is to be considered for assignment during a specific task, the RSO will divide the average ambient concentration of radioactive material in work place air (or the estimated average) by the appropriate DAC value for the contaminants present. The number obtained may be considered initially as an ideal minimum APF for the selected device. If the ALARA evaluation determines that use of a respiratory protection device might be justified, the RSO should consider a device with this APF or greater. If selection of a respirator with this APF is inconsistent with ALARA, however, the RSO may select a device with a lower APF. Worker safety factors other than radiological factors, such as heat stress or impaired vision, should be taken into account when performing such an ALARA evaluation. Consideration should also be given to the possibility that the planned work will cause re-suspension of radioactive material, thus increasing the average concentration during the task.

The extent and level of detail addressed in TEDE ALARA evaluations should be commensurate with the potential radiological and physical risks involved in the activity. The RSO should consider the following factors in an evaluation of whether respirator use is ALARA:

- Environmental conditions;
- Protective equipment and clothing, including the respirator, that would be required for the activity being evaluated and their effects on worker efficiency;
- Comfort level of the workers regarding the use of respirators;
- Experience and skill level of the individual with respect to the task;
- Process and engineering controls to be used;
- Specific details of the tasks to be performed (e.g.. dose rates, estimated average airborne concentrations); and
- Potential post-activity negative impacts (e.g., personnel decontamination and skin dose assessments, portal monitor alarms).

Such evaluations may either be job-specific or be performed for general job types. ALARA evaluations performed for general job types will be reviewed periodically, as necessary, to ensure that none of the assumptions or parameters upon which the evaluation is based have changed.

The RSO should be able to support the decision to use or not to use respirators in each circumstance. Supporting information could include the results of surveys, measurements and calculations, previous history with this or similar jobs, or other pertinent data. The judgment of individuals, such as the RSO, with extensive knowledge and experience in the field may also be sufficient in circumstances that are not amenable to quantitative analysis.

For ALARA evaluations, a respirator-induced worker inefficiency factor of up to 15% may be used without further justification. Larger worker inefficiency factors may be used, but the RSO should have test data to support them.

3.2.2 Estimated ALARA Benefit

The evaluation should demonstrate whether of not the TEDE for the job will be ALARA; that is, whether the internal dose avoided by using the respiratory protection equipment is likely to be greater than or less than any additional external dose that may result from the use of these devices from respirator-induced and other factors. Non-radiological factors should be included.

3.2.3 ALARA Evaluation – Records

The Mill has established 0.50 mrem/hr for prospective external deep dose equivalent from a task or job below which a record of an ALARA evaluation for the use of respirators is not needed. A Radiation Work Permit (RWP) may serve as the record of an ALARA evaluation for the use of respirators for a specific task or job.

Regardless of the magnitude of the projected external and internal dose, the RSO does not need to perform or record ALARA evaluations before requiring the use of respiratory protection equipment as a precautionary measure when there is a large uncertainty about the magnitude of the projected concentrations of airborne radioactive material to which the workers will be exposed (e.g., a new job with significant airborne contamination potential, but with no history of previous similar jobs).

3.2.4 Exceptions to ALARA Requirements for Respirators

The RSO may require the use of respirators in any situation where, in his judgment, respiratory protection would be appropriate, even though a dose assessment would indicate that respiratory protection is not required.

However, when the use or non-use of respirators has no clear impact on TEDE, the RSO should opt to not use respirators in most circumstances.

A reduction in TEDE for a worker would not be reasonable if an attendant increase in the worker's industrial health and safety risk (e.g., from a vision limitation or other respirator-related problem) would exceed the benefit to be obtained by reducing the risk associated with the reduction in TEDE.

## 4. PROCEDURES FOR RESPIRATOR APPLICATIONS

### 4.1 Routine Respirator Use

Donning a respirator must be performed in accordance with the training provided.

Procedures for routine respirator use are set out in detail in the foregoing Sections of this Program.

## 4.2 Non-routine Respirator Use

Non-routine Respirator Use shall be defined as use of respirators in un-assessed areas or for nonrecurring tasks for which engineering controls are not in place or practical. The same procedures apply to non-routine respirator use as apply to routine respirator use, as detailed in this Program.

## 4.3 Emergency Respirator Use

Emergency Respirator Use shall be for recovery of an injured person from an area where air concentrations of radioactive material may be high, the breathing quality of the ambient air has not been assessed, or the area may become immediately dangerous to life or health because of the presence of nonradiological hazards.

Respirators designed for emergency use will be stored in areas that are readily accessible to all workers. Emergency cabinets are located on the north side of the Mill building outside of the SAG Mill doors, outside the SX on the north wall, on the south end of SX on the fire cabinet, and at the fire hose station at the front gate.

The equipment preferred for emergency entry into an unassessed environment, or into an area with high concentrations of a chemical hazard, is the SCBA operated in the pressure-demand mode, with a minimum rated service life of 30 minutes. For other emergency use against airborne radioactive material, the full face air purifying respirators normally used at the facility will be adequate.

The use of demand SCBA in emergency firefighting situations is not permitted, because such respirators do not meet National Fire Protection Association standards.

## 4.4 Safety

### 4.4.1 General

Procedures intended to ensure the safety of the worker are set out in detail in the foregoing Sections of this Program

### 4.4.2 Un-Assessed Environments

For entry into areas where the level of hazard has not been assessed because of the existence of unusual conditions, or in response to unanticipated releases of radioactive material, workers must use only SCBA operated in pressure-demand mode. However, the use of SCBA to circumvent the pre-exposure sampling requirement (R313-15-703(3)(a), 10 CFR 20.1703(c)(1)) is not permitted for non-emergency activities.

### 4.4.3 Emergency Escape

For emergency escape from normally safe environments, where a respiratory hazard might develop suddenly, any of the full face, PAPR or SCBA devices used at the Mill

may be used so long as it provides adequate short-term protection against the type of hazard that might be encountered.

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**VIA PDF AND FEDERAL EXPRESS**

September 28, 2009

Mr. Dane Finerfrock, Executive Secretary
Utah Radiation Control Board
Utah Department of Environmental Quality
168 North 1950 West
P.O. Box 144810
Salt Lake City, UT 84114-4810

Dear Mr. Finerfrock:

**Re: Renewal Application for Radioactive Materials License (RML) No. UT1900479: Health Physics Interrogatories – Round 2; and Engineering Comment Interrogatories – Round 1**

Reference is made to our letter of August 14, 2009 in response to the Executive Secretary's correspondence of July 2, 2009 with attached Health Physics and Engineering Comment Interrogatories.

As contemplated by our response to Health Physics Interrogatory Statement No. 12, enclosed please find a draft revised Respiratory Protection Program for the White Mesa Mill, together with a marked version showing the proposed changes to the Program.

If you should have any questions or require additional information, please contact the undersigned.

Yours very truly,

**DENISON MINES (USA) CORP.**

By:

David C. Frydenlund
Vice President, Regulatory Affairs and Counsel

cc: Ron F. Hochstein
Harold R. Roberts
Steven D. Landau
David E. Turk
C-F

# RESPIRATORY PROTECTION PROGRAM

## Table of Contents

# RESPIRATORY PROTECTION PROGRAM

## ~~1.0~~1. APPLICABILITY

~~The~~This Respiratory Protection Program ~~coordinates~~sets out the

~~1. Air sampling sufficient to identify the potential hazard, select the proper equipment, and estimate exposures;~~
~~2. Surveys and bioassays, as appropriate, to evaluate actual intakes;~~
~~3. Testing of respirators for operability prior to each use;~~

~~Written~~Mill's procedures regarding~~:~~

4.~~•~~ selection, fitting, issuance, maintenance, and testing of respirators, including testing for operability immediately prior to each use; supervision and training of personnel; monitoring, including air sampling and bioassays; and record keeping; and

5.~~•~~ Determination by a physician ~~prior to the initial fitting of respirators, and either every 12 months thereafter or at a greater frequency determined by a physician,~~ that the individual user is medically fit to use the respiratory protection equipment ~~(over the age of 45) or every five years for individuals under 45 years of age~~.

## 1.1 ~~1.1~~ Respiratory Protection Policy

The Respiratory Protection Program is established for ~~this facility as a policy of Denison Mines (USA) Corp. (DUSA)~~the Mill to protect its ~~employees~~workers from occupational exposure to harmful concentrations of radioactive and/or toxic materials in the air.

~~The following is DUSA's policy with respect to respiratory protection:~~

~~1. Process or other engineering controls will be used whenever feasible to reduce the need for use of respirators.~~
~~2. For work in areas in which respirators must be routinely used to reduce exposures, SOP's will detail use of respiratory protection. Non-routine use of respirators will be performed under Safe Work Permits. Self Contained Breathing Apparatus ("SCBA") respirators will only be used for evacuation and emergency response situations.~~
~~3. Due to the added physical stress of working while using a respirator, work periods will be alternated with rest periods.~~
~~4. Respirators will not be issued to employees unless they are to be used.~~

## ~~1.2 Responsibilities~~

As noted in United States Nuclear Regulatory Commission ("NRC") Regulatory Guide 8.15, "it is widely recognized among safety professionals that the use of respiratory protection devices in the workplace can impose physiological and psychological stresses on workers, obstruct their vision, hinder their movements, and make effective

communications difficult. These factors increase the risk of physical injury to respirator wearers that, in many cases, far exceeds any potential risk associated with the inhalation of a small quantity of airborne radioactive material." Therefore, ~~the NRC recommends that~~ process or engineering controls should be used to the extent practical to control the concentration of radioactive material in air, and ~~that~~ the use of respiratory protection devices should be contemplated only after other measures to limit intake have been considered.

The following is the Mill's policy with respect to respiratory protection:

a) Process or other engineering controls will be used whenever feasible to reduce the need for use of respirators;

b) For work in areas in which respirators must be routinely used to reduce exposures, standard operating procedures ("SOP's") will detail use of respiratory protection. Non-routine use of respirators will be performed under Radiation Work Permits. Self Contained Breathing Apparatus ("SCBA") respirators will only be used for evacuation and emergency response situations;

c) Due to the added physical stress of working while using a respirator, work periods will be alternated with rest periods; and

d) Respirators will not be issued to workers unless they are to be used.

Respirators are provided to workers for their personal protection and the proper use of respirators in areas in which such protection is required is a condition of their employment. Violating the established rules for respirator use may result in disciplinary action up to and including dismissal.

## 1.2 Supervisory Positions and Responsibilities

In general, the Mill Manager is responsible for providing the equipment and resources necessary for the successful implementation of ~~the~~this Respiratory Protection Program and for facilitating the application of engineering controls to reduce the need for the use of respiratory protection devices.

The Mill's Radiation Safety Officer ("RSO") has primary responsibility for implementation and oversight of all aspects of the respiratory protection program~~.~~, including supervisory and technical responsibilities. The RSO is assisted by one or more Radiation Technicians or other Radiation Safety Department staff.

The Mill Manager and the RSO will coordinate efforts to use, to the extent practical, procedures and engineering controls based on sound protection principles to ~~achieve ALARA.~~maintain radiation exposures as low as reasonably achievable ("ALARA").

~~1.2.1 Mill Manager~~

The Mill Manager is responsible for ensuring that a respiratory protection program, meeting or exceeding that specified by regulation, is established and maintained for the employees under his or her jurisdiction.

1.2.21.2.1 Radiation Safety Officer

The (RSO) is responsible for the implementation and direct control of the respiratory protection program. The RSO is charged with the followingRSO's responsibilities include:

1.a) Supervision of respirator selection procedures.;

2.b) Establishment of training sessions about respiratory equipment for employees.workers;

3.c) Establishment of a continuing program of cleaning and inspecting the equipment.;

4.d) Designation of proper storage areas for respiratory equipment.;

5.e) Establishment of issuance and accounting procedures for uses of respiratory equipment.;

6.f) Establishment of medical screening programs and procedures for employeesworkers assigned to wear respiratory equipment.;

7.g) Establishment of a periodic inspection schedule of those work places/conditions requiring respiratory equipment to determine exposure and/or changing situations.; and

8.h) A continuing evaluation of the above aspects to assure ensure their continued functions and effectiveness.

1.2.3 Employees

Respirators are provided to employees for their personal protection and the proper use of respirators in areas in which such protection is required is a condition of their employment. Violating the established rules for respirator use may result in disciplinary action up to and including dismissal.

1.2.2 Radiation Technicians and Other Radiation Safety Department Staff

In administering the program, the RSO will be assisted by one or more Radiation Technicians, who may perform supervisory and technical functions, as determined by the RSO, and one or more other members of the Radiation Safety Department Staff, who may perform technical functions. Each such individual must have adequate training to undertake his or her assigned responsibilities, as determined by the RSO.

1.2.3 Respirator Program Administrator

The RSO is the Respiratory Program Administrator. However, the RSO may appoint a Radiation Technician as Respirator Program Administrator, in his stead, to administer the program under the direction and supervision of the RSO.

1.2.4 Training and Re-Training Requirements

The RSO and any Radiation Technician will be required to have satisfied the requirements for those positions as set out in NRC Reg. Guide 8.31 and to be current in their refresher training as set out in that Reg. Guide. Any other member of the Radiation Safety Department who has been given technical responsibilities under this program will have adequate training in order to undertake those responsibilities, as determined by the RSO. Each Radiation Technician will also have completed the training specified in Section 2.2 below.

1.2.5 Qualifications for Appointment

The RSO and, if so appointed by the RSO, one or more Radiation Technicians, will have supervisory responsibility and may also have direct responsibility for various technical aspects of this program. Such individuals will meet the requirements for the position of RSO and Radiation Technician as set out in NRC Reg. Guide 8.31, and will have completed the training specified in Section 2.2 below.

Any other members of the Radiation Safety Department who perform technical functions under this program will have the qualifications and training required to perform the function, as determined by the RSO.

## 1.3 Policy Regarding Facial Hair (Face to Facepiece Seal Integrity)

~~The proper~~ Anything in the face-to-facepiece seal area of a tight-fitting ~~of a respiratory device~~respirator that is under the control of the respirator user is ~~necessary to ensure that it will function adequately. Facial hair (beards, mustaches, and long sideburns) will not allow an airtight seal to be formed between the face and mask, as contaminated air will enter into the wearer's breathing zone if the proper~~prohibited. Materials in this area might interfere with the seal ~~is not achieved~~of the respirator, might prevent proper exhalation valve function, or might impair the operation of a facepiece-mounted air regulator. Leakage of air into the mask will nullify the purpose of the respiratory device.

The list of prohibited materials includes (but is not necessarily limited to) facial hair of any kind (e.g., beards, mustaches and long sideburns) in the seal area (the worker must be clean-shaven), hair from the head intruding into the seal area, cosmetics, spectacle temple bars, protective clothing, and equipment. A respirator wearer is not required to shave more than once during each 12-hour period.

The policy of ~~DUSA~~the Mill concerning facial hair is:

As a condition of employment, those ~~employees~~workers who may at any time be required to wear a respirator as part of their employment, will not have any facial hair or other features that will restrict the proper fitting of a respiratory device.

## 1.4 ~~1.4~~ Physiological or Psychological Limitations to Respirator Use

This ~~section~~Section describes physiological and psychological (including emotional) factors, which may limit an individual's ability to wear or work in a respirator. Any questions or problems concerning respirators or their use, such as the types described in this ~~section~~Section, should be addressed to the RSO.

### ~~1.4~~1.4.1 ~~1~~ Physiological Limitations

As described below in Section 3.1, medical qualification will be required of each ~~employee~~worker that might be using a respirator in ~~their~~his or her normal work duties. This is necessary to evaluate the individual's limitations to wearing respirator devices. A licensed physician ~~to~~will perform the medical evaluation and will determine ~~that~~if the individual user is medically fit to use the respiratory protection equipment ~~will perform the medical evaluation.~~. The physician will report on any physiological factors that may limit an individual's ability to wear a respirator.

### 1.4.2 ~~1.4.2~~ Psychological Limitations

Mental factors must also be taken into consideration when ~~employees~~workers are required to wear respirators. Some individuals become claustrophobic when wearing a respirator. These individuals should not be required to wear respirators if the condition is severe enough to cause panic.

### 1.4.3 ~~1.4.3~~ Other Factors

Other factors, which may cause problems in respirator sealing, must be considered when performing fit testing. These may include such factors as facial structure, scars, skin creases, or dentures.

## 1.5 Equipment

Only National Institute for Occupational Safety and Health ("NIOSH") tested and certified and Mine Safety and Health Administration ("MSHA") approved respiratory protection devices will be used at the Mill. In addition, these devices must be used, maintained, and stored in such a manner that they are not modified and are in like-new condition at the time of issue. A reasonable amount of wear that does not affect performance is acceptable.

The Mill will provide adequate equipment or material, as necessary to supplement respiratory protective equipment, to reduce the likelihood that respirator use might contribute to workplace accidents or injury. Examples of such equipment are:

- Spectacle adapters;
- Voice amplification equipment; and
- Material or equipment to prevent or reduce fogging of respirator lenses.

Safety or protective equipment used in conjunction with respirators should not interfere with the proper fit or operation of the respirator. Manufacturer-supplied equipment (e.g., welder's shields, communications devices) specified on the approved subassemblies list for the respirator may be used in accordance with the manufacturer's instructions. Equipment or devices supplied by a company other than the respirator manufacturer may be used as long as they do not alter the form, fit, or function of the respirator. Any such device that attaches to or requires penetration of the respiratory inlet covering is likely to void the NIOSH approval for the device and should not be used.

## 2.02. PROCEDURES FOR RESPIRATOR USE

### 2.1 Supervision of the Program, Including Program Audits

TheThis Respiratory Protection Program is administered by the RSO. Quarterly ALARA Reports from the RSO are sent to members of the ALARA Committee. The effectiveness of the Respiratory Protection Program is reviewed and exposure data evaluated during annual ALARA audits.

### 2.2 Training and Minimum Qualifications of Respiratory Protection Program Supervisors and Implementing Personnel

A supervisor, that is, a person who has the responsibility of overseeing the work activities of one or more persons who must wear respirators, shall be given adequate training to ensure the proper use of respirators. Supervisor training shall include but shall not necessarily be limited to the following subjects:

1.a) Basic respiratory protection practices.;

b) Nature and extent of respiratory hazards to which persons under his/her supervision may be exposed.;

2.
c) Principles and criteria of selecting respirators.;

3.
d) Training of respirator wearers.;

4.
e) Issuance of respirators.;

5.
f) Inspection of respirators.;

6.
g) Use of respirators, including monitoring their use.;

7.
8.h) Maintenance and storage of respirators.; and

9.i) Regulations concerning respirator use.

## 2.3 Training of Respirator Users

Each employeeworker who may wear a respirator will be required to receive training for the proper use of the device. The following outline will be followed during the training process.

A. 1. 1 Need for Respiratory Protection, Equipment

B. Mechanics of Breathing

C. Types of Respiratory Particles

1. Dust
2. Fumes
3. Mists

D. DUSA's Respiratory Company Respiratory Protection Policy Statement

E. Respiratory Hazards

1. Airborne uranium and effect
2. Radon daughters and effect
3. Chlorine and effect
4. Ammonia and effect
5. Airborne vanadium and effect
6. Acid gases and effect
7. Other effects

F. Engineering Controls

1. De-mister
2. Ventilation
3. Ventilating systems for the yelloweake dryer and packaging rooms

G. Respirator Selection

1. Type of respirators, their function, limitations

a) Full face with combination cartridges
b) Powered Air Purifying Respirators (PAPR) with radiological dust cartridges
c) Self-contained breathing apparatus
d) NIOSH and MSHA approved respirators only

H. Identification of Hazards

1. $O_2$ content

2. Routine hazards
3. Non-routine hazards

I. Instructions on Field Inspection of the Respirator

1. Valves
2. Body of mask
3. Straps
4. Lens
5. Air hoses

J. Fitting, Donning and Wearing Instructions and Training

Wearing instructions and training (including practice demonstrations) shall be given to the requirement for each respirator wearer and shall cover the following items.

a) Donning (includinguser to inspect and perform a user seal check), wearing, and removing the on a respirator.
b) Adjusting the respirator so that its respiratory inlet covering is properly fitted on the wearer and so that the respirator causes minimum of discomfort to the wearer.

c) Allow the respirator wearer to wear the respirator in a safe atmosphere for an adequate period of each time it is donned. The required training for all potential respirator users is found in Addendum 9 of the Mill's Training Manual, SOP Book 13. Such training shall cover the topics necessary to ensure that the wearer is familiar with the operational characteristics of the respirator.each trainee will:

K. Respirator Sealing Problems

Respirators shall not be worn when conditions prevent a seal.Be informed of the hazard to which the respirator towearer may be exposed, the wearer's face. For example:

a) A person who has hair (beard stubble, mustache, sideburns, beard, low hairlines, or bangs) that passes betweeneffects of contaminants on the face and the sealing surface of the face piece of wearer if the respirator shallis not be permitted to wear such a respirator.
b) A person who has facial hair (mustache or beard) which interferes withworn properly, and the function of a respirator valve(s) shall not be permitted to wear such a respirator.

c)a) Glasses, which have temple bars, or straps, which passes between the sealing surface of a respirator's full face piececapabilities and the wearer's face, shall not limitations of each device that may be used.;

d) A head covering which passes between the sealing surface or a respirator face piece and the wearer's face shall not be used.

e) The wearing of glasses or goggles, a face shield, a welding helmet, or other eye and face protective device, which interferes with the seal of a respirator to the wearer, shall not be allowed.

f) If scars, hollow temples, excessively protruding cheekbones, deep creases in facial skin, the absence of teeth or dentures, or unusual facial configurations prevent the seal of a respirator face piece to a wearer's face, the person shall not be permitted to wear the respirator.

g) If missing teeth or dentures prevent the seal of a respirator mouthpiece in a person's mouth, the person shall not be allowed to wear a respirator equipped with a mouthpiece.

h) If a person has a nose of a shape or size that prevents the closing of the nose by the nose clamp of a mouthpiece/nose clamp type of respirator, the person shall not be permitted to wear this type of respirator.

L. Maintenance, Storage, and Respirator Exchange Procedures

1. Cleaning, sanitizing, and maintenance techniques for all types of respirators.

2. The frequency of respirator exchange (clean exchanged for used).

a) Heavy use
b) Occasional use

3. The steps that are to be taken to exchange respirators.

4. When, how, and why SCBA are used.

M. Leaving a Hazardous Area

1. A respirator wearer shall be permitted to leave the hazardous area for any respirator related cause. Reasons which may cause a respirator wearer to leave a hazardous area included but are not limited to the following:

a) Failure of the respirator to provide adequate protection.
b) Malfunction of the respirator.
c) Detection of leakage of air contaminant into the respirator.
d) Increase resistance to breathing.
e) Severe discomfort in wearing the respirator.
f) Illness of the wearer including sensation of dizziness, nausea, weakness, fatigue, breathing difficulty, coughing, sneezing, vomiting, fever, or chills.

~~g) Claustrophobia, anxiety, or other psychological factors that may affect the wearer.~~

~~N. Emergency respirator use:~~

~~1. SCBA (self-contained breathing apparatus)~~
~~2. Emergency respirator issuance~~

~~O. Regulations for respirator use:~~

~~1. 10 CFR Part 20 Subpart H~~

b) Be shown how spectacle adapters, communications equipment, and other equipment that will be used directly in conjunction with the respirator are to be attached and operated properly;

c) Be able to demonstrate competency in donning, using, and removing each type of respiratory protective device that may be used;

d) Be instructed in how to inspect each type of respiratory protective device that may be used and be instructed to perform such an inspection before donning any device;

e) Be instructed in how to perform a user seal check on face-sealing devices and be instructed to perform this user seal check each time this type of device is donned;

f) Be informed that any respirator user may leave the work area at any time for relief from respirator use in the event of equipment malfunction, physical or psychological distress, procedural or communications failure, significant deterioration of operating conditions, or any other condition that might necessitate such relief; and

g) Be advised that in case of respirator malfunction or wearer distress, the respirator may be removed as the respirator user exits the airborne contamination area.

## 2.4 Fit Testing

### 2.4.1 General

Fit testing must be performed for all face sealing respirators, even if they will be used in a positive pressure mode in the field. The worker should be fit-tested with the same make, model, style and size of respirator that will be used in the field.

Each person being fit-tested should already have been trained in how to properly don, and perform a user seal check on, a face-sealing respirator. Therefore, during the test, no

person (including the person administering the fit-test) should assist or coach fit-test subjects who are not obtaining a satisfactory facepiece seal.

Qualitative fit-testing and quantitative fit testing must be accomplished with the face piece operating in the negative pressure mode, regardless of the mode of operation in which it will be used in the field.

Filters used during fit-testing should be at least 99.97% efficient, even if less efficient filters will be used in the work place. The fit-test is intended to measure only face-to-facepiece leakage, so filter efficiency on the test respirator should be as high as possible.

During training or operation, perceptible outward leakage of breathing gas from the face-to-facepiece seal area of any SCBA is unacceptable, and the wearer should not be permitted to continue to use the device. Such leakage will quickly deplete the available breathing gas and if used in an emergency could easily place the wearer in jeopardy.

2.4.2 **Frequency** –of Testing and Re-testing

Fit testing must be performed **annually for every** ~~employee~~worker **who is required to wear a respiratory protective device.**

Retesting should be performed before the next respirator use when the RSO has knowledge that a potential respirator wearer, since the last fit-test, has had:

a) A weight change of 10% or more;

b) Significant facial injury or scarring in the area of the facepiece seal;

c) Significant dental changes (e.g., multiple extractions without prosthesis or acquisition of new dentures;

d) Reconstructive or cosmetic surgery in the area of the facepiece seal; or

e) Any other condition that might change the fit of a face-sealing respirator.

The Mill will advise respirator users of these retest criteria either during general training sessions or during initial fit-testing, and will advise users to advise the RSO of any of the foregoing circumstances.

2.4.3 **Quantitative** ~~fit-testing will be performed using the FitTester 3000, or equivalent.~~Fit Testing

*2.4.3.1 General*

Quantitative fit testing is acceptable for testing all face-sealing devices.

If quantitative fit testing is used to test facepieces that will be operated in the negative pressure mode in the field (e.g., full face respirators), an overall fit factor of at least 10

times the assigned protection factor ("APF") should be demonstrated. Requiring that the overall fit factor meets the acceptance criterion means that the fit factor for one or more of the individual test exercises might be less than the acceptance criterion, but a satisfactory overall fit-test can still be achieved.

If quantitative fit testing is used to test facepieces that in the field will be operated only in a positive pressure mode, an overall fit factor of at least 500 (not 500 times the APF) should be demonstrated with the facepiece operating in negative pressure mode. Face sealing devices that operate in a positive pressure mode are powered air purifying respirators ("PAPRs") and SCBA.

During all quantitative fit-tests, the sample point inside the facepiece should be midway between the mouth and the nose of the test subject.

*2.4.3.2 Quantitative Fit Testing Procedure*

Quantitative fit testing measurements will be performed in accordance with 29 CFR 1910.134 using the FitTester 3000, or equivalent, as follows ~~on the FitTester 3000, or equivalent:~~:

~~a.~~

a) Input the ~~employee's~~worker's name, style of respirator and size~~.~~;

~~a.~~

b) Select "perform fit test" – the computer will walk you through a series of five tests~~.~~;

~~b.~~

c) During the testing program, the computer will evaluate the ~~employee.~~worker;

~~c.~~

d) If there is a failure during any test, the ~~employee~~worker will adjust the respirator and try again~~.~~;

~~d.~~

~~e.~~c) If after several attempts to pass a test and the ~~employee~~worker still fails, try a different size respirator~~.~~;

~~f.~~f) Once the ~~employee~~worker passes each of the five tests, a document will be printed certifying the successful completion of the examination~~.~~;

g) The document will then be signed by both the ~~employee~~worker and the facilitator of the examination~~.~~; and

~~g.~~

~~h.~~h) The document will then be filed with the ~~employee's~~worker's other Safety documents in the Radiation Safety Department.

2.4.4 Qualitative Fit Testing

*2.4.4.1 General*

While no numerical measure of facepiece leakage is directly obtained from qualitative fit-testing protocols, they are designed and validated quantitatively. NRC Reg. Guide 8.15

requires that a qualitative fit test must be capable of verifying a fit factor of 10 times the APF for full face (negative pressure) respirators and a fit factor of 500 (not 500 times the APF) for PAPR and SCBA (positive pressure) respirators. Currently, qualitative fit testing methods are only capable of verifying a fit factor of 100. Therefore, qualitative fit testing methods are only appropriate for respirators having an APF of 10 (such as half face respirators), and are not capable of verifying a fit factor of 500 (i.e., 10x50) needed for full face respirators, or 500 for PAPRs and SCBA. However, the use of qualitative fit-testing in conjunction with (but not in lieu of) the quantitative fit testing procedures described above is considered to be advisable and is performed at the Mill. It is recognized that only credit for an APF of 10 will be taken based on the qualitative fit test alone, even though the APF is higher for the device.

*2.4.4.2 Qualitative Fit Testing Procedure*

~~b.~~ Qualitative fit testing measurements will be performed in accordance with 29 CFR 1910.134 using an MSA ventilation smoke tube, Part No. 5645 or equivalent, aspirator bulb. Steps for respirator issuance fit testing are as follows:

~~1.~~a) Respirators equipped with high-efficiency filters will be used for this test (red/green filters~~).~~);

~~2.~~b) Both ends are broken on an MSA ventilation smoke tube. One end is inserted into the tube connected to the positive pressure of a two-way aspirator bulb and the other end covered by a ½ inch length of tygon, surgical or rubber tubing. The test aerosol is generated by squeezing the aspirator bulb~~.~~;

~~3.~~c) The test subject will don the respirator and a visual inspection of the facepiece to face seal made by the tester. An obvious leak in the facepiece to face seal shall be reason to abort the test and record the mask as unsatisfactory. Expression of discomfort created by the mask shall also be reason to abort the test~~.~~;

~~4.~~d) The smoke will be generated in all areas surrounding the mask. The smoke is not harmful however it is sufficiently irritating that if there is a leak in the seal of the mask, it will be discovered immediately~~.~~; and

~~5.~~e) Any indication of detection of the smoke by the test subject during fitting indicates a failure of that respirator. If leakage is detected the facepiece to face seal shall be visually inspected for obvious leakage. If any doubt about the condition of the respirator or the filter exists, another like respirator shall be tested to ~~assure~~ensure the leakage was due to the facepiece to face seal.

*2.4.4.3 Irritant Smoke*

Only stannic chloride smoke tubes, such as the MSA ventilation smoke tube, Part No. 5645, will be used. Similar tubes that generate smoke of a different chemical composition may not be sufficiently irritating to the test subject to be sensed at low

concentrations. Smoke tubes that use chemicals other than stannic chloride are not acceptable

If irritant smoke is used as the challenge aerosol during qualitative fit-testing, the RSO must take steps to protect the person administering the test from repeated exposures to the irritant smoke. These steps could include using a containment chamber around the head and torso of the fit-test subject to contain the smoke, providing the test area with a ventilation or air filtration system, performing the test outdoors, assigning a respiratory protection device to the person performing the fit-testing, or other measures. The fit-test protocol will also be performed to limit the test subject's exposure, especially when performing the sensitivity screening checks that determine whether the test subject can detect the irritant smoke.

## 2.5 Selecting Respirators

### 2.5.1 General

Respirator selection will be determined by the type of environment in which the ~~employee~~worker will be working. The concentration of oxygen and the type and concentration of hazardous contaminants in the work area atmosphere must be considered during the selection process.

### 2.5.2 Types of Respirators Available for Use at the Mill

Three types of respiratory protection are used at the Mill. These are:

a) full face respirators (which are air purifying respirators);

b) PAPRs (which are air purifying respirators); and

c) SCBAs (which are supplied air respirators). The SCBA devices used at the Mill are full face respirators with an attached hose mechanism that draws air from a compressed air tank worn on the back of the worker. The Mill does not use supplied air hoods or supplied air suits.

The Mill does not use half face or quarter face respirators. Dust masks may be used occasionally at the Mill, for protection against non-radioactive dust, but such masks are not part of the respiratory protection program.

One model of respirator from one manufacturer is adequate, so long as different sizes of facepieces are available and adequate fit factors are obtained for greater than 99% of test subjects who are free of facial characteristics that preclude an adequate respirator fit. For individuals who achieve a fit factor >500 with a negative-pressure full facepiece but who are unable to achieve a fit factor 10 times the APF, consideration will be given to assigning a positive pressure face-sealing device or to a device for which a face seal is not necessary if the individual will be put into a work situation where the use of a respirator may be necessary.

2.5.3 Application of Assigned Protection Factors

The APF for each of the three types or respirators in use at the Mill are as follows:

- Full face respirators have an APF of 50;
- PAPR respirators have an APF of 1,000;
- SCBAs have an APF of 10,000.

Use of the APF assumes that:

- The respirator user has been trained to properly don the device;
- The user has been satisfactorily fit-tested;
- The user properly performs a user seal check to ensure that there is no gross seal leakage; and
- The respirator performs properly.

APFs are to be used for selecting a specific type of respirator to be used in the performance of a specific task, to keep the total effective dose equivalent ("TEDE") of exposed workers ALARA, and to be applied in the derived air concentration ("DAC")/hour calculation to determine the dose from exposure to air particulate. Using APFs to estimate intake and then dose, in conjunction with air survey data and the application of the applicable DAC, is the method of choice for determining the intake and dose for workers at the Mill. Bioassay measurements are taken in order to corroborate such calculations (see Section 2.13.3 below for a summary of the Mill's bioassay program).

In estimating the dose to individuals from intake of airborne radioactive materials, the concentration of radioactive material in the air that is inhaled when respirators are worn is initially assumed to be the ambient concentration in air without respiratory protection, divided by the assigned protection factor. If the dose is later found to be greater than the estimated dose, the corrected value must be used. If the dose is later found to be less than the estimated dose, the corrected value may be used.

2.5.4 Survey Program

A survey program that is adequate to identify potential respiratory hazards, to permit selection of the proper respiratory protection method and to evaluate actual or suspected intakes is contained in Section 2.0 of the Mill's Radiation Protection Manual SOP PBL-RP-2, and described in part in Section 2.13 below.

2.5.5 Procedures to be Followed When Selecting a Respirator

*2.5.5.1 General*

Prior to selecting a specific type of respirator, the work environment must be thoroughly evaluated for respiratory hazards. The following questions must then be answered:

~~1.~~a) What are the hazards the ~~employee~~worker will be exposed to?

~~2.~~b) What are the contaminants and their concentration?

~~3.~~c) Are there any contaminants in the workplace environment that may damage or irritate the eyes, nose, or skin?

~~a)~~(i) Yes – a full-face style is recommended~~.~~;

~~4.~~d) Is the oxygen concentration in the workplace atmosphere between 19.5% to 23%?

~~a)~~(i) Yes – combination cartridges will be used if the concentration of the contaminant is within the acceptable limits for the cartridge~~.~~;
~~b)~~(ii) No – The workplace or area may only be entered if the $O_2$ concentration is between 19.5 and 23%. The workplace environment will be remediated (i.e., ventilated) by safety engineering controls such that the oxygen concentration falls between these limits before it may be entered~~.~~;

e) ~~5.~~ Do the contaminant concentrations in the work environment exceed the limits listed for the combination cartridge being used?

~~a)~~(i) Yes –Modify the air contaminant concentration by safety engineering measures~~.~~;
~~b)~~(ii) No – combination cartridges may be used if oxygen concentration is between 19.5% and 23%.

~~2.5.1 Air Purifying Respirators~~

~~Only MSHA and NIOSH approved and accepted~~Limitations appropriate to the type and mode of use of the respirator will also be considered. When selecting respiratory devices provision will be made for vision correction (see Section 2.15), adequate communication (see Section 2.14), low temperature work environments (see Section 2.16), and the concurrent use of other safety or radiological protection equipment. Equipment will be used in such a way as not to interfere with the proper operation of the respirator

*2.5.1.1 Air Purifying Respirators*

The inventory of air purifying respirators will ~~be used. The inventory will~~ consist of full face and PAPR units ~~and SCBAs~~.

There is only one type of air purifying respirator cartridge used for air contaminants for the full-face respirators. This is a red/green GME-H universal cartridge, which is normally effective for removing all air contaminants and atmospheric hazards, and is approved by NIOSH for use under the following conditions:

~~1.~~a) Organic Vapors – less than 1,000 ppm;

b) Pesticides;

~~2.~~

c) Mists of Paints, Lacquers, and Enamels;

~~3.~~

d) Dust – less than 0.5 mg/m$^3$ (99.97% efficient against all particulate aerosols including oil-based aerosols);

~~4.~~

e) Fumes – less than 0.5 mg/m$^3$;

~~5.~~

~~6.~~f) Mists – less than 0.5 mg/m$^3$;

g) Chlorine;

h) Hydrogen chloride;

i) Sulfur dioxide;

j) Ammonia;

k) Methylamine;

l) Chlorine dioxide;

m) Hydrogen sulfide (escape only);

n) Formaldehyde; and

o) Hydrogen fluoride.

The PAPR units are not designed for areas that may come in contact with chemical mists or high humidity. The PAPR units use an Optifilter XL Filter Assembly HE that is only good for dusty environments. These units are ideal for the packaging enclosure, Yellowcake Dryers, Ore Storage, and Tails.

The ~~PAPR's~~PAPRs must have the battery fully charged prior to usage. The battery charge on each unit will last approximately eight continuous working hours. All maintenance and cleaning techniques utilized with the full-face respirators will be used for the PAPR units.

2.5.2

*2.5.1.2 SCBA and Supplied Air Apparatus*

*SCBA versus supplied-air respirators*

Self-contained breathing apparatus will only be used for evacuation or emergency purposes. The Mill does not use supplied air apparatus.

Supplied-air respiratorsSCBA will be the apparatus of choiceappropriate for use in emergency situations when:

1. The the length of the work exceedswill not exceed 20 minutes.
2. There is adequate time to hook up hoses and filter boards

If at any time the atmosphere contains materials that might be corrosive to the employeeworker or respiratory device, the area will be evacuated. The area must be ventilated until the corrosive materials fall to a safe level before work may resume.

## 2.6 Maintaining Breathing Air Quality

The quality of air delivered to all SCBA and supplied-air respirators shall meet the requirements for Grade D air for breathing air systems as defined in Compressed Gas Association (CGA) publication G-7.1-, "Commodity Specifications for Air." 1997, as cited ed. And included in Regulatory Guide 8.15 under 6.5.2 "Air Quality Requirements". The ANSI/CGA G.7 29 CFR 1910.134(i)(1 1989 specifies the contents of)(ii)(A) through (E), (2007). Grade D quality breathing air ascriteria include: oxygen content (volume/volume) of 19.5 to 23.5%; hydrocarbon (condensed) content of 5 mg/m$^3$ of air or less; carbon monoxide (CO) content of 10 ppm or less; carbon dioxide content of 1,000 ppm or less; and the lack of a noticeable odor.

The Mill obtains the air for its SCBA devices from the local fire department. The Mill does not have its own breathing air supply system. The local fire department is the only nearby facility that can refill the oxygen bottles for the SCBA. The local fire department is certified for such activities by the State of Utah Fire Marshall.

## 2.7 Seal Tests

Each respirator wearer must perform both the Positive-Pressure and Negative-Pressure seal checks, set out below, each time a face-sealing respirator is used (which includes any time a face shield is removed or the seal is broken and re-donned). A user seal check is performed immediately prior to exposure to ensure that the respirator is properly seated on the face.

a) Positive-Pressure Check

Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece

without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

b) Negative-Pressure Check

Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the facepiece collapses slightly and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

It should be noted that a user seal test is not a substitute for a fit test. See Section 2.4 above for the fit test requirements.

### ~~2.7~~2.8 Inventory ~~and~~ Control and Issuance of Respiratory Protection Equipment

Mill Radiation Safety Staff shall maintain positive control over the issuance of respiratory protection devices, such that persons not authorized to wear such devices are effectively prevented from obtaining them. To this end, the following procedures will be followed:

a) Respirators will not be issued to workers unless they are to be used;

b) Storage cabinets that will be used for routine respirator issuance will be located in the respirator cleaning facility. Only persons authorized to use respirators are to access the storage cabinets~~.~~;

c) When ~~an employee~~a worker needs a clean respirator, he or she will obtain one from the storage location where clean respirators are packaged and kept. After obtaining a clean respirator, the ~~employee~~worker will enter the pertinent information on the log sheet that is kept in the cabinet with the clean respirators~~.~~;

d) When a used respirator is exchanged for a clean unit, the dirty respirator will be placed in the receptacle provided for such use~~.~~;

e) ~~Employees~~All workers who ~~routinely~~ wear a respirator ~~for more than four hours each day or work in areas of higher exposure potential (i.e., yellowcake packaging or precipitation), will be required to~~must exchange their respirators daily~~.~~; and

f) ~~Employees~~Workers that need to be issued a PAPR unit will need to see the RSO or his designee to be checked out on the proper usage of the unit. All PAPR's are inventoried and only key operators or ~~RWP~~Radiation Work Permit ("RWP") individuals will be issued one of these units.

~~Those employees who do not use respirators routinely will exchange them as they become ineffective in eliminating the hazardous contaminant. This determination is made by the employee by physical inspection of the respirator, by impaired breathing, (i.e. by plugging of a cartridge) or by the detection of irritant smoke or other conditions which may indicate a defective device.~~
Personnel who issue respirators must ensure that each person issued a respirator has been medically screened (see Section 3.1), trained (see Section 2.3) and fit-tested (see Section 2.4) within the period prescribed.

Persons may only be issued respirators for which they have been fit-tested (i.e., same make, model, style and size).

## ~~2.8~~2.9 Storage of Respiratory Protection Equipment

When in storage and not available for use, respirators and component parts of respiratory protection devices will be stored in such a way as to prevent damage to such components and devices. The following procedures shall be followed:

a) Respirators shall be stored in a manner sufficient to protect the device against dust, sunlight, extreme cold, excessive moisture, or damaging chemicals~~.~~;

b) The cleaned respirators will be stored in cabinets in the respirator cleaning facility outside the safety department. The respirators will be stored in ~~single~~ layers with the facepieces and exhalation valves in a more or less normal position to prevent the rubber or plastic from cracking~~.~~;

c) When respirators are not being used, they must be stored in the plastic bags in which they were issued. Dirty respirators will be placed in receptacles located in the ~~mill central control~~respirator storage room ~~and at the maintenance shop.~~. They will be gathered from these locations for cleaning and repairs~~.~~;

~~The frequency that a dirty respirator must be exchanged for a clean one will be determined by the amount of time it is used. If the employee's use is greater than four hours per day, the exchange will be made daily. Occasional use will require a weekly exchange. Infrequent use will require monthly exchanges.~~

d) All respirator users must exchange their respirators daily;

e) The cabinets containing emergency respirators will be located in areas that are readily accessible and in areas in which a hazard may arise. Emergency cabinets are located on the north side of the ~~mill~~Mill building outside of the SAG Mill doors, outside the SX on the north wall, on the south end of SX on the fire cabinet and at the fire hose station at the front gate. All ~~employees~~workers should be made aware of these locations~~.~~; and

f) The cabinets will not be locked, but they will have seals attached to the hasps. The seals will prevent ~~employees~~workers from using the respirators for routine

use, but will allow emergency access. During emergencies, the seal will be broken and a respirator may be selected in a matter of seconds.

## ~~2.9~~2.10 Maintenance, Repair, Testing, and Quality Assurance of Respiratory Protection Equipment

2.10.1 Maintenance and Repair

Respirators and component parts ~~shall~~will be maintained and repaired only by persons specifically trained to perform this work. Repairs and maintenance ~~shall~~will be performed in accordance with the procedures detailed below. Parts used for repairs will be purchased only from the manufacturer of the unit being repaired or from their agents.

~~2.9.1 Maintenance, Cleaning, Repair, and Testing~~

Each used respirator must be disassembled before cleaning; the cartridges must be removed and discarded and any hoses or regulators must be removed and washed separately. Some of the units have elastic head straps; these should also be removed and washed separately.

2.10.2 ~~The~~Cleaning

Mill staff will decontaminate and disinfect respirators and associated equipment in accordance with the manufacturer's instructions, paying particular attention to the cleaning or sanitizing agents used and to the maximum temperature of the water used for cleaning, to avoid degradation of the respirator. Chemical residues should not be hazardous or irritating to the user. Radiological limits for re-use of respirators after they have been cleaned and sanitized have been established at the Mill and are set out in Section 2.10.3.1 below.

For full face respirators, PAPRs and SCBAs, the respirators will be cleaned and rinsed in a commercially available dishwasher. The radiation and safety staff will perform cleaning and washing of respirators. The respirators will be washed and then aired dried.

2.10.3 Inspection and Testing of Respirators

Inspections of all respiratory devices will be conducted as set out below. Under no circumstances will a device that is known to be defective be used.

*2.10.3.1 General*

Respirator facepieces that are routinely available for issue will be visually inspected at least every month or in accordance with manufacturer's instructions. If such devices are stored in clear plastic bags, they should be handled and examined, but need not be removed from the bags for the inspection as long as the inspector can determine that the device is ready for issue.

Equipment used in conjunction with facepiece respirators (e.g., belt- or facepiece-mounted air regulators, air-supply hoses, portable distribution manifolds) will be inventoried and functionally tested periodically or prior to use.

Repair and replacement parts for respiratory protection devices will be inventoried and inspected periodically. The goal is to ensure that there are sufficient functional parts available to support the respiratory protection program when it is operating at full capacity.

Devices in storage will be inspected quarterly and before they are made available for issue. Equipment stored for periods of a year of more will be re-cleaned annually to ensure that they are in good condition in case they are needed unexpectedly.

Each reassembled respirator must be inspected for radiation contamination before it is used. An instrument survey or a swipe test may be conducted to determine if any item is contaminated. The equipment check must indicate levels of less than 100 dpm/100 $cm^2$ of alpha radiation or 1,000 dpm/100 $cm^2$ of beta-gamma radiation to be serviceable. If repeated washings do not decrease contamination to acceptable levels, that item must be disposed of.

~~Respirators shall be inspected in accordance with NRC Regulatory Guide 8.15, Revision 1, October 1999.~~ Freshly cleaned and inspected respirators will be placed in plastic bags and sealed (see Section 2.10.3.1). The individual who serviced the respirator shall write the date on each bag and initial it to indicate the work has been done properly.

The following conditions should be checked during any type of inspection:

*2.10.3.2 Air Purifying Respirators*

Routinely used air purifying respirators (full face respirators and PAPRs) should be checked as follows before and after each use.

~~A.~~a) Examine the facepiece for:

~~1.~~(i) Excessive dirt;
~~2.~~(ii) Cracks, tears, holes, or distortion from improper storage;
~~3.~~(iii) Inflexibility (stretch and massage to restore flexibility~~)~~);
~~4.~~(iv) Cracked or badly scratched lenses in full facepieces;
~~5.~~(v) Incorrectly mounted full facepiece lens or broken, or missing mounting clips; and
~~6.~~(vi) Cracked or broken air purifying element holder(s), badly worked threads, or missing gasket(s), if required;

~~B.~~b) Examine the head straps or head harness for:

~~1.~~(i) Breaks;
~~2.~~(ii) Loss of elasticity;
~~3.~~(iii) Broken or malfunctioning buckles and attachments; and

~~4.~~(iv) Full facepieces only – excessively worn serrations on the head harness which might permit slippage;

~~C.~~c) Examine the exhalation valve for the following after removing its cover:

~~1.~~(i) Foreign material such as detergent residue, dust particles, or human hair under the valve seat;
~~2.~~(ii) Cracks, tears, or distortion in the valve material;
~~3.~~(iii) Improper insertion of the valve body in the facepiece;
~~4.~~(iv) Cracks, breaks, or chips in the valve body, particularly in the sealing surface;
~~5.~~(v) Missing or defective valve cover; and
~~6.~~(vi) Improper installation of the valve in the valve body;

~~D.~~d) Examine the air purifying elements for:

~~1.~~(i) Incorrect installation, loose connections, missing or warn gaskets, or cross-threading in holder; and
~~2.~~(ii) Cracks or dents in outside case of filter, cartridge, or canister;

~~E.~~e) If the device has a corrugated breathing tube, examine it for:

~~1.~~(i) Broken or missing end connectors;
~~2.~~(ii) Missing or loose hose clamps; and
~~3.~~(iii) Deterioration (determined by stretching the tube and looking for cracks~~)~~);

~~F.~~f) Examine the harness of a front or back mounted gas mask for:

~~1.~~(i) Damage or wear to the canister holder which may prevent its being held securely in place; and
~~2.~~(ii) Broken harness straps or fastenings; and

~~G.~~g) Blower mechanism on the PAPR units only:

~~1.~~(i) Damage to the outer casing of the blower unit will result in the replacement of the blower~~.~~; and
~~2.~~(ii) Missing or broken pins that connect the blower to the battery pack will result in replacing of damaged pieces.

*2.10.3.3 Supplied Air Respirators*

The following shall be checked:

~~A.~~a) If the device has a tight fitting facepiece, use the procedures outlined above for air purifying respirators~~.~~; and

b) ~~B.~~ Examine the air supply for:

~~1.~~(i) Integrity and good condition of air supply lines and hoses including attachments and end fittings; and

~~2.~~(ii) Correct operation and condition of all regulators, valves, or other air flow regulators.

~~2.9.2~~
A visual inspection of the SCBAs shall be performed monthly, and a thorough examination shall be performed two or three times per year. See Section 2.10.3.5 below.

Breathing air cylinders, including SCBA cylinders, must be tested as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR 173 and 178). Each breathing air cylinder will be permanently and legibly marked "Breathing Air" or "Compressed Air".

*2.10.3.4 Re-use of Respirator Filters*

Respirator filters can be re-used by the same person on the same day without being re-tested, as long as contamination control is adequate and the filters do not appear to be damaged. Filters to be re-used during the same day should not have any apparent damage and should meet the Mill's criteria for residual contamination, set out in Section 2.10.3.1. Filters will be discarded after each day's use.

*2.10.3.5 Respirators Used for Emergency Use*

Respirators specifically designated for emergency use are visually inspected once per month, and removed from any protective container and thoroughly examined periodically (e.g., 2 to 3 times per year). Such monthly and periodic inspections will be recorded.

2.10.4 Quality Assurance

To prevent the use of faulty or defective respiratory equipment, the following steps will be taken:

*2.10.4.1 ~~A.~~ New Equipment*

All new equipment will be thoroughly inspected before it is put into service~~.~~ (see Section 2.10.3 above). Only MSHA/NIOSH approved equipment will be used~~.~~ (see Section 1.5 above). Parts used for repairs will be purchased only from the manufacturer of the unit being repaired or their agents~~.~~ (see Section 2.10.1 above).

*2.10.4.2 ~~B.~~ Cleaning and Repairs*

All respiratory devices will be inspected before and after cleaning and before and after repairs are made. The inspection procedures that are to be used are listed above under Section 2.~~9.1~~10.3.

Any replacement items that will be used for repairs will be inspected prior to assembly.

*2.10.4.3 ~~C.~~ Periodic Checks of Items in Storage*

At leaseleast once during each quarter, all of the respirators that are in storage will be checked for serviceability and to make sure that they will be ready for immediate use. See Section 2.10.3.1.

2.10.5 Service Life Limitations

If the respirator equipment manufacturer specifies a shelf life or service life limit on one or more components of a respiratory protection system the Mill will comply with the recommendations of the manufacturer. This will ensure that the device continues to operate properly and that the "like-new condition" is maintained (see Section 1.5 above).

## 2.102.11 Recordkeeping

InspectionsRecords of all respiratory devicesrequired activities in this program will be conducted in accordance with the provisions containedkept in NRC Reg. Guide 8.15 and section 2.9.1 above, and under no circumstances shall a devicemanner that is known to be shows compliance with the requirements of the applicable regulations. Specifically, the following records will be kept:

a) A log sheet for issuance and return of respirators;

b) A log sheet for damaged and defective be used. respirators and the disposal of such devices;

c) A log sheet for cleaning, issuance and release of nose cups;

d) A removable alpha survey sheet for respiratory devices; and

Freshly cleaned and inspected respirators will be placed in plastic bags and sealed.

The individual who serviced the respirator shall write the date on each bag and initial it to indicate the work has been done properly.

e) Respirators used for emergency use are (see Section 2.10.3.1 above). The individual who cleaned and inspected, and the inspection recorded, once per monthrespirator will write the date on each bag and initial it to indicate the work has been done properly.

## 2.112.12 Limitations on Periods of Respirator Use and Relief from Respirator Use

As noted above under Section 1.21, the NRC has noted that the use of respiratory protection devices in the workplace can impose physiological and psychological stresses on workers, obstruct their vision, hinder their movements, and make effective communications difficult. In consideration of this, a respirator wearer shallwill be permitted to leave the work area for any respirator-related cause. Reasons, which may cause a respirator wearer to leave a work area, include, but are not limited to, the following:

a) 1. Failure of the respirator to provide adequate protection.;

b) 2. Malfunction of the respirator.;

c) 3. Detection of leakage of air contaminant into the respirator.;

d) 4. Increased resistance to breathing.;

5.e) Severe discomfort in wearing the respirator.;

6.f) Illness of the wearer including: sensation of dizziness, nausea, weakness, fatigue, breathing difficulty, coughing, sneezing, vomiting, fever, or chills.; and

7.g) ClaustrophiaClaustrophobia, anxiety, or other psychological factors that may affect the wearer.

## 2.13 2.12 Monitoring, Including Air Sampling and Bioassays

### 2.13.1 2.12.1 Evaluation of Respiratory Hazards

Before a respiratory protective device is used, the work area must be evaluated as to the type of hazards that may be encountered. The type of respiratory protection may be selected only after the hazard has been classified.

Most areas of the millMill have been evaluated for hazards during routine work assignments. Signs will be posted in the different areas that will indicate the type of respiratory device to be used under normal conditions.

Equipment needed:

- a) Oxygen and Combustible Gas Detector;
- b) MSA Orion or equivalent;
- c) MSA Samplair Pump Kit (or similar) with the following detector tubes:

(i) Carbon Dioxide;
(ii) Carbon Monoxide;
(iii) Sulfur Dioxide;
(iv) Ammonia;
(v) Hydrogen Sulfide;
(vi) Nitrous Oxide;
(vii) Halogen Gases (Chlorine));
(viii) Acid fumes and mists.; and
(ix) Organic vapors; and

d) Detector tubes for HF and any other potential gas, as determined by the RSO.

Many environmental designs were incorporated into the ~~mill's~~Mill's construction to keep exposures to most hazards at a minimum. This environmental equipment is checked frequently to ensure that it is functioning properly.

To ensure the reliability of these controls, monthly gross alpha and radon daughters samples will be collected at numerous locations throughout the ~~mill.~~Mill. Routine samples will also be collected in the vanadium precipitation and packaging areas and analyzed for airborne vanadium.

The routine samples have already identified some areas that require respirator use at all times during normal working conditions. These areas are inside the yellowcake dryer and packaging enclosures and the vanadium dryer area and the packaging area. Other areas that may require respirator use may include, but would not be limited to, the sample bucking room, and the SAG mill.

Respirators need not be worn routinely during normal working conditions in other areas of the ~~mill.~~Mill. At these locations, usage will be determined by the hazard level or at the ~~employee's~~worker's request. Occasionally, a condition may exist that the environmental controls cannot handle. At that time, the appropriate respirator must be used until the workplace atmosphere is returned to normal.

Infrequently, maintenance work will have to be performed in areas that are not normally sampled or areas that may have questionable air quality. Prior to anyone entering one of these areas, the environment must be evaluated to determine what hazards exist.

A Safe Work Permit is issued for all work tasks that are anticipated to present unidentified or unusual hazardous environmental conditions. A Radiation Work Permit (RWP) is issued for work in unassessed areas or for nonrecurring tasks for which engineering controls are not in place or practical. The ~~safety department~~Radiation Safety Department will be responsible for the evaluation of the areas before work begins.

When the oxygen concentration is listed as potentially hazardous, a portable detector will be used to determine the exact oxygen-air mixture. NIOSH defines that air which contains less than 19.5% $O_2$ is an oxygen-deficient atmosphere, and attempting to breathe such air is considered to present a hazard that would be immediately dangerous to life and health. Any area having less than 19.5% $O_2$ will not be entered until or unless the $O_2$ concentration returns to and is maintained at a level above 19.5%. If an area is identified as having an oxygen-deficient atmosphere, the oxygen levels must be remedied by engineering controls prior to entry by personnel. The use of a SCBA will only be for emergency escape or emergency response purposes.

Other atmospheric hazards will be identified and quantified by using air sampling equipment, such as the MSA Samplair Pump (or similar device) with detector tubes for the specific contaminant in question. The instructions must be carefully read for every test, as each type of detector tube is handled differently.

After exposure to the atmosphere, the tubes will indicate the presence and concentration of the chemical for which that tube is designed. Chemical cartridges are good only in atmospheres in which the chemical concentration is less than the limit set by the manufacturer and the oxygen concentration is equal to or greater than 19.5%. As noted above, the ~~company~~Mill's policy is for workers not to enter an area in which the $O_2$ level is below 19.5%, but to enter such areas only in emergency situations, such as to retrieve an injured worker, and then with the use of a SCBA.

There are many other hazards that are very obvious but are often overlooked. The following are examples:

- dust concentrations have an adverse affect on breathing and/or the comfort of the individual; and
- some substances may cause irritation to the eyes, nose, throat, etc., but may not be chemically toxic.

These and other such conditions should always be considered in evaluating respiratory hazards. If there is any doubt about the conditions within the work area, a respiratory device should be used. Always be conservative.

### 2.13.2 ~~2.11.2~~ Breathing Zone Air Samples

Breathing zone samples are collected to determine the air contamination concentration an individual may be exposed to during the execution of his job. The respiratory protection factor is used to calculate the individual's exposure during the work task duration. The application of a respiratory protection factor assigned to the particular respiratory device is used to reduce an individual's exposure to an air contaminant concentration as determined by breathing zone sampling. Routine breathing zone samples are collected by the use of a small belt-mounted pump attached to a hose that is, in turn, attached to the person's clothing close to the head (or breathing zone). The sample is collected for a period of time that would be representative of one eight hour workday. They are collected in such a manner that the material collected will be representative of that being inhaled by the individual wearing the sampler. See Section 1.1.2 of the Mill's Radiation Protection Manual for the detailed procedures to be followed for breathing zone samples.

### 2.13.3 ~~2.11.3~~ Bioassay Program

Evaluation of the effectiveness of the respiratory protection program will be accomplished by air sampling (described above in 2.~~12.1~~13.2) and by the Mill Bioassay Program.

Those ~~employees~~workers who are working in areas that require the use of respirators will submit a urine specimen for analysis on a biweekly basis. ~~Employees~~ Workers who use respirators during maintenance may also be required to submit specimens after maintenance ceases. The samples will be collected from individuals who have performed maintenance tasks in atmospheres that are significantly elevated in contaminant concentration or they are working in such an area for an extended period of time.

The specimens will be analyzed for uranium content.

See Section 1.4 of the Mill's Radiation Protection Manual for the detailed procedures to be followed for bioassays.

## 2.14 Communication

Respiratory protection devices limit the wearer's ability to communicate. However, all respirator users must be able to communicate well enough to be able to work safely and to keep radiation doses ALARA. The RSO will use his judgment in determining how these goals can best be satisfied. In many situations, adequate communication can be maintained by training the respirator wearers to speak slowly and distinctly. In other situations, especially where ambient noise levels are high or where respirator wearers must communicate across long distances, voice-amplification devices or other types of systems might have to be employed.

If voice-amplification devices are attached to the respirator or require a modification of the respirator, they must be listed on the manufacturer's schedule of approved subassemblies. This ensures that the NIOSH approval for the device remains in force with the addition of the communications equipment.

After-market communications devices supplied by a company other than the respirator manufacturer may be used as long as they do not alter the form, fit, or function of the respirator. Any such after-market device that attaches to or requires penetration of the respiratory inlet covering is likely to void the NIOSH approval for the device.

## 2.15 Vision

Some types of respirators prevent the wearer from using standard spectacles or from using them properly. The ear pieces of standard spectacles pass through the seal area of full-facepiece respirators and are therefore not allowed. However, respirator users must be able to see well enough to be able to work safely and to keep radiation doses ALARA. The RSO will use his judgment in determining how these goals can best be met.

Most manufacturers of full-facepiece respirators offer a spectacle adapter kit. Non-manufacturer-supplied adapters may be acceptable if they do not interfere with the facepiece seal and if they do not cause any distortion of vision, damage the lens of the face-piece, or cause any harm to the wearer during use. Home-made adapters are not acceptable, not is it acceptable to simply tape the spectacles inside the facepiece.

## 2.16 Use of Respirators in Low Temperatures

The RSO should recognize the potential problems associated with respirator use in subfreezing environments, discussed below, and take special care when respirators are used in subfreezing temperatures.

### 2.16.1 Lens Fogging

Fogging of the inside of the respirator lens is commonly experienced in full facepiece respirators. The fogging is caused by the condensation of the moisture in exhaled breath that comes in direct contact with the inside of the lens. Most full facepiece respirators have air inlet ducts positioned to direct the inhaled air across the inside of the lens as it enters the facepiece. This clears off the accumulated condensation, but the lens fogs again during exhalation. The cooler the ambient air temperature, the less effective the lens clearing provided during inhalation. At temperatures below freezing, lens frosting can occur that will not be removed during inhalation and may eventually seriously obscure the wearer's vision. Lens fogging and frosting, therefore, can present a significant safety hazard by restricting the wearer's ability to see clearly in the work place. Some possible solutions to the fogging and frosting problem, that can be employed by the RSO in his discretion, are:

a) Nose Cup.

Most full-facepiece manufacturers provide an optional component called a nose cup. It is attached to the inside of the facepiece in such a way that it directs the stream of exhaled air directly into the exhalation valve, minimizing the amount of moist air contacting the interior of the lens.

b) Anti-Fog Applications.

Most full-facepiece manufacturers provide an anti-fog material that limits fogging when applied to the interior of the respirator lens.

c) Plastic Inserts

Thin plastic inserts that are applied to the inside of the facepiece lens to form a double-pane insulating barrier may effectively reduce fogging.

Before using commercial anti-fogging products (that are not supplied by the respirator manufacturer), the RSO should check with the respirator manufacturer regarding the compatibility of these products with their facepieces.

NIOSH requires that facepieces used with SCBA be designed to prevent lens fogging. This means that, in order to maintain the NIOSH certification of the device, a nose cup or some other method must be used when fogging might be a problem.

2.5.2 Exhalation Valve Freezing

Another potential problem when using any type of face-sealing respirator in subfreezing temperatures is the possibility that the exhalation valve could freeze. If the valve freezes shut, exhaled air will be exhausted through the face-to-facepiece seal area and the respirator wearer will be aware of the malfunction. In this case, the respirator will probably provide adequate protection as the wearer exits the work area.

If the valve freezes in the open position, or if ice forms on a portion of the exhalation valve seat, a path is created for contaminated ambient air to enter the respiratory inlet covering. If the device in use were a PAPR or a continuous-flow supplied-air respirator, it is likely that the respirator wearer would not be aware of the malfunction, although the internal dose consequences of this type of failure would probably be limited.

If the device in use were a pressure-demand supplied-air device (e.g., air line-supplied or SCBA), it is likely that the respirator wearer would recognize that a malfunction had occurred since air would leak out of the facepiece through the exhalation valve. Even though the wearer would continue to be adequately protected, he or she should exit the work area immediately since a respirator malfunction has occurred. If the device in use is a SCBA, the duration of the air supply will be reduced because of the loss of breathing gas from the supply cylinder.

If the device in use is operated in the negative pressure mode, it is unlikely that the respirator wearer would be aware of the malfunction. The air breathed by the wearer would, at least in part, be unfiltered ambient air entering the respiratory inlet covering through the open exhalation valve during the negative-pressure (inhalation) portion of the breathing cycle.

## ~~3.03.~~ PROCEDURES FOR MEDICAL EVALUATIONS AND AUDITS

~~3.1~~

### 3.1 Performing and Documenting the Required Medical Evaluation

Medical qualification will be required of each ~~employee~~worker that might be using a respirator in ~~their~~his or her normal work duties. This is necessary to evaluate the individual's limitations to wearing respirator devices.

3.1.1 The Mill's Physician

The medical evaluation will be performed by a licensed physician, selected by the RSO, to determine that the individual user is medically fit to use the respiratory protection equipment. ~~Medical evaluation~~The RSO will choose a physician with an appropriate specialty (e.g., internal medicine, industrial medicine, family practice), and the physician will be ~~performed prior~~licensed to ~~the initial fitting of a respirator use and either every 12 months thereafter or periodically at a frequency to~~practice medicine in the United States.

3.1.2 Establishing and Performing the Evaluation

The medical screening process and tests and acceptance criteria will be determined by the physician.

~~The medical screening process~~ and will include a medical history and will be sufficient (in the opinion of the physician) to identify any person who should not use respiratory devices for medical reasons, or who should be limited to the use of specific types of respirators. The physician will report any medical restrictions the ~~employee~~worker has that would limit ~~an~~the individual's ability to use a respirator. Based on the physician's recommendations, any ~~employee~~worker may be subject to additional or more frequent medical evaluation as deemed necessary by the physician.

~~3.2~~ ANSI Z88.6-1984, "Respirator Use – Physical Qualifications for Personnel," provides guidance that is acceptable to the NRC staff for the physician to use in determining medical fitness. The screening method may include a medical history questionnaire and spirometry testing. The physician, however, establishes the precise screening method.

The medical evaluation program should be carried out by the physician, or by a certified, medically trained individual such as a registered nurse (RN), licensed practical nurse (LPN), emergency medical technician (EMT), or someone who, in the judgment of the physician, has adequate experience education, training, and judgment to administer the screening program.

Medical evaluations performed by a physician other than the Mill's designated physician may be acceptable as long as comparable screening tests and acceptance criteria are used for screening individuals.

3.1.3 Timing of Medical Evaluations

The initial medical evaluation to determine a worker's fitness to use respirators must be accomplished prior to respirator fit-testing.

The worker must be re-evaluated medically every 12 months thereafter or at some other frequency established by the Mill's physician. The Mill's physician has established the following frequency for re-evaluation:

- Every five years for workers under the age of 45; and
- Every year for workers 45 years or older.

3.1.4 Failure to Meet the Acceptance Criteria

Individuals whose screening results fall outside the range of the criteria established by the Mill's physician may have their cases evaluated by the physician. This evaluation might consist only of a review of the written record, or it might involve a hands-on examination. In these situations, the physician might permit the individual to use one or

more types of respirators judged to impose less stress, and prohibit the use of other more stressful devices. The Mill's physician may confirm the outcome of the screening by prohibiting the individual from using any respirator.

3.1.5 Privacy of Medical Records

Medical records and the results of medical screening tests will be kept private to the extent possible. The only information that will be transmitted from the RSO and any other respiratory program supervisory personnel to the non-supervisory personnel in the respirator department is whether or not an individual may use respirators, or which devices may be used and which may not be.

## 3.2 Maintaining TEDE ALARA and Performing ALARA Evaluations of Respiratory Protection

3.2.1 ALARA Evaluations

As stated in the Policy Statement in 1.0, ~~DUSA shall~~the Mill will use, to the extent practical, procedures and engineering controls based on sound protection principles to achieve exposures to radiation ALARA, and shall limit intakes by means of engineering controls or procedures, along with the use of respirators, consistent with maintaining the TEDE ALARA.

The Mill will endeavor to limit the use of respirators to situations in which respirator use has been shown to keep TEDE ALARA. Other methods of protection against airborne radioactive material, such as the use of process or other engineering controls, limitation of exposure times, decontamination and so on, will be considered before the use of respirators.

Mill staff will perform an ALARA evaluation of the types of situations that will require the use of respirators and, if necessary, for unusual or non-recurring circumstances. As mentioned above, there are undesirable effects from the use of respiratory protection. The use of respiratory protection devices in the workplace can impose physiological and psychological stresses on workers, obstruct their vision, hinder their movements, and make effective communications difficult. These factors increase the risk of physical injury to respiratory wearers that, in many cases, far exceed any potential risk associated with the inhalation of a small quantity of airborne radioactive material. Therefore, when performing an ALARA analysis for the use of respiratory protection in any circumstances, and the results do not show a clear, obvious indication (to use or not use respirators), the RSO will use professional judgment as to whether or not to assign respirators in the circumstances.

When a specific ALARA evaluation is performed to justify the use or nonuse of respirators, the evaluation ~~shall~~will consider the following elements ~~detailed in Section 2.1 of Regulatory Guide 8.15.~~ :

~~4.0 PROCEDURES FOR RESPIRATOR APPLICATIONS~~

a) ~~4.1~~ The use of process and engineering controls, filtered ventilation systems, and decontamination before the use of respiratory protection devices;

b) Control of access, limitation of exposure time, and the use of other types of exposure controls before the use of respiratory protection devices, and

c) The estimated benefit.

In performing an ALARA evaluation, when deciding which respirator is to be considered for assignment during a specific task, the RSO will divide the average ambient concentration of radioactive material in work place air (or the estimated average) by the appropriate DAC value for the contaminants present. The number obtained may be considered initially as an ideal minimum APF for the selected device. If the ALARA evaluation determines that use of a respiratory protection device might be justified, the RSO should consider a device with this APF or greater. If selection of a respirator with this APF is inconsistent with ALARA, however, the RSO may select a device with a lower APF. Worker safety factors other than radiological factors, such as heat stress or impaired vision, should be taken into account when performing such an ALARA evaluation. Consideration should also be given to the possibility that the planned work will cause re-suspension of radioactive material, thus increasing the average concentration during the task.

The extent and level of detail addressed in TEDE ALARA evaluations should be commensurate with the potential radiological and physical risks involved in the activity. The RSO should consider the following factors in an evaluation of whether respirator use is ALARA:

- Environmental conditions;
- Protective equipment and clothing, including the respirator, that would be required for the activity being evaluated and their effects on worker efficiency;
- Comfort level of the workers regarding the use of respirators;
- Experience and skill level of the individual with respect to the task;
- Process and engineering controls to be used;
- Specific details of the tasks to be performed (e.g., dose rates, estimated average airborne concentrations); and
- Potential post-activity negative impacts (e.g., personnel decontamination and skin dose assessments, portal monitor alarms).

Such evaluations may either be job-specific or be performed for general job types. ALARA evaluations performed for general job types will be reviewed periodically, as necessary, to ensure that none of the assumptions or parameters upon which the evaluation is based have changed.

The RSO should be able to support the decision to use or not to use respirators in each circumstance. Supporting information could include the results of surveys, measurements and calculations, previous history with this or similar jobs, or other

pertinent data. The judgment of individuals, such as the RSO, with extensive knowledge and experience in the field may also be sufficient in circumstances that are not amenable to quantitative analysis.

For ALARA evaluations, a respirator-induced worker inefficiency factor of up to 15% may be used without further justification. Larger worker inefficiency factors may be used, but the RSO should have test data to support them.

3.2.2 Estimated ALARA Benefit

The evaluation should demonstrate whether of not the TEDE for the job will be ALARA; that is, whether the internal dose avoided by using the respiratory protection equipment is likely to be greater than or less than any additional external dose that may result from the use of these devices from respirator-induced and other factors. Non-radiological factors should be included.

3.2.3 ALARA Evaluation – Records

The Mill has established 0.50 mrem/hr for prospective external deep dose equivalent from a task or job below which a record of an ALARA evaluation for the use of respirators is not needed. A Radiation Work Permit (RWP) may serve as the record of an ALARA evaluation for the use of respirators for a specific task or job.

Regardless of the magnitude of the projected external and internal dose, the RSO does not need to perform or record ALARA evaluations before requiring the use of respiratory protection equipment as a precautionary measure when there is a large uncertainty about the magnitude of the projected concentrations of airborne radioactive material to which the workers will be exposed (e.g., a new job with significant airborne contamination potential, but with no history of previous similar jobs).

3.2.4 Exceptions to ALARA Requirements for Respirators

The RSO may require the use of respirators in any situation where, in his judgment, respiratory protection would be appropriate, even though a dose assessment would indicate that respiratory protection is not required.

However, when the use or non-use of respirators has no clear impact on TEDE, the RSO should opt to not use respirators in most circumstances.

A reduction in TEDE for a worker would not be reasonable if an attendant increase in the worker's industrial health and safety risk (e.g., from a vision limitation or other respirator-related problem) would exceed the benefit to be obtained by reducing the risk associated with the reduction in TEDE.

## 4. PROCEDURES FOR RESPIRATOR APPLICATIONS

### 4.1 Routine Respirator Use

As noted above under 2.8, the cabinets for routine use respirators will be located in the respirator cleaning facility outside the safety department.

Respirators will not be issued to employees unless they are to be used. Only employees having current authorization to use respirators are to access the storage cabinets and obtain respirators.

When respirators are not being used, they must be stored in the plastic bags in which they were issued. Dirty respirators will be placed in receptacles located in the mill central control room and at the maintenance shop. They will be gathered from these locations for cleaning and repairs.

Donning thea respirator must be performed in accordance with the training provided. At least one type of user seal check must be performed immediately prior to exposure to ensure that the respirator is properly seated on the face.

The frequency that a dirty respirator must be exchanged for a clean one will be determined by the amount of time it is used. If the employee's use is greater than four hours per day, the exchange will be made daily. Occasional use will require a weekly exchange. Infrequent use will require monthly exchanges.

4.2 **Nonroutine**Procedures for routine respirator use are set out in detail in the foregoing Sections of this Program.

## 4.2 ~~Non-routine~~ Respirator Use

~~Nonroutine~~Non-routine Respirator Use shall be defined as use of respirators in ~~unassessed~~un-assessed areas or for nonrecurring tasks for which engineering controls are not in place ~~of~~for practical. The same procedures apply to non-routine respirator use as apply to routine respirator use, as detailed in this Program.

## 4.3 ~~4.3~~ Emergency Respirator Use

Emergency Respirator Use shall be ~~used~~ for recovery of an injured person from an area where air concentrations of radioactive material may be high, the breathing quality of the ambient air has not been assessed, or the area may become immediately dangerous to life or health ~~(IDLH)~~ because of the presence of nonradiological hazards.

Respirators designed for emergency use will be stored in areas that are readily accessible to all ~~employees.~~workers. Emergency cabinets are located on the north side of the ~~mill~~Mill building outside of the SAG Mill doors, outside the SX on the north wall, on the south end of SX on the fire cabinet, and at the fire hose station at the front gate.

The equipment preferred for emergency entry into an unassessed environment, or into an area with high concentrations of a chemical hazard, is the SCBA operated in the pressure-demand mode, with a minimum rated service life of 30 minutes. For other emergency use against airborne radioactive material, the full face air purifying respirators normally used at the facility will be adequate.

The use of demand SCBA in emergency firefighting situations is not permitted, because such respirators do not meet National Fire Protection Association standards.

## 4.4 Safety

### 4.4.1 General

Procedures intended to ensure the safety of the worker are set out in detail in the foregoing Sections of this Program

### 4.4.2 Un-Assessed Environments

For entry into areas where the level of hazard has not been assessed because of the existence of unusual conditions, or in response to unanticipated releases of radioactive material, workers must use only SCBA operated in pressure-demand mode. However, the use of SCBA to circumvent the pre-exposure sampling requirement (R313-15-703(3)(a), 10 CFR 20.1703(c)(1)) is not permitted for non-emergency activities.

### 4.4.3 Emergency Escape

For emergency escape from normally safe environments, where a respiratory hazard might develop suddenly, any of the full face, PAPR or SCBA devices used at the Mill

may be used so long as it provides adequate short-term protection against the type of hazard that might be encountered.