Indiana Repertory Theatre Scene Shop
Hazard Control and Personal Protection Equipment Policy

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Revised 7/2005

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1.0 Hazard Control

A safety program uses three general approaches to hazard control: **administrative control, engineering control and personnel protective equipment (PPE)**.

It is important to note that PPE should be used only to supplement administrative and engineering controls, and not as a substitute for them.

1.1 Definition

Hazard: Any circumstance or condition which poses the risk of an incident.

Incident: Any unplanned and unwanted event which results in injury or damage, or which could have resulted in damage or injury.

There is a tendency to pretend that hazards don't exist. This view will only cause harm over the long run. Remember that hazards exist on every worksite. Some hazards can be eliminated, but others must be identified and the risks controlled by the use of appropriate procedures and/or devices.

1.2 Administrative Control of Hazards

Administrative controls generally deal with directing people and include broad topics such as policies, procedures and training. Also included are specific approaches such as scheduling jobs to avoid crowded work areas, scheduling to avoid excessive work areas and planning jobs with special hazards (eg.hazardous or toxic fumes) for off hours.

Administrative controls also extend to areas of material and equipment procurement. Less toxic products can often be obtained if safety is one of the purchasing criteria. Tools with improved safety features are appearing on the market regularly.

1.3 Engineering Control of Hazards

Engineering controls generally deal with systems that protect workers. Examples of engineering controls include installing ventilation equipment to remove toxic vapors and dust and installing guards around moving machinery parts.

1.4 Personnel Protective Equipment (PPE)

Personnel protective equipment (PPE), the third control method, is dealt with at length in the Personnel Protective Equipment Information section later in this handbook.

2.0 Hazard Assessment

2.1 Mainstage Theater

- Grid: Potential for falling objects from the grid to the stage floor
- Traproom: Potential for objects falling from grid, aerial work platforms, stage or ladders when traps are open.
- Stage: Potential for objects falling from grid, aerial work platforms or ladders.
- Potential for tool usage resulting in sparks, dust, projectiles and other potential injury hazards particularly during the load in or strike operations.

2.2 Upperstage Theater

- Stage: Potential for objects falling from grid, aerial work platforms or ladders.
- Potential for tool usage resulting in sparks, dust, projectiles and other potential eye injury hazards particularly during the load in and strike operations.

2.3 4th Floor Scene Shop

- Potential for tool usage resulting in sparks, dust, projectiles and other potential injury hazards during day to day operations

3.0 Occupational Illnesses

3.1 General Definition

The two ends of the illness spectrum (and there are many stages in between):

Acute

Effects are sharp and severe. They have a rapid onset and run a short course. An acute illness usually occurs from a single massive exposure. The short course of this illness can end in:

- **complete recovery**
- **recovery with some disability**
- **death**

For example, acute exposure to solvents can cause effects ranging from mild narcosis (headache, nausea, loss of coordination) to unconsciousness and death, depending on the severity of the exposure.

Whatever the effects, acute illnesses are usually easy to diagnose because the symptoms commonly express themselves during or shortly after the exposure (unless the symptoms mock other illnesses, for example, flu-like symptoms from lead exposure).

Chronic

Effects may last FOR THE REST OF YOUR LIFETIME, and are caused by repeated exposure to low doses of toxic materials over a long period of time. The symptoms appear very gradually and may be very vague, and thus are hard to diagnose.

While exposure to large amounts of solvents will produce acute effects, regular exposure at low doses over a period of months or years might produce individualized chronic effects like:

- dermatitis (if skin contact is involved)
- nervous system damage that can affect the brain, manifesting itself in irritability, depression or other psychological disabilities, or in trembling, weakness and other physical problems
- chronic damage to the liver, kidneys, and other organs.

3.2 Toxic Concepts

3.2.1 Toxicity

A toxic substance is a substance in a quantity (dose) which exceeds the body's ability to handle it without harm. A substance becomes toxic only when its quantity has exceeded the body's ability to tolerate it. Effects vary according to the dose and the individual.

There are many levels of toxicity. Some substances are:
- no problem for anyone
- some problem, for some people
- adverse effects for many people
- some people die
- everyone dies

3.2.2 Total Body Burden

Your total body burden is the total amount of a single chemical in your body from all possible sources. For instance, if you work with lead pigmented scenic paints, your body burden of lead would be the sum of lead you absorb on the job plus the lead from the air you breathe and the lead in your food and water.

3.2.3 Multiple Exposures

Body burdens sometimes influence each other by interacting. Two ways in which the interact are called "additive" and "synergistic."

Additive effects are seen when different chemicals attack the same organ in the same way. For example, if you inhale solvent vapors while working with an oil paint and then drink liquor (another solvent called ethanol), both chemicals enter the bloodstream (one through the lungs, the other through the digestive system). Both also attack the central nervous system and affect the

liver and kidneys. Since both chemicals have similar effects, the damage to your body is the sum of effects from these two chemicals.

Synergistic effects occur when damage caused by exposure to two substances is far greater than additive effects. Carbon tetrachloride, used as a spot remover or cleaner, works synergistically with alcohol. An exposure to either of them individually would not be nearly as dangerous as an exposure to a combination of the two. There have been many cases of people dying from taking an alcoholic drink when working with "carbon tet."

Smoking combined with any inhaled particulate will be synergistic to some extent. But asbestos exposure and smoking is particularly synergistic. If you're an asbestos worker your chance of contracting lung cancer is about six times; if you smoke, about six times; but if you're an asbestos worker who also smokes, you are not twelve times (which would be additive), but about NINETY TIMES as likely to get lung cancer.

Cumulative Toxins enter the body readily, and exit slowly (for example, lead); they usually can be tested for.

Non-cumulative Toxins are fugitive: they go in, then out of the body quickly (for example, an alcohol test 48 hours after drinking show no evidence). The chemical may pass quickly in and out of the body, but the DAMAGE REMAINS, and it may accumulate.

3.2.4 Two Kinds of Toxic Substances

Carcinogens

Substances that cause cancer. Carcinogens have no known safe exposure limit. Theoretically, one molecule in the right place at the right time can cause cancer. However, the greater the dose, the greater the risk that cancer will occur.

Sensitizers

Chemicals that can provoke allergy in significant numbers of people. Allergies to sensitizers do not occur immediately – they take time. The longer you work with a sensitizer, the more likely it is that you will develop a reaction. An allergy signifies an immune system failure. Once an allergy to a particular chemical develops, it is likely that that individual will be allergic to other chemically similar substances. Some people will become allergic to smaller and smaller amounts (for example, the effect that bee stings have on some people after one or more stings).

Materials which contain sensitizers include: epoxy resins and their curing agents, turpentine, the isocyanates (present in urethane casting and foaming chemicals), chrome compounds (found in some cosmetics), nickel (found in some welding fumes), formaldehyde, fiber-reactive dyes, western red cedar and other woods.

The best protection against sensitizers is to keep exposure as low as possible.

3.3 Labeling of Toxic Materials

"FOR PROFESSIONAL USE ONLY" or **"FOR INDUSTRIAL USE ONLY"** labels mean that the manufacturer intends that you not use this chemical unless you know all of the relevant information, and you are using it in the appropriately controlled environment.

"NON-TOXIC" is a consumer product label term that is often misunderstood. Under the Federal Hazardous Substances Act (FHSA), acute animal tests expose rats to the product via four entry routes: skin contact, eye contact, inhalation, and ingestion.

In the ingestion test, ten rats are given a single dose of the chemical, at 5 grams per kilogram of body weight. The rats are examined two weeks later; if half or more are dead, the product is considered "toxic;" if less than half die, it can be labeled "non-toxic."

*Thus, the difference between "toxic" and "non-toxic" is **one** dead rat.*

In these acute tests, all of the chronic hazards are missed: cancer, failure of reproductive function, birth defects, allergy, cumulative effects (two or more exposures or doses), etc. Under this law, even asbestos can be labeled "non-toxic."

Art materials are very likely to be chronically toxic, so there is now a special labeling law for them (an amendment of the FHSA). This law requires products containing chronically hazardous materials to be labeled with warnings. While this is a great improvement, chemicals whose hazards are unknown or untested can still be labeled "non-toxic." Many of the un studied chemicals in art materials are the dyes and pigments that create the colors.

3.4 Routes of Entry

Chemicals can enter your body by:

- Surface contact (skin or eye)
- Inhalation (breathing it)
- Ingestion (eating it)

- Injection (e.g. a puncture wound)

The first three of these routes of entry are the most common.

3.4.1 Surface Contact

Direct Damage to the Skin

The skin can be destroyed be CORROSIVE chemicals like acids, caustics, peroxides, and bleaches. This damage is dose dependent: the longer it's there, the more damage it does. Left long enough, permanent scarring may result.

IRRITANT chemicals like solvents and strong soaps can also damage the skin. Irritant damage such as redness, swelling, or chapping is usually reversible if exposure is discontinued.

Either type of chemical damages the skin's protective barrier of waxes, oils and dead cells. The skin can no longer protect the body from invasion by many things like bacteria, viruses or chemicals. The result may be infections, chemical damage to the tissues beneath the skin, or even penetration of chemicals into the blood stream, where they can be transported throughout the body causing damage to other organs.

Absorption Through the Skin

Until damaged skin heals completely, many substances can pass through your skin. Of course, chemicals can also enter the body through cuts, abrasions, burns, and rashes. Skin contact with chemicals should be avoided whenever skin is not intact.

There are also toxic substances – such as benzene (in gasoline), glycol ether, and methyl (wood) alcohol – that can, without your knowledge, enter the body through undamaged skin. Once absorbed, these chemicals can travel through the body to cause harm to various tissues and organs.

Remember, if you spill a chemical on yourself, these chemicals can work very fast. For example, DMSO (di-methyl-sulf-oxide) is a skin absorber. Put it on your skin, and in twenty seconds you can taste it and other people can smell it on your breath.

Don't assume that "wash-with-water" or "water based" paints, dyes or other compounds don't contain harmful or lethal chemicals that are skin absorbers. Some marking pens, household spray cleaners, and many latex paints may contain "water-miscible" glycol ether solvents. The primary members of this large group of solvents have

been tested and found to cause atrophy of the testicles, birth defects, and blood changes in all four animal species on which glycol ethers have been tested. Dust also may absorb through the skin if it changes form. For example, fine dust on the skin can be changed into a liquid form by perspiration.

3.4.2 Inhalation

Direct Damage to the Respiratory System:

Inhaled substances can cause acute and or chronic illnesses. Damage to the respiratory system can range from nose bleeds to life threatening chemical pneumonia.

With IRRITANTS and CORROSIVES, the extent of the damage depends on how potent the substance is and the quantity inhaled. Chronic respiratory damage, such as chronic bronchitis and emphysema, can occur from small doses of irritants or corrosives inhaled repeatedly over several years.

Substances that can cause direct damage to the respiratory system include: Welding fumes and gases, fumes from heating or burning plastics, cigarette smoke, dusts from some chemicals

Absorption into the Body Via Respiratory System:

Substances can be absorbed by the lungs into the blood stream just like oxygen can. Once absorbed, they can be carried throughout the body to attack any organ. For example, when solvent vapors are inhaled they can attack the brain (the central nervous system).

3.4.3 Ingestion

Toxic materials can be ingested by eating, drinking or smoking while working –or even just doing these things within the work place –or by thoughtlessly touching your hands to your mouth after having touched chemicals, licking a finger to turn a page, and similar habits.

What do you do when you clear your throat? You're coughing up and then swallowing mucus that contains dust and chemicals trapped by your lungs. The stomach lining then provides an efficient route of entry for hazardous chemicals.

Accidental ingestion can also occur when chemicals are poured into unmarked containers or cups and people – especially children, who DO come backstage, into the shops, on backstage tours – later mistake them for beverages.

4.0 Safe Work Practices

4.1 Definition

Safe work practices: ways of controlling hazards and doing jobs with a minimum of risk to people and property.

4.2 Defective Tools

Defective tools can cause serious and painful injuries. If a tool is defective in some way, **don't use it**. Be aware of problems such as:

- Split or cracked handles
- Chipped or broken drill bits
- Wrenches and pliers with worn out jaws
- Chisels with mushroomed heads
- Tools which are not complete, such as files without handles

To ensure safe use of hand tools, remember:

- Never use a defective tool
- Double check all tools prior to use
- Ensure that defective tools are repaired

Air, gasoline or electric power tools, require skill and complete attention on the part of the user even when they are in good condition. Don't use power tools when they are defective in any way. Watch for problems such as:

- Broken or inoperative guards
- Insufficient or improper grounding
- No ground wire or plug on cords of standard tools
- The on/off switch not in good working order
- Tool blade is cracked, bent, or damaged

4.3 Use of Hand Held Power Tools

The following are minimum accepted practices to be used with these tools:

- Approved safety equipment such as safety glasses or a face shield are to be worn.
- Where harmful vapors or dusts are created, approved breathing protection is to be used.
- The proper sharp blade or bit designed for the work to be done must be selected and used.
- The power supply must be disconnected before making any adjustments to the tool or changing the blade or bit.

- Before any saw is set down be sure that the retracting guard has fully returned to its down position.
- Ensure all cords are clear of the cutting area before start to cut.
- Before cutting, check the stock for foreign objects or any other obstruction, which could cause the saw to "kick back".
- Maintenance is to be done according to the manufacturer's specifications.

4.4 Use of Compressed Air

Air powered tools in the scene shop range from staple guns to pneumatic cylinders and pistons. If not treated with respect, these tools can become a powerful enemy rather than a servant. The following are minimum accepted practices for use of these tools:

- Tools should be inspected before each use for damage and must be properly maintained according to the manufacturer's requirements.
- Hoses must be checked on a regular basis for cuts, bulges or other damage. Ensure that defective hoses are repaired or replaced.
- A proper pressure regulator and relief device must be in the system to ensure that correct desired pressures be maintained.
- Safety devices to prevent accidental discharge of air powered staplers and nailers should not be circumvented or modified.
- Tools should never be pointed at anyone, whether loaded or unloaded. Hands should be kept clear of the muzzle at all times.
- Always disconnect stapler or nailer from pressure when filling or checking fastener magazine.
- Wear personnel protective equipment such as eye protection or face shields
- **OSHA regulation 29CFR1910.242(b) requires that compressed air, when used to blow debris or to clear dirt from work areas or clothing, is not to be used at a pressure higher than 30PSI.**

4.5 Use of Welding, Cutting and Burning Equipment

Work involving welding, cutting, and burning can increase the fire and breathing hazard on any job, and the following should b considered prior to the start of work:

- Always ensure that adequate ventilation is supplied since hazardous fumes can be created during welding, cutting and burning.
- Always use proper safety equipment including welding helmets, goggles, proper welding gauntlets and protective clothing. See appropriate PPE sections for further information on proper equipment.
- Where other workers may also be exposed to the hazards created by welding, cutting, and burning, they must be alerted to these hazards or protected from them by the use of "screens"

- Always have fire fighting or prevention equipment on hand before starting welding, cutting and burning.
- Check the work area for combustible material and possible flammable vapors before starting the work
- A welder should never work alone. A fire or spark watch should be maintained.
- Check cables and hoses to protect them from slag or sparks.
- Cutting and welding must not be performed where sparks or cutting slag will fall on gas cylinders.

4.6 Use of Grinding and Abrasive Cutting Equipment

Grinding and Abrasive wheels can cause severe injury. Proper storage of new wheels, proper use of wheels and proper maintenance of wheels and equipment must be observed.

- Ensure that proper guards are in place and that safety glasses, face shields, gloves and proper footwear are worn when using portable grinders and abrasive saws.
- Always have fire fighting or prevention equipment on hand before starting to use these tools.
- Check the work area for combustible material and possible flammable vapors before starting the work
- Never exceed the maximum wheel speed (every wheel is marked). Check the speed marked on the wheel and compare it to the speed marked on the tool.
- When mounting the wheels, check them for cracks and defects, ensure that the mounting flanges are clean and that all mounting hardware, washers and flanges are used. Do not over tighten the mounting nut.
- Before grinding or cutting, run newly mounted wheels at operating speed to check for vibrations.

4.7 Use of Cleaning Solvents and Flammables

Special care must be taken to protect the worker from hazards which may be created from the use of these liquids. Wherever possible, solvents should be non-flammable and non-toxic. Supervisors must be aware of all solvents/flammables that are used on the job, and be sure that all workers who use these materials have been instructed in the proper use and any hazard that they pose.

- Use non-flammable solvents for general cleaning
- When flammable liquids are used, make sure that no hot work is permitted in the area.

- Store flammables and solvents in special approved storage lockers or cabinets. Ensure that proper containers are used for transportation, storage and use of flammables and solvents.
- Check Material Safety Data Sheets (MSDS) for toxic hazards and protection equipment before use.
- Provide adequate ventilation where all solvents and flammables are being used.
- Use face shields or goggles to protect the face and eyes from splashes or sprays.
- When breathing hazards exist, use the appropriate respiratory protection.
- Never leave solvents in open containers or buckets – return them to closed storage containers when not in use.

5.0 Personal Protection Equipment (PPE) Policy

The purpose of this policy is to minimize injuries to Shop Personnel by utilizing personal protective equipment.

Shop Staff and Overhire will be provided with all necessary approved safety equipment and it is expected that all Shop Personnel will use the proper PPE when and where required.

All PPE used will be in good condition and maintained according to manufacturer's specifications. No piece of PPE will be modified or changed contrary to manufacturer's instructions or specifications. All PPE that is of questionable reliability, damaged, or in need of service will be removed from service immediately.

5.1 Overhead Hazard PPE – Hard Hats

5.1.1 General Definition

Hard Hat: Any protective shell designed to cover the head and protest it from falling hazards. All hard hats must comply with the ANSI standard Z89.1-1986. Any employee supplying their own hard hat must have proof of compliance to this standard.

Falling Object Hazard: Any object that has the potential to fall and cause injury to anyone working in the area. This object could fall from any raised area including catwalks, ladders and personnel lifts.

Hard Hat Area – Any area defined by signage

5.1.2 Emergency Care

If someone sustains a head injury, follow this procedure:

- Check for consciousness
- Check for breathing. If the person is not breathing have someone call 911 immediately and start rescue breathing. If you do not know rescue breathing, find a person who does and call 911.
- Check for bleeding. If the victim is bleeding, call 911 immediately. Administer first aid only if you have been trained, protect your hands with gloves from the emergency kit and staunch the flow of blood as best as possible until professional help arrives.
- Limit the victims movements
- If the victim is mobile but has lacerations, severe pain or pressure in the head, neck or back, trouble seeing or any other signal that the injury may be severe, call 911 or get them to a medical facility.
- When in doubt, call 911. It is important to get help to any victim as quickly as possible.

5.1.3 General Policy

- IRT requires hard hats to be worn whenever overhead falling object hazards may occur. This will include load-in and strike periods as well as any other time when a falling object hazard may exist.

- Hard Hat area will be defined by POSTED signage reading “CAUTION Hard Hat Area” or “CAUTION Overhead Work”.

- All full time personnel will have hard hats available for use during all work shifts. If a hard hat is damaged it must be turned in and replaced as soon as possible. If the hard hat has sustained a forcible blow, turn it in to your supervisor for replacement.

- Each department head/supervisor is responsible for obtaining hard hats for any temporary employees, i.e. overhire, interns, designers and any other outside contractor. A supply of extra hard hats will be made available for these temporary users. Personnel or visitors who use the visitor or temporary hard hats will return them to the location from which they picked up their hat. All department heads/supervisors are responsible for instructing temporary employees and or visitors in the proper use of the hard hats.

- Hard hats must be worn correctly. The hard hats may be set up to worn with the brim either in the front or the back. The adjustment mechanism must be at the back of the head and the hat must be adjusted for a proper fit (snug but not too tight). An employee should be able to bend over at the waist and the

hard hat must remain on the employee's head.

- Before an employee puts on a hard hat they must inspect the hat and suspension for any wear and tear or possible damage. If damage is found the hat must be turned in the department head/supervisor in charge. The hard hat will then be replaced.

- Signs will be posted in the following areas to define Hard Hat Areas:

  Mainstage
  - DSR & DSL Backstage doors
  - USL Backstage door by the freight elevator
  - Loading door into the Paint Shop
  - USR small access door into the Paint Shop
  - A standing sign in the back of the house at the end of each aisle

  Upperstage
  - SR & SL Backstage doors
  - SR Loading door
  - A standing sign outside door from Cabaret & Upperstage Lobby

  Other areas of the building can be considered hard hat areas when it is deemed by a supervisor that an area has a falling object hazard. At those times, signs will be posted at the entrances to the area. Once the area is deemed safe from falling objects by the supervisor, the signs are to be removed

5.1.4 Training

- All employees must be trained in the proper use of hard hats.

- Training will include:
  Discussion of the hard hat policy
  Instruction on wearing and usage of a hard hat
- Training will be conducted by the department head and annual refreshers will be given to all employees.

5.2 Hand PPE - Gloves

5.2.1 General Definition

PPE for the hands includes: Gloves, mitts, finger guards, thimbles and barrier creams. Choose hand PPE that will protect against the job hazard. Gloves should fit well and be comfortable. This type of PPE has to protect against chemicals, scrapes, abrasions, heat and cold, punctures and/or

electrical shocks. When hand PPE is required, advice from the Material Safety Data Sheet or our safety equipment supplier will help in your selection.

Do

- Inspect hand PPE for defects before each use
- Wash all chemicals and fluids off gloves before removing them
- Ensure that gloves fit properly
- Use the proper hand PPE for the job
- Follow manufacturer's instruction on the care and use of the hand PPE you are using

Don't

- Don't wear gloves when working with moving machinery (gloves can get tangled or caught)
- Don't wear hand PPE with metal parts near electrical equipment
- Don't wear gloves or hand protection that is worn out or defective

5.3 Foot PPE

5.3.1 General Definition

Safety footwear is designed to protect against foot hazards in the workplace. This protection can be against compression, puncture injuries and impact. Your choice of protective footwear should always over protect, not under protect.

Do

- Choose footwear according to job hazard
- Lace up boot and tie laces securely; boots don't protect if they are a tripping hazard or fall off
- Choose a high cut boot to provide better ankle support

Don't

- Don't wear defective safety footwear
- Don't under protect your feet or modify safety footwear

5.4 Eye and Face PPE

5.4.1 General Definition

Eye and face PPE is designed to protect the wearer from such hazards as: flying objects and particles, molten metals, splashing liquids and ultraviolet, infrared and visible radiation. Basic eye protection includes goggles and

spectacles with or without side shields. Face protection includes chemical and impact resistant (plastic) face shields and welder's shields or helmets with specified filter plates and covers.

5.4.2 Emergency Care

In the case of an eye injury:

- Eyewash stations are located in the Scene Shop at the sink and on the Mainstage in the SR Kitchen area. Learn where these wash stations are.

- Flush the eye with water until the foreign object has been rinsed out. Don't rub you eye, this can scratch the eye or embed the object.

- Request help from another employee in the area

- If you can't rinse out the object, bandage your eye loosely and get additional medical attention

- Follow up with qualified medical evaluation and assistance.

5.4.3 Shop Eye Protection Policy

All Scene Shop Staff are encouraged to wear eye protection at all times when working in the Scene Shop and other IRT worksites.

Eye protection must be worn in any circumstance where there is the potential for dust, slag, splinters or other foreign objects coming in contact with your eyes.

When grinding or cutting metal, close fitting goggles or a combination of faceshield along with safety glasses must be used.

When welding, safety glasses must be worn along with the welding helmet to protect your eyes from sparks, slag and other foreign objects.

If a Staff member has questions about proper eye protection for a project, he/she should consult with the Shop Foreman or the Technical Director. The Shop Foreman is the primary resource person for safety and construction standards in the shop and other worksites. The Shop Foreman has the duty to ensure a safe workplace and can require additional safety protection requirements based on specific circumstances of a project. Any disputes or disagreements which a carpenter or overhire may have concerning eye

protection requirements should be resolved immediately with the assistance of the TD and/or ATD.

5.4.4 General Eye Protection Requirements

All Safety glasses must meet OSHA PPE standard 29 CFR 1910.132-133 and ANSI standard Z87.1-1989

Hardened glass prescription lens and sport glasses are not an acceptable substitute for proper required industrial eye safety protection. Any employee supplying their own eye protection must have proof of compliance to the standards listed above.

Comfort and fit are very important in the selection of safety eyewear. Lens coatings, venting or fittings may be needed to prevent fogging or to fit with regular prescription eyeglasses.

When eye and face protection are required, advice from the Material Safety Data Sheet (MSDS) or our safety supplier will help in your selection.

Before an employee puts on any eye protection equipment they must inspect the equipment for damage. If the safety glasses are damaged in any way they must be replaced. Replacement parts or new glasses will be provided. A person wearing prescription lenses must monitor their glasses as well. If the lenses are beginning to cause any kind of vision impairment they must be replaced.

5.4.5 Welding Eye Protection Specifications

General Policy**:**

All filter lenses and plates shall meet the test for transmission of radiant energy prescribed in ANSI Z87.1-1968 - American National Standard Practice for Occupational and Educational Eye and Face Protection.

Filter Lenses for Protection Against Radiant Energy:

Source : OSHA 29 CFR 1910.133(a)(5)

Operations	Electrode Size 1/32in.	Arc Current	Minimum (*) Protective Shade
Shielded Metal Arc Welding	Less than 3	Less than 60	7
	3-5	60-160	8
	5-8	160-250	10
	More than 8	250-500	11
Gas Metal Arc Welding and Flux		Less than 60	7
		60-160	10

		160-250	10
		250-500	10
Gas Tungsten Arc Welding		Less than 50	8
		50-150	8
		150-500	10
Plasma Arc Welding		Less than 20	6
		20-100	8
		100-400	10
		400-800	11
Plasma Arc Cutting	Light (**)	Less than 300	8
	Medium (**)	300-400	9
	Heavy (**)	400-800	11
Operations	**Plate Thickness – inches**	**Plate Thickness – mm.**	**Minimum (*) Protective Shade**
Gas Welding:			
Light	Under 1/8	Under 3.2	4
Medium	1/8 to 1/2	3.2-12.7	5
Heavy	0ver 1/2	Over 12.7	6
Oxygen Cutting:			
Light	Under 1	Under 25	3
Medium	1 to 6	25 to 150	4
Heavy	Over 6	Over 150	5

Footnote (*) As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade which gives sufficient view of the weld zone without going below the minimum. In oxyfuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation.

Footnote (**) These values apply where the actual arc is clearly seen. Experience has show that lighter filters may be used when the arc is hidden by the workpiece.

5.4.6 Training

- All employees must be trained in the proper use of eye protection
- Training will include:
  - Discussion of the eye protection policy
  - Instruction on the wearing of the different kinds of eye protection equipment.
- Training will be conducted by the department head with an annual refresher.

Do

- Ensure your eye protection fits properly (close to the face)
- Clean safety glasses daily, more often if needed
- Store safety glasses in a safe, clean, dry place when not in use
- Replace pitted, scratched, bent and poorly fitted PPE (damaged face/eye protection interferes with vision and will not provide the protection it was designed to deliver)

Don’t

- Don’t modify eye/face protection

- Don't use eye/face protection that doesn't have American National Standards Institute (ANSI) certification

5.5 Hearing PPE

5.5.1 General Definition

Hearing PPE is designed to reduce the level of sound energy reaching the inner ear. The "rule of thumb" for hearing protection is: Use hearing protection when you can't carry on a conversation at a normal volume of voice when you are three feet apart. Remember, this is only a rule of thumb. Any sound over 80dba requires hearing protection. Hearing loss can be very gradual, usually happening over a number of years. The most common types of hearing protection are earplugs and earmuffs. Most earplugs and earmuffs, if properly fitted, generally reduce noise to the point where it is comfortable. When hearing PPE is required, advice from the Material Safety Data Sheet or our safety equipment supplier should help in the selection.

Do

- Ensure your hearing protection fits properly
- Clean Earmuffs and re-usable earplugs daily, more often if needed
- Do not re-use disposable earplugs
- Store hearing protection in a safe, clean, dry place when not in use
- Replace damaged PPE (damaged hearing protection will not provide the protection it was designed to deliver)

Don't

- Don't modify hearing protection
- Don't use hearing protection that doesn't have American National Standards Institute (ANSI) certification

5.6 Respiratory PPE

5.6.1 General Definition

Respiratory protection falls into two major categories. The first category is Air Purifying Respirators (APR) which use particle (dust) and chemical cartridges and/or filters. The second category is Atmosphere Supply Respirators (ASR) which include self-contained breathing apparatus (SCBA), air line systems and protective suits that completely enclose the

worker and incorporate a life support system. Only APRs will be dealt with here. The second category of respirators requires much more specific information and training, If you need to use Atmosphere Supplying Respirators, you should get expert advice and training.

There are two basic types of APRs: disposable fiber type with or without charcoal or chemical filters and re-usable rubber face mask type with disposable or rechargeable cartridges and filters. The wearer breathing demands and the concentration of airborne contaminants affects the service life of these APRs. When an APR is required, consult the Material Safety Data Sheet (MSDS) or our safety supplier for the exact specifications of the APR.

Facial hair can prevent a good seal and fit on an APR. An APR is only as good as its seal and its ability to filter out contaminants.

It's important to remember that APRs are limited to areas where there is enough oxygen to support life. APRs don't supply or make oxygen.

5.6.2 Physical Forms of Chemicals - Definitions

If you don't know the precise difference between any two physical forms of a chemical, then:

- *you can't get the right respirator;*
- *you don't know what kind of ventilation is required;*
- *you don't know how to protect yourself from them;*
- *you don't know how they can get into your body, and*
- *you don't know what they can do to you.*

Solid

The molecules in a solid move slowly – they actually vibrate in place - A solid tends to keep its form rather than flow or spread out like a liquid or gas.

Simple barriers such as gloves or protective clothing are usually adequate protection from most chemical solids.

Liquid

The molecules in a liquid move more rapidly and freely with respect to each other, so as to flow readily.

Again, simple barriers such as goggles, gloves, or protective clothing are usually adequate protection from many liquids. However, some solvents penetrate through gloves. They can also penetrate our skin. Special information from glove manufacturers must be obtained to find the right glove for each solvent.

Fume

Fumes are solid particles temporarily suspended in air that are created when some solid materials are heated to the melting point. When metals are welded or soldered, for example, some molecules are released as vapor, and then immediately react with the oxygen in the air to form tiny metal oxide particles.

Fumes are so small; they may remain suspended in the air for many hours. These particles have sufficient weight and mass to be filtered with a very fine filter. Respirator cartridges designed to capture fumes can prevent fume inhalation, but proper ventilation is always the best method of control.

Dust

Particles created from sanding, grinding, or handling powdered materials are released into the air. Large dust particles settle from the air more quickly than fine ones.

The finest dusts are called “respirable” dusts. These dusts are too small to be seen with the naked eye and can be inhaled into the deepest part of the lungs or alveoli (the little air sacs). For this reason most respirable dusts are toxic. Masks or respirators with cartridges designed to capture toxic dust can prevent inhalation of most dusts.

Mist

Mist describes the cloudiness or fog that may sometimes be seen when an activity such as spraying or boiling is performed. A mist consists of liquid droplets that may also contain solid material.

For example: Oil spray paint mist may contain a solvent (liquid), pigment (solid), and oil vehicle (waxes and heavy oils). Although a mist starts out suspended in air, the mist will convert to other forms in time. The liquid will evaporate (become a vapor). The pigment and vehicle will “dry” to settle as a dust.

Respirators for protection against mists must be chosen carefully. There are different types of cartridges for solvent-containing mists as opposed to water containing mists.

Gas

These molecules move even more rapidly than liquid molecules. Gas can expand indefinitely and mix with air evenly to fill the container or room it is

released into. An example of gas molecule movement is seen in the migration of Freon aerosol propellants all the way to the stratospheric ozone layer.

Even gases that are heavier than air will mot "layer out" or separate once they are mixed with the air. Heavy gases will do this only if large amounts are released unmixed into still air, such as in a storage space.

Gases and vapors are molecules, and so there is no filter with spaces small enough to trap them; gases are captured by chemical respirator cartridges which ABSORB (attract molecules) or REACT CHEMICALLY with gas molecules. There are some gases for which there are no approved air-purifying respirators.

Vapor

When liquids evaporate, their molecules go into the air. In this form they are called a vapor. When solids, such as mothballs, convert to a vapor, it is called "subliming." The process of becoming a vapor is accelerated by heat. Vapors, like gasses, diffuse evenly into a containing space.

The only difference between a gas and a vapor is that at high concentrations, vapors re-condense into their liquid or solid form. Vapor molecules, like gases, are too small to be filtered, so respirator cartridges must ABSORB or CHEMICALLY REACT with them. There are some vapors for which there are no approved air-purifying respirators.

****
IN ALL CASES, VENTILATION IS THE BEST METHOD OF CONTROL
****

<u>Do</u>

- Train workers in APRs use, care and limitations
- Ensure that respirators are properly cleaned and stored in sealed bags in their storage cabinet after each use, according to manufacturer's instructions
- Match the cartridge/filter type with the job at hand
- Keep new, unused filters and cartridges away from old and exhausted cartridges and filters
- When you put a new cartridge on a mask, mark the date on the cartridge. Do not use any cartridge more than 3 months after installing on a mask.
- Dispose of old cartridges and masks properly in a sealed bag
- Monitor APR use; they are useless just hung around the neck
- Replace filters when breathing becomes difficult

<u>Don't</u>

- Don’t use for protection against materials which are toxic in small amounts
- Don’t use with gases that can’t be detected by odor or throat or nose irritation
- Don’t use with gases not effectively halted by chemical cartridges regardless of concentration
- Don’t use respirators or masks if their serviceability is in doubt
- Don’t use APRs in areas where oxygen content is below normal levels

5.7 Fall Arrest PPE

5.7.1 General Definition

Full Body Harness Systems are used to provide wearers working at heights above ground level with freedom of movement and protection from falls. These devices will arrest and absorb some of the shock of a fall. These harnesses are worn around the body and attached to a shock absorbing lanyard or other fall arresting device. The lanyard or other fall arresting device is attached to a secure anchor point or lifeline that is able to support the shock load in the event of a fall. A lanyard, lifeline or anchor point should never be used for other lifting duties and only should become load bearing in the event of a fall. At all other times the lanyard or lifeline should be just slack enough to permit freedom of movement of the wearer. It is very important to get quality advice in the selection, purchase and maintenance of all fall arresting equipment.

NOTE: Rappelling and Climbing gear is not approved as or a substitute for a certified fall arrest harness and lanyard.

5.7.2 Phases of Fall Protection

There are four phases of fall protection:

- Before the fall
- Fall Arrest
- Suspension
- Post-fall Rescue

Each phase presents unique safety challenges. Suspension trauma can be influenced by all aspects of the fall, so they are all important. As with many aspects of safety, increasing the safety in one phase can compromise the safety of the others. Whatever training workers have received will determine how they respond to different phases.

Depending on the harness attachment point and the position of the worker's body at arrest, different harness attachments offer different advantages.

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Before the fall

The key issue of fall protection before the fall is compliance. If a harness is too uncomfortable, too inconvenient, or interferes too much with task completion, workers may not use the equipment or may modify it (illegally) to make it more tolerable. A second major point is the length of the attachment lanyard, or, how far can a worker fall before his fall is arrested? The longer the fall, the greater the stress on the body will be when the fall is arrested. The shorter the lanyard, the more often it will have to be repositioned when workers are mobile. A moveable safe anchor is one solution, but this situation is only occasionally available.

Fall arrest

The whole concept of fall protection is that workers who fall will be stopped by the tethering system. The longer the attachment lanyard, the longer the acceleration time during the fall and the greater the stress on the body at arrest. Unfortunately, the posture of the falling worker is unpredictable. Depending on the harness attachment point and the position of the worker's body at arrest, different harness attachments offer different advantages. An attachment near the shoulders means that any drag from the lanyard will serve to position the worker's body in an upright position so the forces are distributed from head to foot. The head is somewhat protected if the legs and body precede it in the fall, but this offers some disadvantages after the fall arrest is completed.

Suspension

Many safety professionals naturally assume that, once a fall has been arrested, the fall protection system has successfully completed its job. Unfortunately, this is not the case. A worker suspended in an upright position with the legs dangling in a harness of any type is subject to suspension trauma.

Fall victims can slow the onset of suspension trauma by pushing down vigorously with the legs, by positioning their body in a horizontal or slight leg-high position, or by standing up. Harness design and fall injuries may prevent these actions, however.

Rescue

Rescue must come rapidly to minimize the dangers of suspension trauma. The circumstances together with the lanyard attachment point will determine the possibilities of self-rescue. In situations where self-rescue is not likely to be possible, workers must be supervised at all times. Regardless of whether a worker can self-rescue or must rely upon others, time is of the essence because a worker may lose consciousness in only a few minutes.

5.7.3 Importance of a Quick Rescue to prevent Suspension Trauma

Wide ranges of situations require safety harnesses of various types. Workers requiring fall protection, workers entering many confined spaces, mountain climbers, deer hunters in elevated stands, and cave explorers all try to protect themselves through the use of safety harnesses, belts, and seats. What is little known however, is that these harnesses can also kill.

All personnel should be trained that suspension in an upright condition for longer than five minutes can be fatal.

Harnesses can become deadly whenever a worker is suspended for durations over five minutes in an upright posture, with the legs relaxed straight beneath the body. This can occur in many different situations in industry. A carpenter working alone is caught in mid-fall by his safety harness, only to die 15 minutes later from suspension trauma. An electrical worker is lowered into a shaft after testing for toxic gases. He is lowered on a cable and is positioned at the right level to repair a junction box. After five minutes he is unconscious--but his buddies tending the line don't realize it, and 15 minutes later a dead body is hauled out.

The cause of this problem is called "suspension trauma." Suspension trauma death is caused by orthostatic incompetence (also called orthostatic intolerance). Orthostatic incompetence can occur any time a person is required to stand quietly for prolonged periods and may be worsened by heat and dehydration. It is most commonly encountered in military parades where soldiers must stand at attention for prolonged periods. Supervisors can prevent it by training soldiers to keep their knees slightly bent so the leg muscles are engaged in maintaining posture.

What happens in orthostatic incompetence is that the legs are immobile with a worker in an upright posture. Gravity pulls blood into the lower legs, which have a very large storage capacity. Enough blood eventually accumulates so that return blood flow to the right chamber of the heart is reduced. The heart can only pump the blood available, so the heart's output begins to fall. The heart speeds up to maintain sufficient blood flow to the brain, but if the blood supply to the heart is restricted enough, beating faster is ineffective, and the body abruptly slows the heart.

In most instances this slowing of the heart solves the problem by causing the worker to faint, which typically results in slumping to the ground where the legs, the heart, and the brain are on the same level. Blood is now returned to the heart and the worker typically recovers quickly. In a harness, however, the worker can't fall into a horizontal posture, so the reduced heart rate causes the brain's blood supply to fall below the critical level.

In suspension trauma, several unfortunate things occur that aggravate the problem. First, the worker is suspended in an upright posture with legs dangling. Second, the safety harness straps exert pressure on leg veins, compressing them and reducing blood flow back to the heart. Third, the harness keeps the worker in an upright position, regardless of loss of consciousness, which is what kills workers.

5.7.4 Recommendations

Safety harnesses save many lives and injuries. However, continual vigilance is needed to train and supervise workers to ensure harnesses are used safely. All phases of fall protection need to be examined for each particular application. Workers and emergency response personnel must be trained to recognize the risks of suspension trauma.

Before the potential fall:

1. Workers should never be permitted to work alone in a harness.
2. Rope/cable tenders must make certain the harness user is conscious at all times.
3. Time in suspension should be limited to under five minutes.
4. Longer suspensions must have foothold straps or means for putting weight on the legs.
5. Harnesses should be selected for specific applications and must consider: compliance (convenience), potential arrest injury, and suspension trauma.
6. Tie-off lanyards should be anchored as high and tight as work permits.

After a fall:

1. Workers should be trained to try to move their legs in the harness and try to push against any footholds.
2. Fall victims can slow the onset of suspension trauma by pushing down vigorously with the legs, by positioning their body in a horizontal or slight leg-high position, or by standing up.
3. Workers hanging in a harness should be trained to try to get their legs as high as possible and their heads as close to horizontal as possible (this is nearly impossible with many commercial harnesses in use today).
4. It the worker is suspended upright, emergency measures must be taken to remove the worker from suspension or move the

fallen worker into a horizontal posture, or at least to a sitting position.

5. All personnel should be trained that suspension in an upright condition for longer than five minutes can be fatal.

For harness rescues:

1. The victim should not be suspended in a vertical (upright) posture with the legs dangling straight. Victims should be kept as nearly horizontal as possible, or at least in a sitting position.
2. Rescuers should be trained that victims who are suspended vertically before rescue are in a potentially fatal situation.
3. Rescuers must be aware that post-rescue death may occur if victims are moved to a horizontal position too rapidly.

Do

- Obtain expert advice before purchasing a fall arresting device
- Properly train in the use of the system
- Use only manufacturer's components for replacement parts
- Inspect all parts of the fall arrest system before each use
- Make sure the harness fits snugly
- Ensure that the anchor points are secure and able to support the load in the event of a fall
- Keep all tools tethered to you – falling tools can cause injury to you and others working below.
- Follow the manufacturer's instructions on care and use
- Use only the proper safety rated fastenings with the system

Don't

- Don't use any component in a fall arrest system that doesn't have American National Standards Institute (ANSI) certification
- Don't modify, change or put additional holes in the harness or hardware
- Don't use the system or any of it components for any other than its specified use

6.0 Fire Safety Information

6.1 Fire and Use of Fire Extinguishers

6.1.1 General

Good housekeeping is essential in the prevention of fires. Fires can start anywhere and at any time. This is why it is important to know which fire extinguisher to use and how to use it.

Always keep fire extinguishers visible and easily accessible. Fire extinguishers have to be properly maintained to do the job. The Scene shop

maintains several Class A pressurized water extinguishers that are to be used by fire watchers on welding and cutting projects. These can be distinguished by the red tape band at the top and the "IRT Scene Shop" label. If these units are discharged, they should be refilled, recharged and the pin re-secured as soon as possible. Time will be taken at the top of each season to train staff in maintaining these extinguishers. If any other fire extinguisher in the building is discharged, the director of maintenance (x333) must be notified immediately.

6.1.2 Types of Fires

Class A: These fires consist of wood paper, rags, rubbish and other ordinary combustible materials.

Recommended extinguishers: Water from a hose, pump type water can, or pressurized extinguisher and soda acid extinguishers

Fighting the Fire: Soak the fire completely, even soaking the embers

Class B: Flammable liquids, oil and grease

Recommended extinguishers: ABC units, dry chemical, foam and carbon dioxide extinguishers

Fighting the Fire: Start at the base of the fire and use a swinging motion from left to right, always keeping the fire in front to you.

Class C: Electrical equipment

Recommended extinguishers: carbon dioxide and dry chemical (ABC units) extinguishers

Fighting the Fire: Use short bursts on the fire. When the electrical current is shut off on a Class C fire, it can become a Class A fire if the materials around the electrical fire are ignited.

6.1.3 Correct operation of a Fire Extinguisher

Remembering the **P A S S**- word will help you to use an extinguisher correctly.

Pull the pin. All extinguishers have a locking mechanism that is unlocked by removing a pin. This will allow you to operate the lever handle on the extinguisher. Many extinguishers will have seals or tamper-proof devices that prevent the pin from being removed accidentally. This seal will break easily by pulling the pin.

Aim the nozzle. The nozzle or horn should be aimed at the base of the fire. Aiming at the flames will not stop the reaction of the fire happening at its source.

Squeeze the lever above the handle. Pushing down on the handle releases the extinguishing agent. If you let up on the lever or handle it will stop the discharge.

Sweep the extinguisher from side to side. Moving toward the fire and keeping the nozzle aimed at the base of the fire sweep the extinguisher from side to side to cover the fire area. Repeat this until the flames appear to be out. If it re-ignites, repeat the procedures.

6.2 In the event of a fire

6.2.1 Designated Evacuation Meeting Point

In the event of an evacuation of the building, Scene Shop staff and Overhire should exit the building as quickly as possible and make their way to the designated meeting point on the sidewalk directly across Washington St. from the theater's marquee in front of the Hyatt Hotel.

7.0 Emergency/Medical Information

Please review and understand the information herein before an emergency happens

7.1 Emergency Phone Numbers

Police/Fire/Ambulance 911
Poison Information 929-2323

7.2 Nearest Emergency Room

Methodist Hospital
Emergency Room entrance is at the corner of
North 16th St. & Senate

7.3 For non-emergency medical treatment

7.4 Blood Borne Pathogens/ Bodily Fluids Procedure

This procedure deals with blood, vomit, urine, defecation, or other bodily fluids that may need to be dealt with or cleaned. Every effort should be made to avoid contact with any bodily fluid. Each First Aid Station should have available rubber gloves and a bodily fluids disposal kit.

If you should come in contact with a bodily fluid you should wash the area exposed immediately. Report any exposure to your supervisor or the Production Supervisor.

Do not attempt to clean bodily fluids. Page the Housekeeping Staff. Should any bodily fluid need cleaning, do the following:

- Cover the substance with a towel or absorbent material if available.
- Station people to prohibit staff or patrons from coming in contact with the substance.
- Page the Housekeeping Staff to let them know you have a bodily fluid clean up. Be specific about substance and location.
- Fill out incident report indicating location and type of bodily fluid and who cleaned.

7.5 In the event of any injury the following procedure must be followed:

1. Administer First Aid
2. Ascertain the gravity of the injury or illness
3. Call 911 if there is any question about the severity of the situation.
4. A Worker's Compensation Form must be filed regardless of the severity of the injury or treatment. The Technical Director, General Manager and Production Supervisor should be informed of the situation as soon as is feasible. Copies of the Worker's Compensation Form should be filed with the Scene Shop, General Manager, Production Supervisor and the Business Office.

7.5.1 If you call 911:

1. Inform the 911 operator of where the emergency personnel should go in the building.
2. Alert the Receptionist that 911 has been called and inform them of your location. If there is not a receptionist on duty, send someone to the front of the building to meet the emergency personnel if possible.
3. Continue to administer First Aid if necessary until the emergency personnel arrive.

4. Take with you and fill out a Worker's Compensation Form. The injured employee should not fill out this form. Copies of this form should also be filed with the Scene Shop, Business Office, General Manager and the Production Supervisor as soon as possible after the situation has been resolved

7.5.2 If you don't need 911:

For bleeding or broken bones-

Transportation to Methodist Hospital Emergency Room should be coordinated with the Company Manager, when available, and can be provided by anyone who might be around. Under no circumstances should the injured person be allowed to drive themselves to the hospital.

For other injuries that do not require emergency care-

Transportation to United Methodist Occupational Health Center should be coordinated with the Company Manager, when available, and can be provided by anyone who might be around. Under no circumstances should the injured person be allowed to drive themselves to the hospital.

8.0 For Reference and Further Reading

8.1 Books and Publications

Stage Fright – Health and Safety in the Theater
by Monona Rossol, 1991 ISBN: 0-9607118-3-X

The Health & Safety Guide for Film, TV & Theater
By Monona Rossol, 2000 ISBN: 1-58115-071-7

Theatre Safety Basics – a guide to creating a Safety Program for your company
Published by The Canadian Institute for Theatre Technology, 1999
Citt@mail.culturenet.ca

8.2 Websites

http://www.caseweb.com/ACTS/
Arts, Crafts & Theatre Safety – Monona Rossol's site
Information about the hazards posed by toxic materials and dangerous equipment used in art and theater settings

http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1910#
OSHA website and specific pages relating to health and safety standards

http://www.msdssearch.com/DictionaryN.htm
Free MSDS search database and dictionary of terms

http://www.msdsprovider.net/Site/msdsprovider.nsf/search?openform
Free MSDS search database

http://www.usdoj.gov/crt/ada/reg3a.html
Americans with Disabilities Act (ADA) Regulations