

## SECTION 11- PERSONAL PROTECTION PROGRAM

### INTRODUCTION

This section applies to employees, students, or visitors on campus who are determined to be in need of personal protective equipment by virtue of their exposure to hazards in the working, teaching, or research environment. **The use of Personal Protective Equipment (PPE) is most often required by employees and students who work in shops, campus grounds and custodial activities, shop/labs, and clinics/training facilities and traditional teaching or research laboratories. Such environments are located in most administrative units on campus. The PPE that must be used for a task must be indicated in Job Safety Analyses or in lab/operational protocols used in shop/labs and teaching/research laboratories. In cases where a JSA or operational protocol do not exist, the instruction as to when and how a PPE should be used must be posted in the work area and the supervisor over that area must train persons in those areas as to their proper use.**

Protective equipment, including personal protective equipment for eyes, face, hands and extremities; protective clothing; respirator devices; and protective shields and barriers, shall be used and maintained in sanitary and reliable conditions whenever is necessary by reason of hazards of process, environment, chemical hazards, radiological hazards, biological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation, or physical contact.

**Under no circumstances shall a person knowingly be subjected to a hazardous condition without appropriate personal protective equipment.**

Persons who are exposed to hazards requiring personal protective equipment shall be properly instructed in the use of such equipment by the individual in charge of the activity or his/her designee.

**It is the responsibility of the individual in charge of the activity to assure that safety practices are adhered to.**

If those individuals required to wear personal protective equipment fail to do so, they will be subject to disciplinary action.

Elimination of hazards is the best protection for personnel; but when the hazards cannot be eliminated, personal protective equipment shall be worn. Personal protective equipment can also be used in the case of temporary work or during emergency procedures.

All personnel, for their own protection, should wear the proper protective equipment whenever there is any risk of hazard exposure. Personal protective equipment can include protection from head to toe. Common areas for protection are eyes, ears, face, skin, body, hands, head, and feet.

**All personal protective equipment should be of a safe design, kept clean, properly maintained, and conveniently available.**

Some types of personal protective equipment are provided by the University at no cost to the employee. Other types may require the employee to make the purchase or pay part of the cost of the equipment. This should be discussed with a supervisor. If personal protective equipment needs are of a short-term

nature, for a special project or non-routine activity, the Environmental Health and Safety Department has some equipment available for loan.

## TRAINING AND RE-TRAINING ON THE USE OF PERSONAL PROTECTIVE EQUIPMENT (PPE)

When a person is employed, their supervisor is required to conduct a comprehensive safety orientation with that employee, before they can begin their duties (see New Employee Training in Section 1 of the Plan). This orientation includes identifying all personal protective equipment that are to be used when conducting assigned tasks and verifying that the new employee knows how to properly use this equipment. This training is documented on the "New Employee Safety and Risk Management Orientation Form".

A review of these tasks and the PPEs to be used when performing them is conducted annually, when each employee reviews the JSAs that are appropriate to the task they perform.

## EYE PROTECTION

### **General**

The human eye is one of our most prized possessions, and we depend on sight for gathering most of the information about our environment. Therefore, an eye injury is often described as a serious traumatic loss to the human body.

The eyes can be exposed to a variety of hazards, such as flying objects (from hand tools), small particles (grinding wheels), dust, splashes of corrosive liquids and metals, injurious light or heat rays, and poisonous gas fumes.

The eye has limited natural defenses against the intrusion of foreign matter. The defenses can only be increased by the use of protective equipment such as eye glasses, face shields, and goggles.

**Persons working in or studying occupations such as painting, carpentry, construction, labor, landscape, general maintenance, metal trades, chemistry, other sciences and engineering, or any work/study activity which involves hazards such as flying objects, dust and/or vapors, hot metals, chemicals, or light radiation shall be required to wear approved safety eyewear/goggles at all times while exposed.**

**Custodial workers shall be required to wear approved safety eyewear/goggles when cleaning bathroom appliances or mopping floors with caustic or abrasive cleaners.**

**Food service personnel must wear approved eyewear/goggles when there is a possibility of eye injury from caustic materials, hot fat splatters, or associated hazards.**

**Management level employees, students, or visitors who made occasional visits to machine, welding, and carpentry shops, boiler rooms, equipment rooms, power houses, construction areas, chemistry labs, or other areas in which eye injury is a possibility shall wear approved eyewear.**

### **Prescription Lens Wearers**

If required to wear eye protection, such persons shall wear an approved face shield, goggles that fit over glasses, prescription glasses with protective optical lenses fitted with side shields, or goggles that incorporate prescription lenses.

### **Contact Lens Wearers**

Contact lenses shall never be considered as a substitute for eye protection; eye protection shall be worn over them. Contact lenses, by themselves, do not provide eye protection in the industrial sense and shall not be worn in a hazardous environment without appropriate covering safety eyewear. (ANSI Z87.1-1989)

### **Approval, Selection and Fitting**

Eye protection shall meet the ANSI Z87.1-1989 standard and the eyewear shall indicate such on the lens or the frame.

Visitors shall be provided protective eyewear meeting ANSI Z87.1 protection factors for visitors eyewear or other approved eyewear while on duty.

Required eye protection for special case is as follows:

1. Chemical splash
  - a) Chemical splash goggles
  
2. Gases, fumes, and mists:
  - a) Gas-tight goggles
  - b) Rubber-frame chemical goggles, unventilated
  
3. Molten metal splash
  - a) Eye cup goggles, basic (3 mm lenses), with shielded/baffled ports
  - b) Rubber-frame chemical goggles, with baffled vents
  - c) Plastic-vision face shield, with crown and chin protectors
  - d) Flexible-fitting mask goggles, with shielded/baffled ports
  
4. Dust
  - a) Special fabric-cup goggles

Fitting shall be done by a department member knowledgeable of the procedure, or in case of prescription lenses, by an ophthalmic specialist. Purchase of eye protection shall be made through an authorized department representative to ensure compliance.

### **Inspection and Maintenance**

All eye and face protection shall be kept clean and inspected daily before each use. Badly scratched or damaged items are to be replaced immediately.

## **Other**

It is recommended that all employees required to wear eye and face protection shall not share these PPEs with others and be required to inspect and maintain them in accordance with this section.

## **Ultraviolet & Infrared**

In addition to damage from physical and chemical agents, the eyes are subject to the effects of radiant energies. Ultraviolet rays produce cumulative destructive changes in the structure of the cornea and lens of the eye. Exposure to ultraviolet radiation requires the protection of safety lenses or shields. Goggles that absorb both long and short wave ultraviolet rays are available. They reduce eye strain and sharpen contrast when working with fluorescent techniques. Infrared radiation and intense radiation in the visible range also require protective glasses. Welding presents problems in the control of infrared, visible, and ultraviolet radiations.

Goggles and helmets or hand shields must be used during all arc welding operations in order to protect the face, neck, and ears from direct radiant energy from the arc. This will provide protection from injurious rays, from adjacent work, and from flying objects.

The helmets and hand shields should insulate from both heat and electricity, and should be sterilizable, non-flammable, and non-corrosive. The filter plates and cover plates are necessary for the helmets and should be designed for easy removal. In order to prevent lens fogging, ventilated goggles are best.

All glass of lenses is to be tempered for safety and free from flaws, and the source and shade should be permanently identified.

Persons next to welding areas are to be protected from the rays by screens or shields, or must be required to wear appropriate goggles.

For gas welding, brazing, or oxygen cutting operations, goggles or other suitable eye protection need to be worn. For additional information on welding, refer to "Welding, Cutting, and Brazing."

## **FALL PROTECTION**

### **Employees/Students Covered**

Fall protection shall be utilized by those employees/students for the specific purpose of securing, suspending, or retrieving the employee/student in or from a hazardous work area, and/or when work exposes them to the risk of falling more than 15 feet whether outdoors or inside buildings.

### **Approval, Selection and Fitting**

Fall protection devices and equipment shall meet ANSI A 10.14 standard, and employees/students shall only be allowed to purchase or receive them through an authorized department representative to insure compliance. Selection of fall protection shall be based on the attached, "Classification of Safety Belts, Harnesses, and Lanyards." The appropriate safety belt shall be chosen for the hazard. It shall be securely buckled and worn tightly enough to prevent any possibility of the wearer slipping out.

## **Inspection and Maintenance**

Safety belts and associated equipment shall be inspected before each use. Cut, worn, or damaged belts, lifelines, lanyards, etc., shall be discarded and replaced. Safety belts in service shall not be tested for maximum impact loading. After an accidental free fall, the safety belt and lanyard shall be discarded.

## **FOOT PROTECTION**

### **Employees/Students Covered**

For all non-office personnel, "Footwear such as sandals, open toed shoes, platforms, high heels, cloth-bodied tennis shoes, or sneakers is not considered safe and is prohibited for use as a good work shoe. Well-built safety shoes, leather-bodied shoes, or boots in good condition with low heels and hard soles are to be used."

### **Approval, Selection and Fitting**

Foot protection used shall meet ANSI Z41.1 "Men's Safety-Toe Footwear." Employees/students shall only be allowed to purchase or receive them through an authorized department representative to insure compliance. When employee/student purchase footwear, they shall be individually fitted by someone skilled in the procedure.

### **Inspection and Maintenance**

All foot protection shall be kept reasonably clean and in good repair. Shoes shall be repaired or replaced periodically.

## **HAND PROTECTION**

### **Employees/Students Covered**

Hand protection shall be worn by employees when handling hot work, chemicals, electrical items, and rough and/or sharp items. Hand protection is also necessary when employees are doing landscaping work, welding, and "wherever it is necessary by reason related to environmental hazards, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable or causing injury or impairment." (OSHA 1910 Standards)

Hand protection shall not be worn while working on moving machinery such as drill saws, grinders, or other rotating and moving equipment that might catch the hand protection and pull the workers's hand into a hazardous area.

### **Approval, Selection and Fitting**

Hand protection used will meet the criteria for its particular use. Employees/students shall only be allowed to purchase or receive hand protection through an authorized department representative to insure compliance. Fitting shall be done by hazards and size of employees hand

Refer to the attached "Glove Materials" to determine appropriate hand protection.

## Inspection and Maintenance

All hand protection shall be kept clean and inspected daily before each use. Badly worn or damaged items are to be replaced.

### GLOVE MATERIALS

#### LIQUID-PROOF GLOVE CHOICES

<b>Features Liquid Proof Styles</b>	<b>Benefits</b>
Butyl (cement*)	Highest resistance to permeation by most gases and water vapor.
Viton (cement*)	Exceptional performance when subjected to chlorinated and aromatic solvents, coupled with excellent resistance to permeation by many vapors.
Nitrile (latex*)	Superior puncture and abrasion resistance. Recommended as a general duty glove. Excellent resistance to the degrading effects of fats, petroleum products, and a wide array of chemicals.
Natural Rubber (cement*)	Excellent resistance to the degrading effects of alcohols and caustics. Ideal for use in sand blasting.
PVC Coated	Excellent abrasion resistance in a liquid-proof glove. Also provides cushioning.

\*Cement and Latex refer to two basic manufacturing processes of unsupported liquid proof gloves. As a general rule, cement dipped gloves exhibit greater resistance to liquid and vapor permeation than do latex dipped gloves. Therefore, where a permeation barrier is required, a cement dipped glove shall be selected.

**GENERAL PURPOSE GLOVES: FABRIC AND COATINGS**

Worknit	Combines the toughness of a nitrile coating with the softness and stretchy comfort of jersey.
Worknit HD	Developed and designed to replace leather and/or heavy cotton gloves, the HD fabric has a heavier cotton liner than the regular Worknit. This glove is best used where a touch job requires a product which provides protection, excellent wear, comfort, and value.
<p>Coated Machine Knits</p> <p>A. Grip-N, Grip-N Hot Mill, Double Grip-N</p> <p>    1. Reversibility</p> <p>    2. N-tread PVC coating</p> <p>B. Clean Grip</p> <p>    1. Reversible</p> <p>    2. Large Soft PVC Dots</p>	Unique, economical answer to the general purpose glove. Offers comfort and long wear. Four wearing surfaces instead of two. Superior grip and abrasion resistance.
<p>Impregnated Wovens &amp; Jerseys</p> <p>A. Newtex</p> <p>B. PVC Dotted Canton and Jersey</p>	Woven cloth for strength. Coating for abrasion resistance. The original coated glove. Cool, comfortable cotton, permanently ΔDotted@ for longer wear and better grip.
Uncoated Knit Fabrics Machine Knit (string glove)	100% cotton. They are cool, comfortable, and the lowest-priced glove on the market.
Side Split Leather	Superior combination of strength, thickness and suppleness in split cowhide leather. A minimum of flaws, scars, and weaknesses, provides longer wear and comfort.
Shoulder Split Leather	Provides cushioning and abrasion resistance in a more economical grade of leather.
Grain Leather	Better flexibility, finger dexterity and fit than split leather. Generally more comfortable, but less durable than split leather.

**HEAD PROTECTION**

### **Employees/Students Covered**

Employees/students in areas such as painting, carpentry, construction, plumbing, labor, landscape, maintenance, metal trade, and any occupations that involve hazards from falling objects and/or overhead shall be covered.

Hard hats (or helmets) protect the worker's head from impact, flying particles, and electric shock. There are 4 classes of hard hats: (1) general service, low voltage resistance; (2) high voltage resistance; (3) no voltage protection (metallic helmets); (4) limited protection, for fire fighters. Appropriate helmets must be worn in all areas where there is any possibility of danger. It is important that people who work at machines protect long hair from contact with moving parts. Protective caps, binding the hair, or some other means should be used.

### **Approval, Selection and Fitting**

Head protection used shall bear the ANSI Z89.1 or Z89.2 approval, manufacturer's name, and ANSI class designation (A, B, C, or D). Employees shall only be allowed to purchase or receive them through an authorized department representative to insure compliance. Refer to the attached "Selection Chart for Head Protection for University Employees" to determine appropriate head protection. Each employee shall be individually fitted. The hard hat shall fit firmly but comfortably on the employee's head.

### **Inspection and Maintenance**

Cleaning: Hard hats shall be washed every thirty days, following the manufacturer's instructions for cleaning this type of material. If worn by more than one employee, it shall be washed daily.

Inspection: Before each wearing of the hard hat, it shall be checked for wear and damages, especially the suspension system.

### **Other**

Hard hats shall not be stored or carried on the rear window shelf of a vehicle. Sunlight and extreme heat can affect the degree of protection offered. Also, the hard hat can become a projectile in an accident.

## **HEARING PROTECTION**

### **Employees/Students Covered**

Hearing protection shall be worn by employees/students when noise exposure is above that of the 85 dB (action level) when measured on a standard sound level meter at slow response. **Approval and Selection**

Personal hearing protection devices shall meet ANSI 53.19 and employees/students shall only be allowed to purchase or receive them through an authorized representative to insure compliance.

Selection of hearing protection shall take into consideration durability, ease of fit, noise calculations in area, and length of time to be worn. There are many types of disposable and permanent hearing protection. Listed below are three:



1. Earmuffs: fluid or foam-filled cushions connected by a plastic or metal band that fits over the head. They reduce noise levels by 35-40 dB depending on type and fit. In order for them to be effective a perfect seal must be formed. Glasses, long side burns, and facial movements can reduce protection.

2. Ear Plugs: the most commonly used ear protection device. They come in many different shapes, sizes, and materials. Ear plugs can be purchased as disposables, preformed, or molded (professionally fitted). They reduce noise levels by 25-30dB depending on type and fit. **Cotton is ineffective as ear plugs.**

3. Ear Caps: a cross between ear muffs and ear plugs-ear plugs connected to a plastic (usually) band which can be worn under the chin, over the top of the head, or behind the neck. They reduce noise levels by 25-35dB depending on type and fit.

NOTE: Combinations of ear plugs and ear muffs can reduce noise level by an additional 3-5dB depending on type and fit. Preformed ear plugs have to be professionally fitted. All others are fitted according to need in accordance with Louisiana Tech University's hearing conservation and evaluation program.

### Inspection and Maintenance

All ear protection, if not disposable, shall be inspected and cleaned before each use. All damaged ear protection shall be discarded and replaced. No unauthorized modifications shall be allowed.

### IMPULSIVE OR IMPACT NOISE

It is recommended that exposure to impulsive or impact noise shall not exceed the limits listed in the table below. No exposures in excess of 140 decibels peak sound pressure level are permitted. Impulsive or impact noise is considered to be those variations in noise levels that involve maxima at intervals of > 1 per second. Where the intervals are < 1 second, it should be considered continuous.

THRESHOLD LIMIT VALUES IMPULSIVE OR IMPACT NOISE

Sound Level (dB)	Permitted # of Impulses or Impacts per day
140	100
130	1,000
120	10,000

**LEVELS OF SOME COMMON SOUNDS**

<b>Sound Pressure, P N/m<sup>2</sup> (Pascal)</b>	<b>Sound Pressure Level, Lp dB re 20 N/m<sup>2</sup> (Pascal)</b>	<b>Sound</b>
100,000 (1 bar)	194	Saturn rocket
20,000.0	180 170	
2,000.0	160 150	Ram jet Turbo jet
200.0	140 135 130	Threshold of pain Pipe organ
20.0	120 110	Riveter, chipper Punch press
2.0	100 90	passing truck Factory
0.2	80 70	Noisy Office
0.02	60 50	Conversational speech Private office
0.002	40	Average residence
0.0002	20 10	Whisper Threshold of good hearing

## PROTECTIVE CLOTHING

### Employees/Students Covered

Protective clothing shall be worn by employees/students when the potential of an employee/student being exposed or coming in contact with harmful substances is evident.

### Approval and Selection

There are many different standards for approval of protective clothing (ANSI, ASTM, etc.). Protective clothing shall be selected for specified hazard, degree of protection, comfort, and ease of use.

Once the specifics or multi-hazards have been identified, contact a reputable vendor or Environmental Health and Safety personnel for recommendation of proper clothing and/or equipment needed.

### Fitting

Protective clothing shall fit the wearer comfortably with a minimum of undo play.

### Inspection and Maintenance

Protective clothing shall be routinely cleaned unless disposable. Disposable clothing shall be disposed of after use. Damaged, torn, ripped, etc., clothing shall be replaced before use.

### Selection Chart For Head Protection For University Employees

Hard Hat: A rigid head gear of varying materials used to protect the worker's head from impact, penetration, electrical shock, or a combination of these.

1. Composition: Special plastics, fiberglass and plastics combination, cloth and resin, and aluminum alloy.
  
2. Types:
  - a) Type 1: Helmet (hard hat), full brim. Allows for complete protection of head, face, and back of neck.
  - b) Type 2: Helmet (hard hat), brimless with beak. This type is most commonly used and can accommodate various types of face shields and ear protection.
  
3. Classes: There are four different voltage classes of head protection. University personnel covered under this section shall only be allowed to wear class A and B.
  - a) Class A: Limited voltage protection. Used by employees or students in general service (non-electrical) occupations. I.e., construction, landscape, etc.
  - b) Class B: High voltage protection. Used by employees in electrical occupations, i.e., electricians.

- c) Class C: Metal helmets. Under no circumstances shall metal helmets be used by University employees or students.
- d) Class D: Firefighter=s helmet.

#### **Other Forms of Protective Head Gear:**

- a. Bump Hats: Shall not be used unless approved by the EHS.
- b. Hair Protection: All employees/students with long hair or bears who work around chains, belts, or other machines with moving parts shall be required to wear protective hair coverings. **Hair nets, bandannas, and turbans shall not be considered satisfactory.** Contact local vendors for information on the type of protective hair coverings available. Those who work around sparks, hot metals, flames, etc., shall use flame-resistant protective hair coverings.

#### **Foot Protection Classification and Protection Factors**

##### Classification of Safety Shoes

1. Safety-toe Shoes: Steel toes and metal reinforced sole. Usage: Areas where heavy, protruding or falling objects present a threat.
2. Conductive Shoes: Reduces the possibility of generating a spark. Usage: Areas where fire and explosive hazards exist.
3. Foundry Shoes: Contains no fasteners and is easily removed. Usage: Areas where exposure to splashes of molten metal is likely.
4. Explosive Operation Shoes: A shoe with non-conductive and grounding properties. Usage: Areas where explosive compounds are present when cleaning tanks with volatile hydrocarbons.
5. Electrical Hazard Shoes: A shoe which minimizes the hazard of conducting electricity (no metal in shoes).

Listed below are seven types of shoe protection which are available. These shall be considered in determining the type or types of protection needed.

1. Toe Protection from Impact and Compression: Shoes for this type of protection shall meet the rated factors. These factors are rated as Class 30, Class 50, and Class 75.
2. Metatarsal Protection: If the top of the foot or ankle is likely to be struck by a heavy object, a metatarsal guard is needed. This type of protection can be added to the shoe or may be built into the shoe. Metatarsal protection is classified MT30, MT50, MT75 to correspond with the protective potential of toe protection.
3. Puncture Protection: The purpose of puncture resistance is to reduce the hazards of puncture wounds caused by sharp objects which could penetrate the sole of the footwear. Puncture resistant footwear shall have a rating designation of PR.
4. Sole Slip Resistance: The purpose of slip resistant footwear is simply to prevent injury due to failure of footwear to resist slipping on slippery surfaces. Most safety shoe manufactures do not provide a slip resistance rating at this time..

5. Coefficient of Adherence.” For example:  
 There is no grip at all between the two surfaces.  
 0.15 Accepted as a minimum.  
 0.20 Very good coefficient.  
 0.30 Indicates an outstanding grip.
6. Electrical Hazard Protection: The purpose of this requirement is to reduce hazards due to contact with electrically energized parts. Electrical hazard shoes are not intended for use in explosive or hazardous locations in which conductive footwear is required. Footwear with this protection may be rated as EH.
7. Conductive Protection: The purpose of this requirement is to protect against the hazards of static electricity buildup or to facilitate the equalization of electrical potential of personnel (lineman) and energized high voltage lines. Footwear with this protection may be rated CD Type 1 or CD Type 2.
8. Upper Shoe Protection: The purpose of this requirement is protection from substances which may be harmful or hazardous penetrating the upper shoe covering and causing discomfort or injury to the foot. The rule of thumb here is that the upper shoe covering shall be able to resist whatever harmful substances the worker may spill or contaminate his/her shoes with.

### **Classification of Safety Belts and Harnesses**

<u>Class I:</u>	Body belt (work belts), used to restrain a person in a hazardous work position and to reduce the probability of falls.
<u>Class II:</u>	Chest harness, used where there are only limited fall hazards (no vertical free-fall hazard) and for retrieval purposes, such as removal of a person from a tank, bin, or other enclosed place.
<u>Class III:</u>	Body harness, used to arrest the most severe freefalls. This harness is ideal for workers on elevated sites. During a fall, it distributes the fall impact over the body.
<u>Class VI:</u>	Suspension belts, independent work supports used to suspend or support the worker.
<u>Lifeline:</u>	A horizontal line between two fixed anchorages. Support capacity 5400 lbs. Line diameter 2 inch.
<u>Personal Lifeline:</u>	This system is usually a rope system that provides flexibility for worker freedom of movement, yet will arrest a fall and help absorb the shock. These systems always have some type of belt or harness that is worn around the waist to which a lanyard or rope-grabbing device is attached.
<u>Lanyard:</u>	A short piece of flexible line used to secure wearer of safety belt to a lifeline or dropline, or fixed anchorage. Support capacity 5400 lbs.

## RESPIRATORY PROTECTIVE EQUIPMENT

Toxic materials can enter the body in three ways: (1) through the gastrointestinal tract, (2) through the skin, and (3) through the lungs. The human respiratory system presents the quickest and most direct avenue of entry because of its need to oxygenate the tissue cells.

The following information provides background information on different types of respirators and the hazards associated with their use.

When respirators are to be used, the Office of Environmental Health and Safety shall be consulted before said use starts. All respirators used on the Louisiana Tech campus shall be NIOSH/MSHA approved. No exceptions.

Respiratory protection are normally used by personnel in the Trades and all personnel who use it are trained and fit tested by that Unit prior to the employee attempting task that require such protection. Documentation of this training and fit testing is kept in this Unit.

### **Classification of Respiratory Hazards**

1. Oxygen deficiency
2. Gas and vapor contaminants
  - A. Immediately dangerous to life or health
  - B. Not immediately dangerous to life or health
3. Particulate contaminants (aerosols including dust, fog, fume, mist, smoke, and spray)
4. Combination of Gas, vapor, and particulate contaminants.
  - a) Immediately dangerous to life or health
  - b) Not immediately dangerous to life or health
  - c)

### **Classification of Respiratory Protection Devices (Respirators)**

Respiratory protection devices fall into three classes: (1) air purifying, (2) air supplied, and (3) self-contained breathing apparatus.

1. Air Purifying Devices (Respirators) remove contaminants from the atmosphere and can be used only in atmospheres containing sufficient oxygen to sustain life (at least 16 percent by volume at sea level) and within specified concentration limitations of the specific device. Various chemicals remove specific gases and vapors, and mechanical filters remove particulate matter. The useful line of an air purifying device is dependent upon the concentration of the contaminants, the breathing volume of the wearer, and the capacity of the air purifying medium. The basic types of air purifying devices are:
  - A. Mechanical filter respirators: provides respiratory protection against particulate matter such as nonvolatile dusts, mists, or metal fumes. Selection of the appropriate respirator is based on the type, toxicity, and particle size of the particulate matter. Specific types of mechanical filter respirators are approved under USBM Approval Schedule 21 and its revisions.

- B. Chemical cartridge respirators: provides respiratory protection against certain gases and vapors in concentrations not in excess of 0.1% (by volume). Specific types of chemical cartridge respirators are approved under USBM Approval Schedule 23 and its revisions.
- C. Combinations of chemical cartridge and mechanical filter respirators: provides respiratory protection where exposure is both gaseous and particulate.
- D. Gas masks: provides respiratory protection against certain specific gases and vapors in concentrations up to 2% (by volume) or as specified on the canister label and against particulate matter. Specific gas masks are approved USBM Approval Schedule 14 and its revisions.

NOTE: See chart "Color Coding for Air Purifying Respirators."

2. Air Supplied Respirators deliver air through a supply hose connected to the wearer's facepiece. These devices shall be used only in atmospheres not immediately dangerous to life or health, unless an auxiliary ingress or egress cylinder is incorporated into the system.
  - A. Air line respirators are available with or without auxiliary ingress or egress cylinders. The air respirator is connected to a suitable compressed air source (a purified air compressor and/or cylinder supply system) by a hose and air is delivered in sufficient volume to meet the wearer's breathing requirements.
  - B. All air supplied respirator systems shall meet OSHA 1910.134 criteria, and no air supplied system shall be used on the Louisiana Tech University campus without approval from the Office of Environmental Health and Safety.
3. Self-Contained Breathing Apparatus (SCBA) provides respiratory protection against toxic gases and oxygen deficient atmospheres. SCBA's are not for underwater use.
4. Most SCBA's used on campus consists of a high-pressure air cylinder (15-20 minute air supply), a demand regulator connected by a high-pressure tube to the cylinder, a facepiece and tube assembly with an exhalation valve or valves, and a method of mounting the apparatus on the body. All users of SCBA's shall be trained in its use by a competent instructor. For more information on training, monitoring, inspection, fit, testing, maintenance, and repair requirements, contact the Office of Environmental Health and Safety at 257-2120 or Campus Box 22

**COLOR CODING FOR AIR PURIFYING RESPIRATORS**

Atmospheric Contaminants to be Protected Against	Colors Assigned*
Acid gases	White
Hydrocyanica acid gas	White with 2 <u>green</u> stripe completely around the canister near the bottom
Chlorine gas	White with 2 <u>yellow</u> stripe completely around the canister near the bottom
Organic vapors	Black
Ammonia gas	Green
Acid gases and ammonia gas	Green with 2 <u>white</u> stripe completely around the canister near the bottom
Carbon monoxide	Blue
Acid gases and organic vapors	Yellow
Hydrocyanic acid gas and chloropicrin vapor	Yellow with 2 <u>blue</u> stripe completely around the canister near the bottom
Acid gases, organic vapors, and ammonia gases	Brown
Radioactive materials, excepting tritium and noble gases	Purple (magenta)
Particulates (dust, fumes, mist, fogs, or smokes) in combination with any of the above gases or vapors	Canister color for contaminant, as designated above, with 2 <u>gray</u> stripe completely around the canister near the top
All of the above atmospheric contaminants	Red with 2 <u>gray</u> stripe completely around the canister near the top

\*Gray shall not be assigned as the main color for a canister designed to remove acids or vapors.

Orange shall be used as a complete body or stripe color to represent gases not included in this table. The user shall refer to the canister label to determine the degree of protection the canister will afford



**GUIDE SELECTION OF RESPIRATORS**

<b>Hazard</b>	<b>Respirator</b>
Oxygen Deficiency	Self-contained breathing apparatus. Hose mask with blower, Combination airline respirator with auxiliary self-contained air supply or an air storage receiver alarm.
Gas and Vapor Contaminants: Immediately dangerous to life or health	Self-contained breathing apparatus. Hose mask with blower, Air-purifying, full facepiece respirator with chemical canister (gas mask). Self-rescue mouthpiece respirator (for escape only). Combination airline respirator with auxiliary self-contained air supply or an air storage receiver with alarm.
Gas and Vapor Contaminants: Not immediately dangerous to life or health	Airline respirator. Hose mask without blower. Air-purifying, half-mask or mouthpiece respirator with chemical cartridge.
Particulate Contaminants: Immediately dangerous to life or health	Self-contained breathing apparatus. Hose mask with blower. Air-purifying, full facepiece respirator with appropriate filter. Self-rescue mouthpiece respirator (for escape only). Combination airline respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
Particulate Contaminants: Not immediately dangerous to life or health	Air-purifying, half-mask or mouth piece respirator with filter pad or cartridge. Airline respirator. Airline abrasive-blasting respirator. Hose mask without blower.
Combination gas, vapor, and particulate contaminates. Immediately dangerous to life or health	Self-contained breathing apparatus. Hose mask with blower, Air-purifying, full facepiece respirator with chemical canister and appropriate filter (gas mask with filter). Self-rescue mouthpiece respirator (for escape only). Combination air-line respirator with auxiliary self-contained air supply or an air-storage receiver with alarm.
Combination gas, vapor, and particulates not immediately dangerous to life or health	Airline respirator. Hose mask without blower. Air-purifying, half-mask or mouthpiece respirator with chemical cartridge and appropriate filter.