

Attachment B

Heat and Cold Stress Guidelines

Attachment B Heat Stress Guidelines

1.1 Introduction

A majority of project activities are performed in outdoor locations and, as such, employees occasionally perform these activities in temperature extremes. In light of this, it's important that all employees understand the signs and symptoms of potential injuries associated with working in temperature extremes.

1.2 Heat Stress

Heat stress occurs when the body's physiological processes fail to maintain a normal body temperature because of excessive heat. The body reacts to heat stress in a number of different ways. The reactions range from mild, such as fatigue, irritability, anxiety, and decreased concentration, to severe, such as death. Heat related disorders are generally classified into four basic categories: heat rash, heat cramps, heat exhaustion, and heat stroke. Symptoms and treatment are described below:

Heat Rash

- Description: Heat rash is caused by continuous exposure to heat and humid air and is generally aggravated by coarse clothing. This condition decreases the ability to tolerate heat. Heat rash is the mildest of heat related disorders.
- Symptoms: Mild red rash which is generally more prominent in areas of the body in contact with PPE.
- Treatment: Decrease the amount of time in PPE and use powder to help absorb moisture.

Heat Cramps

- Description: Heat cramps are caused by perspiration that is not off-set with adequate fluid intake. This condition is the first sign of a situation that can lead to heat stroke.
- Symptoms: Acute, painful spasms occurring in the voluntary muscles (e.g., abdomen and extremities).
- Treatment: Remove victim to a cool area and loosen clothing. Have victim drink 1 to 2 cups of water immediately and every 20 minutes thereafter until the symptoms subside. Total water consumption should be 1-2 gallons per day. Consult with a physician.

Heat Exhaustion

- Description: Heat exhaustion is a state of very definite weakness or exhaustion caused by the loss of fluids from the body. This condition is more severe than heat cramps.
- Symptoms: Pale, clammy, moist skin with profuse perspiration and extreme weakness. Body temperature is generally normal and the pulse is weak and rapid. Breathing is shallow. The victim may show signs of dizziness and may vomit.
- Treatment: Remove the victim to a cool, air conditioned atmosphere. Loosen clothing and require that the victim lay in a flat position with the feet slightly elevated. Have the victim drink 1 to 2 cups of water or other rehydrating fluid(s) (e.g., Gatorade) by taking frequent, small sips if not nauseated. Rehydrating fluids should be diluted in half before administering to workers experiencing heat exhaustion. Seek medical attention, particularly in severe situations.

Heat Stroke

- Description: Heat stroke is an acute and dangerous situation. The victim's temperature control system shuts down completely, resulting in a rise in body core temperature to levels that can cause brain damage and can be fatal if not treated promptly and effectively.
- Symptoms: Red, hot, dry skin, with no perspiring. Rapid respiration, high pulse rate, and extremely high body temperature are other symptoms.
- Treatment: Cool the victim quickly. If the body temperature is not brought down fast, permanent brain damage or death can result. The victim should be soaked in cool water. Get medical attention as soon as possible.

1.2.1 Preventive Measures

There are a number of steps that can be taken to minimize and/or eliminate the potential for heat stress disorders when working in hot atmospheres. Some of these are as follows:

- Acclimate employees to working conditions by slowly increasing workloads over extended periods of time. Do not begin site work activities with the most demanding physical expenditures.
- Where possible, conduct strenuous activities during cooler portions of the day, such as early morning or early evening.
- Provide and encourage all employees to drink lots of tempered water during the course of the work shift and discourage the use of alcohol during nonworking hours. It's essential that fluids lost due to perspiration get replenished.
- During hot periods, use administrative controls to limit exposure.
- Provide cooling devices when appropriate. Mobile showers and/or hose down facilities, powered air purifying respirators, and ice vests have all proven effective in reducing heat stress potential.

1.2.2 Heat Stress Monitoring

For strenuous HVHFF activities that are part of on-going site work activities in hot weather, the following procedures are used to monitor the body's physiological response to heat. These procedures are implemented when employees are required to wear impervious clothing in atmospheres exceeding 70 degrees Fahrenheit (°F).

- Monitor Heart Rate: Heart rate should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The measurement at the beginning of the rest period should not exceed 110 beats/minute.

If the heart rate is in excess, the next work period should be shortened by 33 percent, with the length of the rest period remaining the same. If the heart rate is still in excess at the beginning of the next rest period, the following work cycle should be shortened by 33 percent. This procedure continues until the rate is maintained below 110 beats/minute.

- **Monitor Body Temperature:** Body temperature is measured with an ear probe temperature sensor with a disposable probe cover as early as possible in the resting period. Temperatures should not exceed 99.6°F. If it does, the next work period should be shortened by 33 percent. If the oral temperature at the end of the next work period still exceeds 99.6°F, the following work cycle is shortened by another 33 percent. This procedure continues until the body temperature is maintained below 99.6°F.

The Wet-Bulb Globe Temperature (WBGT) Index is a method of monitoring environmental factors that most nearly correlate to an individual’s physiological response to heat. This method uses a black globe thermometer, a natural wet-bulb thermometer, and a dry-bulb thermometer. From measurements with these instruments, the WBGT can be calculated. The WBGT is then compared with work load categories with the result being the establishment of recommended work - rest regimens. Examples of permissible heat exposure TLV are described in the following table.

**Examples of Permissible Heat Exposure TLV
(Values are given in °C and (°F) WBGT)**

Work - Rest Regimen	Work Load		
	Light	Moderate	Heavy
Continuous Work	30.0 (86)	26.7 (80)	25.0 (77)
75% work - 25% rest, each hour	30.6 (87)	28.0 (82)	25.9 (78)
50% work -50% rest, each hour	31.4 (89)	29.4 (85)	27.9 (82)
25% work -75% rest, each hour	32.2 (90)	31.1 (88)	30.0 (86)

Notes: As workload increases, the heat stress impact on a worker is exacerbated. For workers performing a moderate level of work, the permissible heat exposure TLV should be reduced by approximately 25 percent.

1.3 Cold Stress

Persons working outdoors in low temperatures, especially below freezing, or in wet or snowy weather are potentially subject to cold stress disorders. Factors that contribute to cold stress exposure include temperature, humidity, wind, sunlight, rain, snow, fog, exposure duration, clothing, and work activity. Individual susceptibility to cold stress disorders can vary widely. Individual physical factors that can affect a person’s response to cold work environments include a person’s general fitness and age. The following guidelines should be considered when working in ambient air temperatures below 40°F, especially when other contributing weather conditions such as snow, rain, or wind are present. The descriptions, symptoms, and treatment for cold related disorders are described as follows.

Hypothermia

Hypothermia results from a cooling of the body’s core temperature and if left unattended can become a serious condition. Hypothermia can result in the loss of physical skills and impair judgment thereby contributing to the potential for other accidents. Severe hypothermia can result in death. Hypothermia can occur at temperatures above freezing as well as below.

- Symptoms include shivering, teeth chattering, fumbling hands, slurred speech, and loss of coordination. Eventually, the pulse and respiratory rate may slow. The victim may appear blue or lose color in the face.
- Treatment for hypothermia is to catch symptoms early and move the individual to a warm environment indoors or in a vehicle. If a warm location is not immediately available, the victim should be sheltered from the wind and provided extra clothing such as coats or blankets and observed to determine if their condition is improving. If the victim continues to deteriorate and becomes colder, they should be transported to a medical facility for assistance.

Frostbite

Frostbite is a condition in which the fluids around cells of body tissue freeze. The condition can lead to body tissue damage. The most vulnerable parts of the body are the nose, ears, cheeks, fingers, and toes.

- Symptoms of frostbite include body parts becoming white, firm, cold to the touch, and may feel waxy. The victim will not feel pain in the affected area.
- Treatment of frostbite requires that the victim be brought to a warm environment and the affected areas be allowed to thaw and warm. If frostbite has progressed beyond small patches of skin and affects whole body parts such as a hand, foot, or ear, the victim should be transported to a medical facility for treatment and observation.

1.3.1 Cold Stress Monitoring

Personnel should monitor themselves and each other for signs and symptoms of frostbite and/or hypothermia. If symptoms are observed in an employee or subcontractor, steps should be taken to treat the symptoms by having the individual go to a warm environment either in a nearby structure or vehicle.

1.3.2 Cold Stress Control and Prevention

Cold stress can easily be prevented with proper planning and prevention. Some basic controls and preventative measures are listed below:

- Forecasted conditions. Consider the effect of wind chill (Table on following page).
- Dress in layers and stay dry. Avoid cotton clothing such as socks or T-shirts. Bring extra clothing.
- Wear hardhat liners and gloves. Wear rain gear in rain and snow.
- Curtail work if extreme weather conditions such as a blizzard, extreme wind chill (e.g., less than 0°F), torrential cold rains, or wind is expected.
- For long-term projects in cold environments, consider setting temporary structures with portable heaters.
- Take warming breaks as needed.
- Avoid beverages with caffeine, alcohol, or medications that restrict blood flow.
- Drink warm non-caffeine beverages such as hot chocolate or soups on breaks.

WIND CHILL FACTOR CHART												
COOLING POWER OF WIND EXPRESSED AS AN EQUIVALENT CHILL TEMPERATURE (UNDER CALM CONDITIONS)												
ESTIMATED WIND SPEED (IN MPH)	ACTUAL THERMOMETER READING (F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	EQUIVALENT TEMPERATURES (F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-124
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-21	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
Winds greater than 40 MPH have little additional effect.	LITTLE DANGER (For properly clothed person) Maximum danger of false sense of security.			INCREASING DANGER Danger from freezing of exposed flesh.			GREAT DANGER					
	Trench foot and immersion foot may occur at any point on this chart.											

Attachment C
Field Health and Safety Meeting Record

Field Safety and Health Meeting Record

Trainer: _____ **Date:** _____ **Time:** _____

Site: _____

Review:

- Health & Safety Plan - Buddy Teams - Hospital Route/Nearest Phone Location
- Weather Concerns - Potential Problems - Problems Previously Occurred

Protective Clothing/Equipment: _____

Special Equipment: _____

Chemical Hazards: _____

Physical Hazards: _____

Emergency Actions: _____

Other Issues: _____

Check:

- H&S Monitoring Equipment/Calibration - Fire Extinguisher/Communications
- First Aid Kit/Eye Wash Station - H&S Plan

Name (Print):

Signature:

Attachment D
Signature Form

HEALTH AND SAFETY PLAN FORM
Woolsey Health and Safety Project
No.: Woodrow #1H-410308-193

This document is for the exclusive use of
Woolsey and its subcontractors.

Woolsey Operating Company, LLC

The following personnel have read and fully understand the contents of this SSHP and further agree to all requirements contained herein.

Name

Affiliation

Date

Signature

Attachment E
Fugitive Dust Control Plan

**WOODROW #1H-310408-193
HYDRAULIC FRACTURING WELL**

STATE OF ILLINOIS
HYDRAULIC FRACTURING PERMIT APPLICATION

**FUGITIVE DUST PREVENTION
AND CONTROL PLAN**

Prepared for Submittal to
Illinois Department of Natural Resources

Prepared by
Shawnee Professional Services



On behalf of
Woolsey Operating Company, LLC



November 8th 2016

WOODROW #1H-310408-193 Fugitive Dust Control Plan

1.0 Introduction

This Fugitive Dust Prevention and Control Plan (FDPCP) was prepared in accordance with the Hydraulic Fracturing Regulatory Act (225 ILCS 732/ 1-75) for controlling fugitive dust particles by request of Woolsey Operating Company (WOC). The purpose of the plan is to reduce short-term impacts to air quality during the mobilization, construction, and demolition activities needed to support the final design, construction, and operation of the Woodrow #1H-310408-193 Hydraulic Fracturing Well Site (Woodrow #1H). The Woodrow #1H Project includes work activities at two locations: the Woodrow #1H Well Site and the #1 Class 2 well operated by TrueFlo Solutions LLC (TrueFlo) at 987 IL Highway One. An alternate disposal site is located at the Rankin #1 well operated by Haggard Well Services near Calvin, IL. This FDPCP is submitted to the Illinois Environmental Protection Agency as Appendix X of the Hydraulic Fracturing Permit Application.

2.0 Definition

Fugitive dust is not emitted from a definable point source, but is emitted from several sources and escapes beyond the property boundary, right-of-way, or easement. In the case of the Woodrow #1H Project, fugitive dust may be emitted from the roadway, material storage piles, and other construction activities, including drilling operations and transportation activities. Other possible sources of fugitive dust and the associated dust control methods are summarized in Attachment E.1, Fugitive Dust Control Plan Matrix. This FDPCP is a tool to help prevent, reduce, control, and manage the production of fugitive dust in the project area during construction and operation. An environmental representative for Woolsey Operating Company will implement this FDPCP. This representative will be a member of the Woolsey Environmental Team listed in Table E.1. The inspection and monitoring requirements within the FDPCP are expected to fall under the responsibilities of the Woolsey Environmental Compliance Inspector (WECI), or designated representative, on fugitive dust control relative to specific work activities. The Woolsey Environmental Team recognizes that periodic review of construction activities and conditions are important to the success of implementing this plan and remaining in compliance with the Hydraulic Fracturing Regulatory Act (225 ILCS 732/ 1-75). It is recognized that fugitive dust can be a nuisance that interferes with the enjoyment of life and property, and can be a safety hazard and harmful to human health or the environment. Procedures to address these issues are provided below.

2.0 Requirements for Dust Control

2.1 SITE INSPECTIONS, ASSESSMENTS, AND RECORDKEEPING: WOC staff will conduct weekly erosion control inspections (or more often as necessary, depending on rainfall) and dust control issues will be included as part of those inspections. Any observation of substantial fugitive dust will be noted as part of the regular inspections and recorded on the Fugitive Dust Control Monitoring Log (Attachment E.2). This log will also be used by the WECl to document other occurrences of fugitive dust witnessed outside of the regular inspections and any occurrences of fugitive dust reported by other construction personnel. In addition, the WECl, or other persons supervising the site, will conduct monthly effectiveness assessments of the project site, including all erosion and fugitive dust control issues.

2.2 PERSONNEL TRAINING: All project employees (including subcontractors) will be trained on the contents of this FDPCP, including potential dust sources and fugitive dust control measures, as summarized in the Fugitive Dust Control Plan Matrix (Attachment E.1). This training will occur at the start of the project. For any new subcontractors or new WOC employees that are hired, training will occur prior to starting work on-site.

2.3 GENERAL RESPONSIBILITIES FOR ON-SITE PERSONNEL: All project personnel have responsibility for fugitive dust control. Any WOC employee or subcontractor who notices fugitive dust will respond as appropriate based on their training. They will implement a defensive strategy by ceasing the activities generating the fugitive dust and immediately notify their supervisor who will respond based on his or her capabilities and who will notify the responsible Site Superintendent. The Site Superintendent will notify the WECl to complete the Self-Inspection Checklist: Fugitive Dust Control Monitoring Log (Attachment E.2), as required, to document the fugitive dust occurrence.

2.4 RESPONSIBILITIES OF THE CONSTRUCTION MANAGER: The designated person responsible for assessing fugitive dust and implementing this FDPCP at the Woodrow #1H well site with WOC. The alternate is the WECl. Incidents involving fugitive dust emissions shall be reported to the WECl.

2.5 GENERAL REQUIREMENTS: WOC is required to provide dust control measures for all areas disturbed by construction. The measures listed below will be required, as necessary, to control fugitive dust. Dust issues located outside of the project limits but identified as originating from the project will be handled similarly. Dust control will be implemented as appropriate by WOC within the project limits, regardless of whether active construction is occurring or not. Dust control is required any time dust is substantially visible in the air. Dust control will be achieved primarily through application of water, and by covering soils, stockpiled materials, and debris. The source of water may be from storm water, fire

hydrants, and/or proposed freshwater wells on the site or near the work area (as permits allow), supplied by a contracted sweeping/cleaning service, or other approved means.

2.6 ON-SITE DUST CONTROL ON UNPAVED ROADS: During mobilization, construction, operation, maintenance, and demobilization of the project, WOC will suppress dust by applying water. WOC will apply water to the active construction work area as needed and if applicable to the work site, without creating unnecessary muddy areas and problems with track-out. WOC will also construct stabilized construction entrances for ingress and egress points, such as County Road 1675 North, to prevent tracking of mud and soil onto paved roads. Use of process waters to control fugitive dust is strictly prohibited.

2.7 DUST CONTROL ON PAVED ROADS: WOC will implement the following requirements on paved roads:

- Construction entrances and exits will be established for all construction-related traffic in order to prevent tracking of mud and soil onto paved roads from the use of unstable ingress or egress points.
- Procedures for removing dirt from wheels and truck exteriors will be used, and will include a wheel wash at the entrance/exit from the site to County Road 1675 North if necessary. Dirt, dust, and debris will be removed from this area on a regular basis to prevent and minimize the transport of soils or dirt off-site.
- Spills of transported material onto public roads will be cleaned up immediately.

2.8 ON-SITE DUST CONTROL ON DISTURBED AREAS: During construction, operation, and maintenance of the project, WOC will suppress dust by applying water. WOC will apply water to active construction work areas, as needed, to control fugitive dust without creating unnecessary muddy areas and problems with track-out. Stabilization best management practices (BMPs; as listed in Attachment E.1) to be used for disturbed areas not supporting construction traffic or active work may also include vegetation, plastic covering, erosion control fabrics and matting, and the early application of a gravel base on areas to be paved. During grading, excavation, and other construction activities, water sprays will be used to keep the soil damp to minimize fugitive dust. Any trucks leaving the site locations with soils or materials that could result in fugitive dust will be covered with a tarpaulin to ensure that there are no emissions during transit. If materials are at any time stockpiled, they may be dampened by water sprays as needed or covered by secured tarpaulins to minimize fugitive dust, if necessary.

2.9 DUST CONTROL DURING DEMOLITION AND DEMOBILIZATION ACTIVITIES: Demolition and demobilization activities for the site locations will be limited to demolition and removal of site infrastructure improvements. Dust control methods during demolition activities include the same methods described above including general dust control methods, methods for disturbed areas, and unpaved roads. Additional BMPs may include the following, if necessary, to meet the general requirements listed above:

- Use of shop vacuums.
- During demolition, water will be used to dampen the area that is being demolished prior to starting the demolition. During the demolition process a water spray will be used to minimize the fugitive dust. The ground will be sprayed with water either by water truck or some type of water spray to minimize fugitive particulate emissions from haul trucks and demolition equipment.
- During the loading of trucks with demolition debris a water spray will be used to minimize fugitive particulate matter emissions. The trucks will have tarpaulins installed to cover their loads prior to leaving the site to ensure that there are no emissions while the trucks are in transit.

2.10 CONTROL OF OTHER AIR EMISSIONS: Other emission-generating activities related to operations and maintenance may include sandblasting or other abrasives, painting, and coating in contained areas shrouded either with plastic or fabric, and general operation of diesel equipment. The following BMPs may be implemented to limit unnecessary generation of air pollutants:

- Appropriate emission-control devices on equipment powered by gasoline or diesel fuel can reduce CO and NOx emissions in vehicular exhaust. Low-sulfur diesel will be used when possible.
- Sandblasting materials will be stored inside a building.
- Non-slag (inert) sandblasting abrasives will be used when feasible.
- Sandblasting will be conducted on days when the wind will not transport the material off-site or in a confined area to limit emissions.
- Spent material will be immediately contained and disposed of at an appropriate facility.
- Lids will be kept on all containers of paints and coatings.
- Methods will be implemented for efficient paint application to reduce over spraying, including proper training for painters.
- When possible, paint types such as waterborne paints, powder coatings, ultraviolet light or electron beam curable coatings, or higher solids paints will be used.
- When possible, cleaners with low hazardous air pollutant and volatile organic compound content such as water-based, alkaline, or microbial cleaners may be used.

**Table E.1
WOC Environmental Compliance Team Duties and Responsibilities**

Team Member	Environmental Compliance Team Duties and Responsibilities
WOC Environmental Manager/ IL District Landman	
Ryan Kelley Phone: (618) 751-9206	Coordinates with WECL, Project Director, and Construction/Demolition Manager <ul style="list-style-type: none"> • Has stop-work authority • Oversees job-specific environmental compliance program • Provides environmental compliance training and work plan reviews • Develops permit matrix with WECL • Ensures permit compliance and fulfillment of project environmental commitments. • Specialized Training:
WOC Environmental Manager/ Production Forman Illinois Basin	
Mike Lyke Phone: (618) 554-7221	Coordinates with WECL, Project Director, and Construction/Demolition Manager <ul style="list-style-type: none"> • Has stop-work authority • Oversees job-specific environmental compliance program • Provides environmental compliance training and work plan reviews • Develops permit matrix with WECL • Ensures permit compliance and fulfillment of project environmental commitments. • Specialized Training:

**ATTACHMENT E.1
FUGITIVE DUST CONTROL PLAN MATRIX**

Potential Source	Applicable Dust Control Methods	Schedule/Rate of Application	Backup Plan
Temporary construction Haul Road (work site only)	<ul style="list-style-type: none"> • Water haul roads • Control haul routes • Control haul road speeds 	<ul style="list-style-type: none"> • As needed • Follow the Work Plan 	<ul style="list-style-type: none"> • Chemical dust suppressants or surfacing haul roads • Schedule construction trucks
Tracking	<ul style="list-style-type: none"> • Tire wash (drive-through, if needed) 	<ul style="list-style-type: none"> • Wash prior to leaving site 	<ul style="list-style-type: none"> • Wash road with water in compliance with TESCP (i.e. only

	<ul style="list-style-type: none"> Stabilized construction entrances Sweep roads 	<ul style="list-style-type: none"> Place per plan and adjust and maintain as necessary Sweep daily or as needed 	after sediment if removed)
Stockpiles	<ul style="list-style-type: none"> Cover-piles Water stockpiles 	<ul style="list-style-type: none"> As needed 	<ul style="list-style-type: none"> Wet stockpiles during active work
Sawing/Grinding	<ul style="list-style-type: none"> Use water assisted saws and grinders 	<ul style="list-style-type: none"> As needed 	<ul style="list-style-type: none"> Use sweeper tuck
Haul Trucks	<ul style="list-style-type: none"> Ensure adequate truck bed freeboard while on haul roads, including local public roads 	<ul style="list-style-type: none"> Always 	<ul style="list-style-type: none"> Cover loads on scheduled construction trucks
Grading Activities	<ul style="list-style-type: none"> Pre-wet soils before excavating Avoid activity during high winds Minimize time frames between operations Minimize areas of clearing and grubbing to manageable sizes 	<ul style="list-style-type: none"> As needed As weather dictates 	<ul style="list-style-type: none"> Post-wetting
Rain/Wind	<ul style="list-style-type: none"> Keep cleared areas covered for major rain/wind events During dry weather, spray exposed soil with water 	<ul style="list-style-type: none"> Prevent the mud-to-dust scenario 	<ul style="list-style-type: none"> Use sweeper truck
Exposed Soils	<ul style="list-style-type: none"> Apply BMPs such as: plastic covering, erosion control fabrics and matting, and the early application of a gravel base on areas to be paved 	<ul style="list-style-type: none"> For all areas not being worked and that contain erodible soils 	<ul style="list-style-type: none"> N/A

**ATTACHMENT E.2
SELF-INSPECTION CHECKLIST: FUGITIVE DUST CONTROL MONITORING LOG**

Date/Time	Location	Fugitive Dust Source	Control Method	Comments

*May be copied as needed

Attachment F
Respiratory Protection Program

Woolsey Operating Company Respiratory Protection Program

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1. General

It is necessary to protect employees who may be exposed to harmful mists, smoke, vapors, etc. or to an oxygen enriched or deficient atmosphere. Whenever possible, engineering controls should be utilized to provide this protection. When engineering controls are not possible, respiratory protection must be provided and used.

2. Purpose

Any person required to wear a respirator on the job needs instruction and training prior to using the equipment. In part, the training should include the nature, extent, and effects of the respiratory hazards to which a person may be exposed as well as signs and symptoms of exposure. Before a person is required to wear a respirator on the job, a determination should be made that he/she is physically fit and able to wear a respirator. The respiratory protective program should be evaluated annually to determine its effectiveness.

3. Definitions

Air Purifying Respirator – means a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Assigned Protection Factor – means the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program as specified by OSHA 29 CFR 1910.134

Atmosphere Supplying Respirator – means a respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

Canister or Cartridge – means a container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.

Demand Respirator – means an atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

Emergency Situation – means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

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

End-of-service-life indicator (ESLI) – means a system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.

Escape-only Respirator – means a respirator intended to be used only for emergency exit.

Filter or Air Purifying Element – means a component used in respirators to remove solid or liquid aerosols from the inspired air.

Filtering Facepiece (Dust Mask) – means a negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

Fit Factor – means a quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

Fit Test – means the use of protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual

Helmet – means a rigid respiratory inlet covering that also provides head protection against impact and penetration.

High Efficiency Particulate Air (HEPA) Filter – means a filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter.

Hood – means a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulder and torso.

Immediately Dangerous to Life and Health (IDLH) – means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Loose-fitting facepiece – means a respiratory inlet covering that is designed to form a partial seal with the face.

Negative Pressure Respirator – means a respirator in which the pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

Oxygen Deficient Atmosphere – means an atmosphere with an oxygen content below 19.5% by volume.

Oxygen Enriched Atmosphere – means an atmosphere with an oxygen content above 23.5% by volume.

Positive Pressure Respirator – means a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

Qualitative Fit Test – means a pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

Quantitative Fit Test – means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator

Self-Contained Breathing Apparatus (SCBA) – means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

Supplied Air Respirator – means an atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

User Seal Check – means an action conducted by the respirator user to determine if the respirator is properly seated to the face.

4. Responsibilities

Management will:

- a. Assist in determining if respiratory protection is needed
- b. Assist in the selection of appropriate respiratory protection
- c. Provide fit testing and respirator training
- d. Monitor program compliance

The department supervisors will:

- a. Determine if respiratory protection is needed
- b. Identify employees requiring respiratory protection
- c. Provide proper respirators
- d. Maintain fit test and training records

The employee will:

- a. Use the respirator in accordance with guidelines described in this policy
- b. Inform his/her supervisor if a respirator is lost or damaged
- c. Report to his/her supervisor any illness or change in physical condition that may interfere with the safe use of a respirator

5. Respirator Selection

Respiratory protection is only as good as the respirator in use. Therefore, it is very important to select the right respirator for the right job. The selection of a respirator will be made in accordance with the most current ANSI Z88.2 standard. Only respirators which are approved by NIOSH/MSHA or the U.S. Department of Interior, Bureau of Mines should be used.

a. Selection Considerations

The selection of a respirator is dependent on many factors.

- i. The characteristics of the hazardous operation:
 1. Work area characteristics
 2. Materials used
 3. Worker activities
- ii. The nature of the respiratory hazard:
 1. Type of hazard: a contaminant or an oxygen deficient atmosphere
 2. Physical and chemical properties of the contaminant
 3. Physiological effects on the body
 4. Actual concentration of the contaminant (as determined by sampling or actual knowledge of the concentration) established Permissible Exposure Limits (PELs) or Threshold Limit Values (TLVs)
 5. Immediately Dangerous to Life and Health (IDLH) concentration
 6. Warning properties of the contaminant

iii. The location of the hazardous area in relation to the nearest area having respirable air; this needs to be considered when planning for:

1. Emergency escape
2. Entry of workers
3. Rescue operations

iv. The period of time for which respiratory protection must be provided:

1. Routine use
2. Emergency use

v. The activities of workers in the hazardous area:

1. Light, medium, or heavy work rate
2. Intermittent or continuous work

vi. The physical characteristics, functional capabilities, and limitations of the various respirators: (certain conditions require a specific respirator)

1. An oxygen deficient atmosphere requires use of a respirator which provides an independent, respirable atmosphere, a Self-Contained Breathing Apparatus (SCBA) or airline; for breathing purposes, air must contain at least 19.5% oxygen; less than 19.5% oxygen is considered to be oxygen deficient.
2. An IDLH atmosphere requires use of a SCBA or an airline respirator with continuous flow and escape provisions.

vii. Respirator protection factor

1. A measure of the degree of protection which is provided by a respirator
2. Based on the concentration of the contaminant outside the mask divided by the concentration found inside the mask
3. Helps determine maximum concentration of the contaminant in which a particular respirator can be used
4. Takes into account the capabilities and limitations of the type of respirator

For example: the protection factor for a half-face piece air purifying respirator is 50; with proper cartridges, etc., this type of respirator is suitable in an atmosphere that contains a contaminant at a concentration that is 50 times higher than the TLV or PEL.

b. Respirator Descriptions

There are many types of respirators. Respirators can be classified according to whether they use an air source or the ambient air; whether they operate under a negative or positive pressure; and the configuration of the mask. See Figure 1 for respirator illustrations.

i. Supply Air Respirators:

Self-contained breathing apparatus (SCBA)

1. Use supply air from a cylinder carried by the user airline
2. Use supply air from a source which is located away from the user

3. Require a compressor or cylinder(s) and an airline hose and must be used in an oxygen deficient atmosphere.

ii. Air Purifying Respirators:

1. Use ambient air; cannot be used in an oxygen deficient atmosphere.
2. Purify the ambient air by use of a chemical cartridge or canister, or a particulate filter.
3. Powered air-purifying respirators (PAPRs) operate in a positive-pressure continuous-flow mode utilizing filtered ambient air

iii. Disposable or single use respirators:

1. Cloth or paper construction
2. Primarily used as a particulate filter for nuisance dusts

iv. Air Flow:

Positive pressure respirators maintain positive pressure in the face piece during both inhalation and exhalation. Negative pressure respirators draw air into the face piece by the negative pressure created by inhalation (these are demand type respirators).

1. Pressure-demand respirators maintain the mask's positive pressure except during high breathing rates.
2. Continuous-flow respirators send a continuous flow of air into the mask at all times.

MASKS

Full facepiece mask covers the face from the hairline to below the chin; this type of mask does provide eye protection.

Half mask covers the face from above the nose to below the chin; this type of mask does not provide eye protection.

Quarter mask covers the face from above the nose to above the chin; this type of mask does not provide eye protection

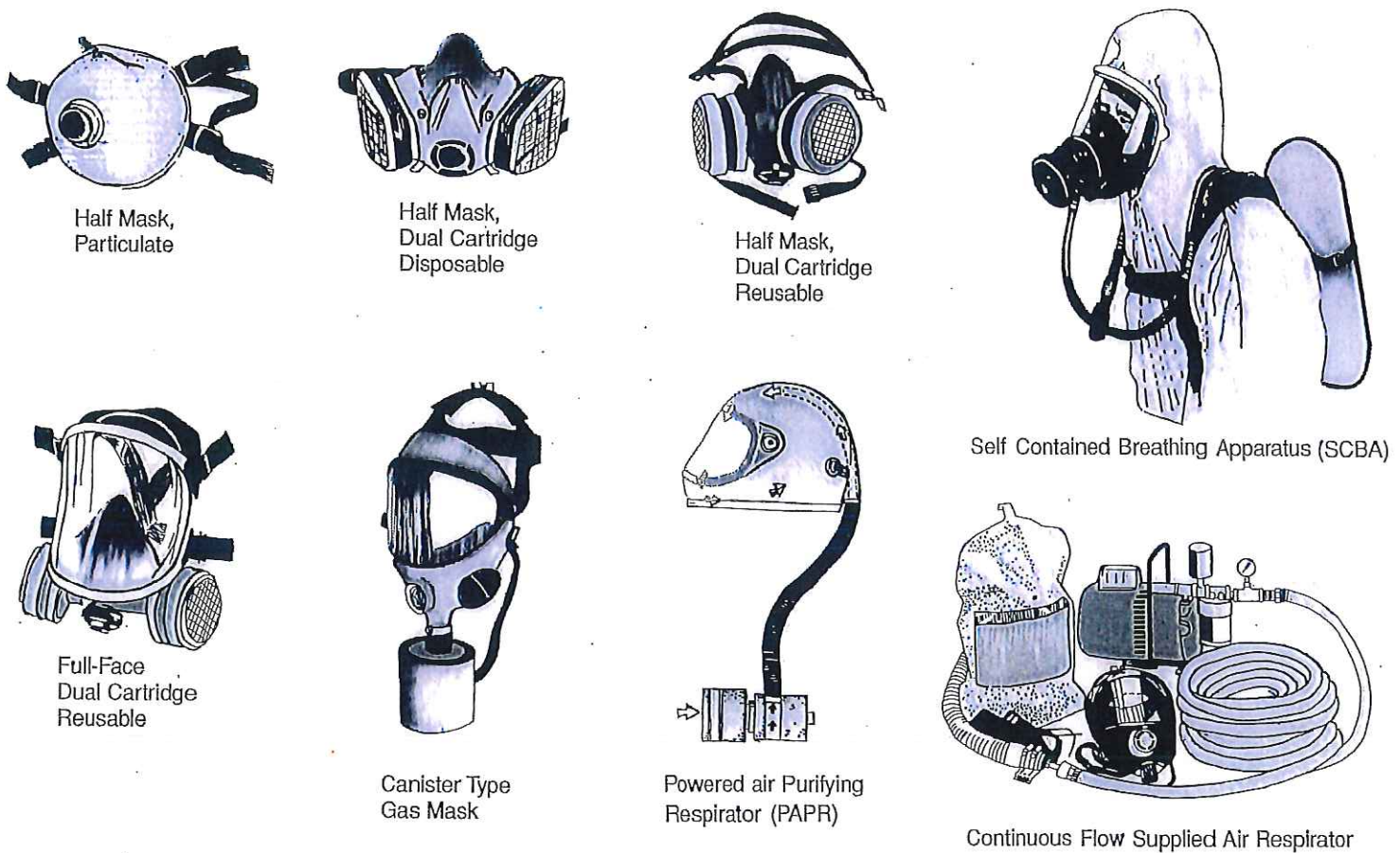


Figure 1: Types of Respiratory Protection

c. Different Protection for Different Hazards

i. Filter respirators

1. Provide protection against particulate matter such as dust, fumes, mists, smoke, microorganisms, and asbestos.
2. Do not provide protection against chemical vapors or gases, or oxygen deficiency.

ii. Chemical cartridge/canister respirators

1. Provide protection against certain gases and vapors up to a particular concentration.
2. Do not provide protection against oxygen deficiency or particulate matter.

iii. Air supply respirators

1. Dependent on the type, can provide protection against particulates, chemical vapors and gases, as well as oxygen deficiency.

d. Selection Guidelines

To aid in the selection of an appropriate respirator consider the following:

iv. If the contaminant is of a biological nature, e.g., a spill of viable bacteria, a High Efficiency Particulate Air (HEPA) filter respirator must be used.

v. Identity and concentration of the contaminant should be known in order to select a respirator.

vi. If the identity and concentration of the contaminant is not known, then an air supply respirator must be used.

vii. When the identity and concentration is known, a respirator must be selected with a protection factor that is high enough to ensure that the user will not be exposed to a chemical level in excess of the PEL or TLV.

viii. If an oxygen deficient atmosphere is known or suspected to be present, an air supply respirator must be used.

ix. If an IDLH condition exists, an air supply respirator must be used.

Respirators are available in different sizes; the correct size for the wearer will be determined by a fit test (See Fit Testing Section).

If it is possible that an airline could be damaged or degraded by chemicals, then an SCBA should be used instead of an airline respirator.

6. Inspection

Prior to and after each use, the respirator should be inspected to ensure that it is in good operating condition. Inspect a respirator that is stored for emergency or rescue use at least monthly. A respirator inspection should be tailored to the type of respirator, as follows:

a. Disposable Respirators

1. Integrity of the filter - check for holes or tears
2. Elastic strips - check for loss of elasticity, tears, etc.
3. Metal nose clip - check for breakage

b. Air Purifying Respirators

i. Rubber face piece, check for:

1. Excessive dirt
2. Cracks, tears, or holes
3. Distortion from improper storage
4. Cracked, scratched or loose fitting lens
5. Broken or missing mounting clips
6. Worn threads in filter holder
7. Missing or worn gaskets in filter holder

ii. Head straps, check for:

1. Breaks
2. Loss of elasticity
3. Broken or malfunctioning buckles or attachments

iii. Inhalation and Exhalation Valve, check for:

-
1. Detergent residue, dust particles, dirt
 2. Cracks, tears, or distortion
 3. Missing or defective valve cover

iv. Chemical canisters and/or particulate filters, check for:

1. Proper filter or canister for the hazard
2. Approval designation
3. Worn threads on filter housing
4. Cracks or dents in the filter housing
5. Deterioration of harness (gas mask canister)
6. Service life indicator, expiration date (if applicable)

v. Corrugated breathing tube (gas masks), check for:

1. Cracks
2. Missing or loose hose clamps
3. Broken or missing connectors

c. Atmosphere Supplying Respirators

- i. Check facepiece, head straps, valves, and breathing tube as described for air purifying respirators
- ii. Hood, helmet, blouse, or full suit (if applicable), check for:
 1. Rips and torn seams
 2. Headgear suspension
 3. Cracks or breaks in face shield
- iii. Air supply system, check for:
 1. Low volume of air cylinders
 2. Incorrect gas in cylinders
 3. Breaks or kinks in air supply hoses and end fitting attachments
 4. Loose connections
 5. Improper setting of regulators and valves (consult manufacturer recommendations)
 6. Incorrect operation of air purifying elements and carbon monoxide
 7. High temperature alarms (for air compressors)
- iv. Self-contained breathing apparatus (SCBA), check for:
 1. Air or oxygen cylinders that may not be fully charged according to manufacturer's instructions

7. Cleaning and Disinfecting

Proper maintenance of respirator equipment is essential to ensure its effectiveness. Whenever possible, each individual should be assigned a respirator for his/her exclusive use. Proper cleaning of a respirator reduces the potential for contamination and dermatitis.

Proper cleaning guidelines include:

- a. Frequently clean and disinfect personal respirators
- b. Thoroughly clean and disinfect shared respirators between users
- c. Clean and disinfect emergency use respirators after each use
- d. Ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

Procedure for Cleaning Respirator:

- i. Remove filters, cartridges, or canisters. Disassemble facepiece by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.
- ii. Wash components in warm water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
- iii. Rinse components thoroughly in clean, warm, preferably running water. Drain.
- iv. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:
 1. Hypochlorite solution (chlorine) made by adding approximately one milliliter of laundry bleach to one liter of warm water; or,
 2. Aqueous solution of iodine made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of warm water; or,
 3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
- v. Rinse components thoroughly in clean, warm preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepiece may result in dermatitis. In addition, some disinfectants may cause premature deterioration of rubber or corrosion of metal parts if not completely removed.
- vi. Components should be hand-dried with a clean lint-free cloth or air-dried.
- vii. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.
- viii. Test the respirator to ensure that all components work properly.

8. Storage

Respirators need to be stored properly to prolong their life and to maintain their effectiveness.

- a. Do not store around dust, sunlight, heat, extreme cold, excessive moisture, and chemicals.

-
- b. Do not store respirators unprotected in lockers or tool boxes.
 - c. Store respirators with the facepiece and exhalation valve resting in a normal position.
 - d. Routinely used respirators may be placed in plastic bags.
 - e. Store emergency use respirators in an accessible, clearly marked compartment.

9. Proper Use of Equipment

It is essential that a person who is required to wear a respirator be informed and made aware of conditions and factors which might interfere with a respirator's performance. Listed below are some Do's and Don'ts regarding respirator use:

- a. DO
 - i. Make sure you have the correct respirator for the job.
 - ii. Have an additional person present in dangerous atmospheres.
 - iii. Determine a means of communication between respirator wearers prior to using the respirators in the field (hand signals are acceptable).
 - iv. Use a respirator which has been approved by NIOSH/MSHA or U.S. Department of Interior, Bureau of Mines.
 - v. Check a respirator each time before use.
 - vi. Shave (if applicable) before wearing a respirator.
 - vii. Be aware that some contaminants may enter or damage the body by means other than the respiratory tract (protective clothing may be required).
 - viii. Return to fresh air if: the canisters or cartridges need replacing; you feel nauseous, dizzy, or ill; or if you experience difficulty breathing.
 - ix. Wear eye protection if the contaminant concentration causes eye irritation (a full facepiece respirator may be used).
 - x. Be aware that some environmental conditions can compromise a respirator's performance, i.e. high temperatures can cause a person to sweat, breaking the face to facepiece seal; freezing temperatures can ice clog an exhalation valve and regulator; at high breathing rates, positive pressure may not be maintained in positive pressure SCBAs.
 - xi. Be alert to signs and symptoms of heat stress.
- b. DON'T
 - i. Remove a respirator in a contaminated atmosphere.
 - ii. Use a respirator without the proper training.
 - iii. Talk unnecessarily or chew gum while wearing a respirator.
 - iv. Overexert yourself.
 - v. Wear contact lenses while using a respirator.
 - vi. Mistakenly use a filter respirator for protection against gases or vapors.
 - vii. Allow hair or temple bars from glasses to pass between the face and facepiece of the respirator.

10. Air Purifying Respirators

Air purifying respirators remove specific contaminants from the air by passing the air through a filter, cartridge, or canister. Air purifying respirators are limited in the protection they provide, so it is necessary to understand their limitations, how to select the correct type, and how to use them.

a. Limitations of Air Purifying Respirators

The following limitations must be considered when using an air purifying respirator:

- i. Cannot be used in atmospheres containing less than 19.5% oxygen.
- ii. Cannot be used in IDLH atmospheres (except escape gas masks).
- iii. Cannot be used when the identity of the contaminant is not known.
- iv. Cannot be used when contaminant concentrations are unknown or when established maximum levels have been exceeded.
- v. Proper cartridge must be selected for the contaminant.
- vi. Relative humidity might reduce the effectiveness of the sorbent.
- vii. Cartridges/canisters should only be used for chemicals having adequate warning properties (odor, taste, or irritant effects are detectable below the TLV or PEL) or the cartridge/canister has an approved end-of-service-life indicator.
- viii. Cartridges/canisters are specific to the brand of respirator (e.g. 3M cartridges must be used with a 3M mask).

b. Classes of Air Purifying Respirators

i. Disposable dust respirators

1. Made of cloth or paper
2. NIOSH/MSHA approved dust respirators provide protection against nuisance dusts (i.e. a TLV of 10 mg/cubic meter or greater)
3. difficult to fit test and to obtain a good facepiece-to-face seal

ii. Mouthpiece respirators

1. Approved for escape only
2. Mouthpiece held by teeth; clamp used to close nostrils
3. Only used when hazard is identified and respirator is approved for that hazard

iii. Quarter mask respirator

1. Used with cartridges or particulate filters
2. Not suitable for protection against dusts with TLVs less than 0.05 mg/cubic meter

iv. Half mask respirator

1. Uses one or two cartridges
2. Approved for vapors, dusts, fumes, mists, gases, and combinations thereof

v. Full-face mask respirator

1. Provides more protection than half mask respirators (e.g. eye protection and a higher protection factor)

2. Approved for same contaminants as half mask respirators, but at higher concentrations

vi. Powered respirators

1. Have no breathing resistance

2. Can be used with half masks, full-face masks, and helmets

c. Air Purifying Element Considerations

Air purifying elements must be properly selected, stored, maintained, and replaced in order to provide adequate protection to the user.

i. Canisters

1. Remove vapors and gases from the air

2. Have a large sorbent volume and provide protection against higher concentrations of vapors and gases

3. A component of gas masks

ii. Cartridges

1. Contain less sorbent than a canister

2. Lifetime is short

iii. Cartridge selection

1. Cartridges are color-coded to indicate the contaminants which they protect against

2. The cartridge selected must be made by the same manufacturer and be compatible with the respirator in use.

3. Chemical and HEPA filter cartridges can be combined to provide protection against particulates and gases and vapors.

4. Some cartridges can be combined to provide protection against more than one chemical.

5. If a worker is exposed to two or more chemicals and a combination cartridge is not available, then a supply air respirator should be used.

d. Cartridge/Canister must be replaced if any of the following conditions occur:

i. Cartridge/canister develops an uncomfortably high temperature (due to chemical absorption reaction)

ii. Wearer detects an odor or taste, or feels eye or throat irritation

iii. Shelf-life date is expired

iv. The end-of-service-life indicator changes color (if applicable)

v. Cartridge/canister becomes wet or is grossly contaminated

vi. Physical damage is noticed

vii. In addition, it is recommended to replace the cartridge/canister at the end of each day, especially if the respirator is not stored properly (clean and bagged to prevent exposure to humidity and chemical vapors).

e. Filters (HEPA Cartridges, Dust Pads, or Disposable Dust Respirators) must be replaced if any of the following conditions occur:

- i. Breathing becomes difficult
- ii. Filter or dust respirator becomes physically damaged (tears, holes, etc.)
- iii. Filter or dust respirator is visibly dirty
- iv. Filter or dust respirator becomes wet
- v. The inside of the dust respirator becomes contaminated
- vi. In addition, disposable dust respirators should be disposed of after use

11. AIR SUPPLY RESPIRATORS

Air supply respirators require a separate source for breathing air, this source could be a cylinder which is carried by the user (self-contained breathing apparatus), a compressor or cylinders which provide air to the user from a distant location via an airline (airline device), or breathing air from a distant location which is directed to the user via a hose (hose mask).

a. Self-Contained Breathing Apparatus (SCBA)

There are two basic designs of self-contained breathing apparatus (SCBA):

- i. Closed circuit
 1. a.k.a. "re-breather"
 2. Mixes oxygen with exhaled breath which has had the carbon dioxide removed by a scrubber
 3. Have a longer service time than open circuit SCBA (1-4 hr use)
 4. During inhalation, a negative pressure is present in the facepiece
 5. Generally not acceptable for use in atmospheres immediately dangerous to life and health
 6. Not commonly used.
- ii. Open circuit
 1. Most common type used
 2. Requires a supply of compressed breathing gas (almost always air, but can be oxygen) which is in a cylinder carried on the user's back
 3. If using compressed oxygen, it CANNOT be used in a device designed for compressed air
 4. Air is exhaled, not recycled
 5. Amount of air is limited: generally allows for 30 or 60 minutes of air; 5 minute units are available for escape purposes
 6. Air must meet at least Grade D specifications

7. Consists of: cylinder, high-pressure hose, alarm, regulator, breathing hose, facepiece, backpack and harness

8. Principle of operation: air from a cylinder passes through a regulator where pressure is reduced, then through the breathing tube and into the facepiece where it is inhaled by the user

9. Function in one of two modes of operation: demand and pressure demand

10. Demand: air flows into facepiece only when user inhales; during inhalation there is a negative pressure inside the facepiece which could allow contaminants inside if a leak would develop; should not be used in atmospheres immediately dangerous to life and health

11. Pressure demand: maintains a positive pressure in the facepiece at all times; if a leak would develop in the facepiece, contaminants would not enter and harm the user; should be used in atmospheres immediately dangerous to life and health.

b. Airline Device

Airline devices deliver air to the wearer via a high pressure airline hose up to 300 feet in length. The air source can be a compressor or compressed air cylinders, thereby allowing longer use time than SCBAs. These devices can be equipped with a half or full-face mask, helmet, hood, or a complete suit. Airline devices cannot be used in atmospheres immediately dangerous to life and health because of the dependence on the air source and airline, which may become impaired. There are three types of airline devices:

i. Demand

1. Air only enters the facepiece when wearer inhales
2. A negative pressure is present in the facepiece during inhalation

ii. Pressure demand

1. Air flows continuously into facepiece
2. A positive pressure is maintained in the facepiece
3. Provides more protection than the demand type device

iii. Continuous flow

1. Uses an airflow control valve or orifice instead of a regulator
2. Air flows continuously into facepiece
3. A positive pressure is maintained in the facepiece

c. Hose Mask

i. Hose masks allow air to the wearer via a large diameter hose, but do not use compressed air.

ii. Hose masks are not widely used.

iii. The hose extends to a non-contaminated air space.

iv. The user either breathes with the aid of a blower or breathes against the resistance to airflow in the hose.

v. Depending on the manufacturer, a hose mask with a blower may have a hose length up to 300 feet and may have a facepiece, helmet, or hood.

vi. Depending on the manufacturer, a hose mask without a blower may have a hose length up to 75 feet and must have a tight fitting facepiece.

vii. With or without a blower, hose masks cannot be used in atmospheres immediately dangerous to life and health.

d. Limits of Air Supplying Respirators

The following limitations must be considered when using an air supply respirator:

i. SCBA

1. These respirators are bulky and heavy and may not be suitable for strenuous work or for working in constricted spaces
2. The use time is limited by the amount of air contained in the cylinder (normally 30 or 60 minutes)
3. The air in the cylinder must be at least Grade D as determined by the compressed Gas Association Commodity Specification for Air, G-7.1
4. Heat stress and worker fatigue need to be considered

ii. Airline device

1. The air supply line restricts the wearer's mobility
2. Protection may be lost due to: cutting, kinking, or crushing of the air supply line; air compressor failure; the depletion of the air in the cylinder(s)
3. Only an airline device with an additional self-contained air supply (which can be used for escape) is allowed for atmospheres that are immediately dangerous to life and health
4. If using a compressor: it must be located in a safe, non-contaminated environment; it must be equipped with in-line air-purifying sorbent beds and filters; it must have alarms to indicate compressor failure and overheating; it must have an alarm that indicates the presence of carbon monoxide or the air must be tested for carbon monoxide
5. If using a cylinder(s): it must be tested and maintained as prescribed by the Department of Transportation (49 CFR 178); it must be marked in accordance with ANSI Z48.1-1954 or other applicable standard
6. Airline couplings must be incompatible with outlets for other gas systems

iii. Hose mask

1. Cannot be used in atmospheres immediately dangerous to life and health
2. The air supply hose limits mobility
3. The hose mask without a blower is limited to a 75 foot hose and the wearer must inhale against resistance to airflow which can cause worker fatigue
4. Source of contaminant free breathing air must be nearby

e. Donning a SCBA

There are different methods to don an SCBA. The wearer needs to find a method that feels comfortable. The following describes one method (from the Fire Protection Training Division, Texas Engineering Extension Service) which can be used to don a SCBA:

-
- i. Remove SCBA from the case, open cylinder valve and check the air pressure.
 - ii. Position the SCBA with the cylinder down, arms toward the wearer, and cylinder control valve pointing toward the body (the SCBA can be placed on the ground or preferably on a table).
 - iii. Grasp shoulder strap on which the regulator is mounted with the right hand.
 - iv. Pick up SCBA, place left arm through the strap supported by the right hand, placing strap on left shoulder.
 - v. Remove right hand from the left shoulder strap, place right arm into the remaining strap.
 - vi. Grasp both shoulder straps near the shoulders and complete positioning of the SCBA, lock snaps, and adjust the straps.
- f. The following method can be used to don the face mask:
- i. Position the adjustable straps (fully extended) to the outside of the mask
 - ii. Place hands between the straps and the mask, with the straps laying on the back of the hands
 - iii. Place mask on the face, inserting chin first, working the mask up on the face
 - iv. Raise hands away from the mask, continue movement around the sides of the face until the straps are in place
 - v. Adjust straps until the mask fits tightly on the face (this is done by pulling the straps straight back toward the ears), the bottom straps should be adjusted first
 - vi. Test the mask by holding the end of the air tube against the palm of the hand, inhale, if a leak is noted, readjust the straps

g. Care and Use of an SCBA

In addition to the general requirements found in the Proper Use of Respirator Equipment and Proper Care of Respirator Equipment sections, there are specific requirements and considerations which must be followed by all SCBA wearers.

- i. OSHA requires that SCBA used for emergency use be inspected once a month and records must be maintained of the inspection.
- ii. NIOSH recommends all stored SCBA's be inspected weekly.
- iii. After each use, air or oxygen cylinders should be fully charged according to the manufacturer's instructions.
- iv. Determine at least monthly that the regulator and warning devices on the SCBA function properly.
- v. Follow the "Use and Care" instructions for the SCBA which are usually mounted inside the carrying case lid.
- vi. Frequently monitor the pressure gauge on the SCBA which indicates the volume of air remaining in the cylinder.
- vii. Warning devices will signal an alarm when 20-25% of service time remains.

12. Respirator Use in Dangerous Atmospheres

Only full-face pressure demand respirators are acceptable for use when toxic or oxygen deficient atmospheres may be present or if the identity of the contaminant is unknown. Personnel who may encounter dangerous atmospheres in normal operations or emergencies must be familiar with the following procedures:

- a. One additional person must be present in areas where, if a respirator fails, the respirator wearer could be overcome by a toxic or oxygen deficient atmosphere.
- b. Communications must be maintained between the individuals present; the communications can include visual, voice, or signal line.
- c. An additional person equipped with rescue equipment including a SCBA must be in a nearby safe area where he can assist the others in case of an emergency.
- d. When a SCBA is used in an atmosphere immediately dangerous to life and health, standby personnel must be present with rescue equipment.
- e. Any respirator wearers in an atmosphere immediately dangerous to life and health must be equipped with safety harnesses and safety lines so they can be removed if they are overcome.

13. Fit Testing

There is not one style or size of respirator available which will properly fit every person who needs to wear one. This is why it is so important that every respirator be fit tested before it is used. The OSHA Standard, 29 CFR 1910.134 states that respirators shall be fitted properly and shall be tested for their facepiece-to-face-seal. Fit testing can be accomplished by one of two methods: quantitative or qualitative. Both methods are described below.

a. Quantitative Fit Test

This method of fit testing is very accurate, but costly. This method exposes the respirator wearer to a test atmosphere, e.g. an aerosol, vapor, or gas. An instrument is used to measure the test atmosphere as well as the air inside the respirator. A quantitative fit factor is calculated which indicates how well the respirator fits the wearer. This test is expensive and requires highly trained personnel to administer.

b. Qualitative Fit Test

This method of fit testing is inexpensive, fast, and easily performed. It is the most commonly used method. The test atmosphere is an easily detected substance such as isoamyl acetate (banana oil) and/or an irritant smoke. The respirator used for the test must provide protection against the test substance (e.g. an organic vapor chemical cartridge must be used for the isoamyl acetate and a HEPA cartridge must be used for the irritant smoke test). Please note:

- i. Disposable dust masks cannot be fit tested.
- ii. Refer to the Respirator Training and Fit Test Form (Figure 3).
- iii. Test will be performed annually or when a different respirator is used.
- iv. Records must be kept for every fit test performed.

The qualitative fit test involves having the test subject don a respirator, exposing the employee to the test substance, requiring him to perform some task (such as reciting the

alphabet), moving head from side to side and determining whether the test subject can detect the test substance:

1. If the test substance is detected, then the respirator does not fit well and the test is repeated after some adjustments have been made to the respirator, or a new respirator may be tested.
2. If the test substance is not detected, then a satisfactory fit is assumed to be achieved.

14. Training

Any person assigned a task requiring respiratory protection must receive adequate training regarding the safe and proper use of the respirator. This training should include the following:

- a. Reasons for the need for respiratory protection
- b. Nature, extent and effects of respiratory hazards to which the person may be exposed
- c. Selection of appropriate respirator for the hazard
- d. Explanation of the operation, capabilities, and limitations of the selected respirator
- e. Instructions in inspecting, donning, fit testing and wearing the respirator
- f. Directions for maintenance and storage of the respirator
- g. Hands-on training to allow actual handling of the respirator
- h. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
- i. Choose respirators certified for use to protect against the contaminant of concern. A label or statement of certification should appear on the respirator or respirator packaging.
- j. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against.
- k. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

RESPIRATOR TRAINING COMPLETION FORM

Company: _____

Location: _____

Fit Test Conducted By: _____
(Print) (Signature)

Name: _____

Signature: _____

	SCBA Size: S M L Brand: Model:	Cartridge Full-face Size: S M L Brand: Model:	Cartridge Half-face Size: S M L Brand: Model:
1. I understand why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.			
2. I understand what the limitations and capabilities of the respirator are.			
3. I understand how to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.			
4. I understand how to inspect, put on and remove, use, and check the seals of the respirator.			
5. I understand what the procedures are for maintenance and storage of the respirator.			
6. I wore this respirator equipment in a test atmosphere generated by smoke or other means.			
7. I know how to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.			

15. Medical Evaluations

Woolsey will provide a medical evaluation to determine the employee's ability to use a respirator, before the employee is fit tested or required to use the respirator in the workplace. Administration of the medical questionnaire and examination shall be provided confidentially during the employee's normal working hours or at a time and place convenient to the employee.

a. Initial medical examination procedures

- i. Woolsey has designated ____TBD____ as the PLHCP.
- ii. ____TBD____ will use the OSHA Respirator Medical Evaluation Questionnaire and Physician Approval Form (refer to Appendix A).

b. Follow-up medical examinations

- i. The employer shall ensure that a follow-up medical examination is provided for an employee who gives a positive response to any question among questions 1 through 8 in Section 2, Part A of the OSHA Respirator Medical Evaluation Questionnaire or whose initial medical examination demonstrates the need for a follow-up medical examination.
- ii. The follow-up medical examination shall include any medical tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make a final determination.

c. Additional medical examinations

At a minimum, the employer shall provide additional medical evaluations if:

- i. employee reports medical signs or symptoms that are related to ability to use a respirator;
- ii. A PLHCP, supervisor, or the respirator program administrator informs the employer that an employee needs to be reevaluated;
- iii. Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or
- iv. A change occurs in workplace conditions that may result in a substantial increase in the physiological burden placed on an employee.

Woolsey will discontinue the employee's medical evaluations when the employee is no longer required to use a respirator.

APPENDIX A
OSHA Respirator Medical Evaluation
Questionnaire
And
Physician Approval Form

OSHA Respirator Medical Evaluation Questionnaire (Appendix C to 29 CFR 1910.134)

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A. Section 1 (Mandatory): The following information must be provided by every employee who has been selected to use any type of respirator (please print).

Can you read?Yes No

Date: _____

Name: _____

Age: _____ Height: _____ Weight: _____ Sex: Male Female

Job title: _____

A phone number where you can be reached by the licensed health care professional (LHCP) who is reviewing this questionnaire (include area code): _____

What is the best time to reach you at this number: _____ a.m. _____ p.m.

Has your employer told you how to contact the LHCP reviewing this questionnaire:Yes No

What type of respirator will you use? (select all that apply):

- a. N, R or P-disposable respirator (filter-mask, non-cartridge type only)
- b. Half or full-face type, powered air-purifying, self-contained breathing apparatus or supplied air

Have you ever worn a respirator?Yes No

If "yes", what type(s)? _____

Part A. Section 2 (Mandatory): Every employee selected to use any type of respirator must answer questions 1 through 9 below (please select yes or no).

1. Do you *currently* smoke tobacco, or have you smoked tobacco in the last month?Yes No

2. Have you *ever* had any of the following conditions?

- a. Seizures (fits).....Yes No
- b. Diabetes (sugar disease).....Yes No
- c. Allergic reactions that interfere with your breathingYes No
- d. Claustrophobia (fear of closed in places).....Yes No
- e. Trouble smelling odorsYes No

3. Have you *ever* had any of the following pulmonary or lung problems?

- a. AsbestosisYes No
- b. SilicosisYes No
- c. AsthmaYes No
- d. Pneumothorax (collapsed lung)Yes No

- e. Chronic bronchitisYes No
- f. Lung cancerYes No
- g. EmphysemaYes No
- h. Broken ribs.....Yes No
- i. PneumoniaYes No
- j. Any chest injuries or surgeriesYes No
- k. TuberculosisYes No
- l. Any other lung problem that you have been told aboutYes No

4. Do you *currently* have any of the following symptoms of pulmonary or lung illness?

- a. Shortness of breathYes No
- b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline
.....Yes No
- c. Shortness of breath when walking with other people at an ordinary pace on level ground
.....Yes No
- d. Have to stop for breath when walking at your own pace on level groundYes No
- e. Shortness of breath that interfered with your jobYes No
- f. Shortness of breath when washing or dressing yourselfYes No
- g. Coughing that produces phlegmYes No
- h. Coughing that wakes you early in the morningYes No
- i. Coughing that occurs mostly when you are lying downYes No
- j. Coughing up blood in the last monthYes No
- k. WheezingYes No
- l. Wheezing that interferes with your jobYes No
- m. Chest pain when you breathe deeplyYes No
- n. Any other symptoms that you think may be related to lung problemsYes No

5. Have you *ever* had any of the following cardiovascular or heart problems?

- a. Heart attackYes No
- b. StrokeYes No
- c. AnginaYes No
- d. Heart failureYes No

- e. Swelling in your legs or feet (not caused by walking)Yes No
- f. Heart arrhythmia (irregular heart beat)Yes No
- g. High blood pressureYes No
- h. Any other heart problems that you have been told aboutYes No

6. Have you *ever* had any of the following cardiovascular or heart symptoms?

- a. Frequent pain or tightness in the chestYes No
- b. Pain or tightness in the chest during physical activitiesYes No
- c. Pain or tightness in the chest which interfered with your jobYes No
- d. Have you noticed you heart skipping or missing a beat in the last 2 yearsYes No
- e. Heartburn or indigestion that is not related to eatingYes No
- f. Any other symptoms that you think may be related to heart or circulation problemsYes No

7. Do you *currently* take medication for any of the following problems?

- a. Breathing or lung problemsYes No
- b. Heart troubleYes No
- c. Blood pressureYes No
- d. Seizures (fits)Yes No

8. If you have used a respirator, have you *ever* had any of the following problems? (If you have *never* used a respirator continue to question 9)

- a. Eye irritationYes No
- b. Skin allergies or rashesYes No
- c. AnxietyYes No
- d. General weakness or fatigueYes No
- e. Any other problem that interferes with your respirator useYes No

9. Would you like to discuss your answers with the health care professional who will review your questionnaireYes No

Questions 10 – 15 must be answered if you will use either a self-contained breathing apparatus (SCBA) or full-face respirator.

10. Have you *ever* lost vision in either eye temporarily or permanentlyYes No

11. Do you *currently* have any of the following vision problems?

- a. Wear contact lensesYes No
- b. Wear glassesYes No

- c. Color blindYes No
- d. Any other eye or vision problemYes No
12. Have you *ever* had an injury to your ears, including a broken ear drum?.....Yes No
13. Do you currently have any of the following hearing problems?
- a. Difficulty hearingYes No
- b. Wear a hearing aidYes No
- c. Any other hearing or ear problemsYes No
14. Have you ever had a back injury?Yes No
15. Do you currently have any of the following musculoskeletal problems?
- a. Weakness in any of your arms, hands, legs, or feetYes No
- b. Back painYes No
- c. Difficulty fully moving your arms or legsYes No
- d. Pain or stiffness when you lean forward or backward at the waistYes No
- e. Difficulty fully moving your head up and downYes No
- f. Difficulty fully moving your head side to sideYes No
- g. Difficulty bending at your kneesYes No
- h. Difficulty squatting to the groundYes No
- i. Climbing a flight of stairs or ladder with 25 pounds.....Yes No
- j. Any other muscle or skeletal problem that interfered with using a respiratorYes No

Part B. Section 1. The health care professional who will review this questionnaire may add these questions and any other questions not listed at their discretion.

1. In your job are you working at high altitudes (5,000 ft.) or in a place that has lower than normal amounts of oxygenYes No
- If "yes", do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you are working under these conditionsYes No
2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g. gases, fumes, or dust), or have you come into contact with hazardous chemicalsYes No

If "yes", name the chemicals if you know them:

3. Have you ever worked with any of the materials, or under any of the conditions listed below?
- a. AsbestosYes No
- b. Coal (for example, mining)Yes No

- c. Silica (e.g. sandblasting) Yes No
- d. Iron Yes No
- e. Tungsten/cobalt (grinding or welding this material) Yes No
- f. Tin Yes No
- g. Dusty environments Yes No
- h. Beryllium Yes No
- i. Any other hazardous exposures Yes No
- j. Aluminum Yes No

If "yes", describe the exposure(s):

4. List any second jobs or side businesses you have:

5. List your previous occupations:

6. List your current and previous hobbies:

7. Were you ever in the military service? Yes No

If "yes", were you exposed to biological or chemical agents (training or combat)? Yes No

8. Have you ever worked on a HAZMAT team? Yes No

9. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications) Yes No

If "yes", name the medications:

Part B. Section 2. Supplemental information for the health care professional filled out by the employer.

10. Will the employee use any of the following items with your respirator?

a. HEPA filter Yes No

b. Canisters (i.e. gas masks) Yes No

c. Cartridges Yes No

11. How often will the employee use the respirator(s)? Mark all that apply

a. Escape only (no rescue) Yes No

b. Less than 2 hrs. per day Yes No

c. Emergency rescue only Yes No

d. 2 to 4 hrs. per day Yes No

e. Less than 5 hrs. per week Yes No

f. Over 4 hrs. per day Yes No

12. When the employee uses the respirator(s), is their work effort:

a. Light (less than 200 kcal per hour) Yes No

If "yes", how long does this period last per shift _____ hrs. _____ min.

Examples of light work are sitting while writing, typing, drafting, performing light assembly work, or standing while controlling machines

b. Moderate (200 to 350 kcal per hour) Yes No

If "yes" how long does this period last per shift _____ hrs. _____ min.

Examples of moderate work are sitting while nailing or filing, driving a truck, drilling, nailing, performing assembly work, transferring a moderate load (about 35 lbs.) at trunk level, or pushing a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.

c. Heavy (above 350 kcal per hour) Yes No

If "yes", how long does this period last per shift _____ hrs. _____ min.

Examples of heavy work are lifting a heavy load (about 50 lbs.) from the floor to your waist or shoulder, working on a loading dock, shoveling, standing while bricklaying or chipping casting, or climbing stairs with a heavy load (about 50 lbs.).

13. Will the employee wear protective clothing and /or equipment (other than the respirator) while using the respirator Yes No

14. Will they be working in hot conditions (above 77 degrees F) Yes No

15. Will they be working in humid conditions Yes No

16. Describe the work they will be doing while using the respirator:

17. Describe any special or hazardous conditions they may encounter when using a respirator:

18. Provide the following information, if you know it, for each toxic substance that they will be exposed to when using their respirators:

Name of the first toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

Name of the second toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

Name of third toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

Name of any other toxic substance that they will be exposed to while wearing their respirator:

19. Describe any special responsibilities they will have while using their respirator that may affect the safety and wellbeing of others (i.e. rescue, security):

Physician Approval Form

Date: _____

To whom it may concern:

I have performed a standard medical evaluation for _____ . It is my medical opinion that this individual shall be able to wear a respirator:

Without any limitations: _____

With limited restrictions (Note Below): _____

Not authorized for use: _____

(Print)

(Signature)