



Weatherization Notebook
October 2009

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We encourage you to comment on these materials. Please give your suggestions to those teaching the program in which you are now enrolled, or forward them to the Midwest Consortium for Hazardous Waste Worker Training, University of Cincinnati, P.O. Box 670056, Cincinnati, OH 45267-0056.

Warning

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The material was prepared for use by experienced instructors in the training of persons who are responsible for providing rescue services to organizations whose employees work in confined spaces. Authors of this material have prepared it for the training of this category of workers as of the date specified on the title page. Users are cautioned that the subject is constantly evolving. Therefore, the material may require additions, deletions, or modifications to incorporate the effects of that evolution occurring after the date of this material preparation.

Disclaimer

This program is developed for workers who will be doing a range of activities to weatherize homes. This health and safety training will help you avoid hazards that could cause injury or ill health. This training is **in addition to** the skills training that you will receive. Anyone doing the following requires **additional** training: *asbestos abatement*, *lead paint abatement*, and *mold remediation*.

The training presented here will help you recognize these potential exposures but not fix them. Alert your supervisor if asbestos, lead or mold is suspected in an area where you are improving the home by weatherizing.

There is no overall health and safety standard from the Occupational Safety and Health Administration (OSHA) for weatherization work; but many activities you may do are covered by OSHA standards such as electrical safety using hand tools. Many of these activities are covered in this notebook. We will develop health and safety information to add to the notebook as you and others provide additional topics.

Weatherization work hazards change with the home and the season. Always work in teams and know how to alert others that you need help.

ABC's: Safe Work Practices at Any Worksite

Workplace violence

WHEN DOES THIS APPLY TO ME?

General safe work practices should be followed no matter where you are to prevent workplace violence. According to the Occupational Safety and Health Administration (OSHA), workplace violence is any violence or the threat of violence against workers. It can occur at or outside the workplace and can range from threats and verbal abuse to physical assaults and homicide.

WHY SHOULD I FOLLOW SAFE WORK PRACTICES?

By following general safe work practices, you could avoid possible injury to yourself and others. You should be aware of different forms of workplace violence to prevent incidents from occurring. According to OSHA, homicides from workplace violent acts are the 4th leading cause of fatal occupational injuries.

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

According to the National Institute for Occupational Safety and Health (NIOSH), the following risk factors may increase the risk of workplace violence:

- Exchange of money
- Having a mobile workplace
- Working alone or in small numbers
- Working late at night or during early morning hours

Prevention Strategies

Be able to identify every worker on the job site. Notify your supervisor if you notice someone lurking around the property or an unfamiliar face.

Never work alone! Always remain within earshot of another worker. Always use the buddy system especially when working at dawn, dusk, or after dark or when picking up or delivering material. Discuss with your supervisor an effective way to alert others if

a problem occurs. For example, your supervisor may use walkie-talkies on the job site to keep in constant contact with all workers.

Always work in well lighted areas. If working at dawn or after dark, use portable lights for external lighting. Always ensure that all doors in the building are unlocked and know the location of all exits.

Do not exchange or count money at work or in public. Don't wear flashy jewelry.

If you feel threatened, bullied, harassed, or feel your personal safety is being compromised by another worker or a member of the public, notify your supervisor immediately. Also notify your supervisor if someone brings any type of weapon(s) onto the job site.

Asbestos and Vermiculite Insulation

Safe work practices

WHEN DOES THIS APPLY TO ME?

During weatherization, you will be removing and installing insulation. Insulation can contain asbestos or asbestos-contaminated vermiculite. Also, caulking produced prior to 1977 most likely contained asbestos. Asbestos fibers in the air are usually so small that you cannot see them.

WHY SHOULD I BE CONCERNED ABOUT ASBESTOS AND VERMICULITE?

Exposure to asbestos increases your risk of developing lung diseases including asbestosis, lung cancer, or mesothelioma, and disease may not occur until decades after exposure. The risk of disease increases as the level, duration, and frequency of exposure increases. That risk is made worse by cigarette smoking.

Asbestos is a naturally occurring fiber that was used in insulation, caulking, brake pads, glues, ceiling tiles, floor tiles, and a number of other products. Asbestos was used in these products because it is extremely heat and flame resistant and provides a good means of insulation. Exposure to asbestos causes lung cancer and other diseases.

Vermiculite is a naturally occurring mineral composed of shiny flakes, resembling mica. When heated to a high temperature, flakes of vermiculite expand as much as 8-30 times their original size. The expanded vermiculite is a light-weight, fire-resistant, and odorless material and has been used in numerous products, including insulation for attics and walls. Sizes of vermiculite products range from very fine particles to large (coarse) pieces nearly an inch long.

Vermiculite from a mine near Libby, Montana is the most contaminated with asbestos. This mine was the source of over 70 percent of all vermiculite sold in the U.S. from 1919 to 1990. Vermiculite from Libby was used in the majority of vermiculite insulation in the U.S and was often sold under the brand name Zonolite. If you encounter vermiculite insulation during weatherization, you should assume this material may be contaminated with asbestos and take steps to protect yourself and fellow workers from exposure.

WHAT CAN I DO TO PROTECT MYSELF AND OTHERS FROM EXPOSURE?

There is no known safe level of asbestos exposure. Asbestos fibers must be airborne to cause a health risk through inhalation, so the first step is not to disturb the material, which would release more fibers into the air. If you remove or disturb the insulation, caulking, ceiling tiles, and etc., it is probable that you may inhale some asbestos fibers – the degree of health risk depends on how much and how often this occurred. It is not possible to say whether your exposure may result in disease.

Avoid getting insulation on your clothes or in your hair because you can track the contaminated insulation home and expose your family.

Identifying asbestos and vermiculite insulation:

If the building you are weatherizing was built before 1977, it may have asbestos containing insulation, floor tiles, or caulking. If you notice that caulking, floor tiles, or ceiling tiles are crumbling, then they may release asbestos fibers.

Vermiculite insulation is a pebble-like, pour-in product and is usually gray-brown or silver-gold in color. Before removing insulation, inspect it without disturbing the material.

The following photographs show typical vermiculite insulation. Photographs courtesy of the EPA.



Typical Vermiculite Insulation



Typical Vermiculite Insulation between Attic Joists



Vermiculite insulation particle size relative to a paper clip



Different Sizes of Vermiculite Particles



Typical Vermiculite Insulation

**ALWAYS ASSUME
THAT VERMICULITE
INSULATION CONTAINS
ASBESTOS!**

(empty)

How to Reduce Your Exposure:

- Leave vermiculite insulation and any crumbling caulking and tiles undisturbed.
- Do not attempt to remove the insulation yourself. It can spread harmful fibers to other areas of the building.
- Notify your supervisor immediately if you believe you have found any asbestos containing materials.
- Make every effort to stay on the floored part of the attic and do not disturb the insulation. For asbestos to present a problem, it must be disturbed so that fibers are released into the air.
- If you must remove the insulation or other potential asbestos containing materials, wear respiratory protective equipment. **Common dust masks do not protect you against asbestos fibers.** You should at least wear an OSHA-approved respirator and appropriate protective clothing and eye protection as indicated in OSHA workplace standards. You must be trained and authorized before using any respiratory equipment. For information on OSHA-approved personal protection, visit OSHA's Web site at <http://www.osha.gov/SLTC/asbestos/>.
- If you must perform activities that may disturb the vermiculite insulation such as moving boxes (or other materials), do so as gently as possible to minimize the disturbance. Wear protective clothing, such as a Tyvek® suit, to avoid getting insulation on your clothes.

- Leave the attic immediately after the disturbance.
- Do not track vermiculite insulation or associated dust into other areas of the building.
- Be aware that vermiculite insulation and associated dusts can be carried home on your clothing or in your hair.
- If work needs to be done in a portion of the building that will disturb vermiculite insulation or other asbestos containing materials, additional training and certification is needed.

QUICK CHECKLIST

Preventative actions to reduce asbestos exposure	Yes	No
Was the building built prior to 1977?		
Has an inspection of the building, by a worksite supervisor, been conducted to look for asbestos containing materials?		
Are there any crumbling tiles or caulking?		
Does the building contain vermiculite insulation?		
Are you trained in the hazards of asbestos and how to identify it?		

*This information was derived from Environmental Protection Agency's Asbestos-Contaminated Vermiculite Insulation (http://www.epa.gov/asbestos/pubs/verm_questions.html) and Asbestos.com Caulking Exposure Risks (<http://www.asbestos.com/products/construction/caulking.php>).

Bloodborne Pathogens

Safe work practices

WHEN DOES THIS APPLY TO ME?

You may be exposed to human blood, urine, feces, vomit, or other potentially infectious materials during weatherization.

WHY SHOULD I BE CONCERNED ABOUT BLOODBORNE PATHOGENS?

When you come into contact with human blood, urine, feces, or vomit, you may be exposed to Hepatitis B, Hepatitis C, HIV, or any number of other pathogens.

If you come into contact with blood, urine, feces, or vomit, exposure and infection can occur through open sores, wounds, if the substance enters your mouth, or through injection. Exposure may also occur in an emergency situation, or accidental contact with infected needles or other sharp objects.

WHAT CAN I DO TO PREVENT EXPOSURE TO MYSELF AND OTHERS?

OSHA created the Bloodborne Pathogens Standard (29 CFR 1910.1030) to help protect workers who work with or who may be exposed to bloodborne pathogens. The standard stresses safe work practices and engineering controls to minimize exposure. Personal protective equipment (such as gloves) must be worn at all times when exposure is possible.

Before work begins at a job site, your supervisor or another appointed worker should inspect the area and building for any potential contaminated areas. Notify your supervisor if you come across any discarded needles, broken glass, or other potentially contaminated items.

Be careful not to come into contact with any needles or sharp objects located in or around the building you are weatherizing. Always wear gloves if you are required to remove, clean, or service any part of the building where you may be exposed to human blood, urine, feces, or vomit. If you are required to clean up contaminated glass or other materials, use a broom or other cleaning device, instead of your hands, to clean up the mess. Thoroughly wash your hands with warm water and soap after the job task has been completed.

If you believe you were potentially exposed, notify your supervisor immediately so that appropriate and timely medical attention and follow-up can be provided. There

is no vaccine for Hepatitis C or HIV. However, your doctor can administer a Hepatitis B vaccine to protect you during weatherization work tasks.

QUICK CHECKLIST

Preventative actions to avoid bloodborne pathogen exposure	Yes	No
Have you been trained regarding Bloodborne Pathogen exposures?		
Have you been trained how to respond to an injured or sick worker?		
Is personal protective equipment available in case of potential exposure?		
Do you know what steps to take if you experience an exposure?		
Has the worksite been inspected for potential contaminated areas?		

Chemicals

Safe work practices

WHEN DOES THIS APPLY TO ME?

You may come in contact with stored chemicals in buildings you are weatherizing. You will also be using chemicals to perform normal job tasks such as caulk, cleaning agents, and spray insulation.



Improperly Stored Chemicals
image from: <http://www.tampagov.net>

WHY SHOULD I BE CONCERNED ABOUT CHEMICALS?

Chemicals attack specific organs of the body and can have irreversible consequences. You should be able to identify these hazards and take the necessary precautions to prevent exposure or injury. Chemicals can enter your body 4 ways: through skin absorption, inhalation, ingestion, and injection. Some chemicals can enter the body in more than one way:

- Solvents: absorption, inhalation, ingestion, injection
- Metal fumes: absorption and inhalation
- Carbon monoxide: absorption and inhalation
- Metal particles: inhalation

The following is a more detailed explanation of chemical routes of entry:

Skin Absorption

The skin may be a major route of exposure, as many chemicals (solvents and liquid insecticides) cross through the skin and get into the bloodstream. Some chemicals (e.g., formaldehyde) penetrate the skin and set up an allergic reaction. Chemicals pass through the skin into the blood. If the skin is irritated, damaged, or punctured, absorption is increased.

Inhalation

As we breathe, we take in whatever is in the air. If dusts, particles, and chemicals are in the air, they may be deposited in the lungs or cross into the bloodstream along with oxygen. Inhaled dusts and fibers caught in the nose and airways are moved out of the nose and airways on an “escalator” made of hair-like cilia and mucus and then swallowed. Inhalation is the major way that toxic substances get into your body. If the “escalator” becomes damaged, you will keep more of the particles in your lungs.

Ingestion

Chemicals can be ingested through the mouth and swallowed when eating, drinking, and smoking. Toxic particles are cleared from the nose and lung in mucus. The mucus is swallowed and moves through the stomach and intestines. Toxic particles may be absorbed from the intestines into the bloodstream.

Injection

A chemical can be accidentally injected into the body if you get injured by a tool, compressed air/gas line, fall, or sharp object.

Chemical Effects

Local effects occur at the point of contact with the skin, eyes, nose, throat, and airways. Some local effects include:

- Irritation to the lungs, eyes, skin, throat, and nose
- A burning sensation in the lungs
- Chemical skin burns

Systemic effects occur when a chemical or physical agent gets into the blood and is distributed in minutes throughout the body to all organs and tissues (including muscle and fat). For example, the route of entry of solvents such as benzene may be at the skin

or through the lungs, but the exposure affects the bone marrow or brain. A toxic gas such as hydrogen cyanide is inhaled, but the exposure affects the use of oxygen in the muscles and organs. If the heart (muscle) or brain (organ) can't use oxygen, you are dead in minutes.

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

Never assume a chemical is safe to use. Never use a chemical without being trained and authorized by your supervisor. Always read the Material Safety Data Sheet (MSDS) or container labels before use. The MSDS and container labels will notify you of the hazards, routes of exposure, and what kind of personal protective equipment that should be worn while using the chemical (safety glasses, chemical gloves, etc.). For additional information on chemicals, visit the National Institute for Health and Safety's (NIOSH) Pocket Guide to Chemical Hazards website at <http://www.cdc.gov/niosh/npg>.

Do not move or disturb chemicals stored at the worksite. You do not know what these chemicals are and what they can do to your body.

Wash hands with warm water and soap after handling chemicals and before eating, drinking, smoking, or applying cosmetics. If gloves are required while using the chemical, always wash your hands after removing the gloves. Never touch your face, mouth, eyes, nose, or any other body part until you wash your hands.

If a chemical spills, notify your supervisor immediately. Do not attempt to clean it up without the proper personal protective equipment. Only trained and authorized employees should be cleaning up chemical spills.

Terms and Definitions

The following is a list of terms and definitions you may encounter while reading the MSDS or NIOSH Pocket Guide:

- **OSHA:** Occupational Safety and Health Administration. This government organization sets mandatory health and safety regulations.
- **NIOSH:** National Institute for Occupational Safety and Health. An agency within The Department of Health and Human Services. This organization makes recommendations on health and safety issues.
- **ACGIH:** American Conference of Governmental Industrial Hygienists. This is a non-governmental organization that makes recommendations on health and safety issues.
- **PEL:** Permissible exposure limits are legal exposure levels set by OSHA. Employers must keep exposures below the PELs.
- **TLV:** Threshold limit values are recommendations for exposure limits which are prepared by the ACGIH, a private, non-governmental agency. TLVs, which are not legally enforceable, are reviewed and updated annually.

- **REL:** Recommended exposure levels (RELs) are set by NIOSH. RELs are not legally enforceable.
- **STELs:** Short-term exposure limits are set by ACGIH, OSHA, and NIOSH. The STEL is a maximum average concentration a person may be exposed to over a short period of time, usually 15 minutes. It is legally enforceable if set by OSHA. STEL is sometimes abbreviated further to ST.
- **Ceiling Limit:** The ceiling limit is an exposure level set by ACGIH, OSHA, and NIOSH which should not be exceeded at any time. It is legally enforceable if set by OSHA.
- **IDLH:** Immediately Dangerous to Life and Health: Conditions which pose an immediate threat to life or health or conditions that pose an immediate threat of severe exposure to contaminants which are likely to have harmful effects on health.
- An **acute exposure** involves a high exposure of a toxic chemical for a short period of time.
- A **chronic exposure** involves a low exposure of a toxic chemical over a long period of time.

QUICK CHECKLIST

Preventative actions to reduce chemical exposure	Yes	No
Are there any stored chemicals at the worksite?		
Have you been trained in the proper use and personal protective equipment of chemicals you will be using?		
Is all required personal protective equipment provided on-site?		
Are you aware of chemical spill procedures?		

Compressed Air

Safe work practices

WHEN DOES THIS APPLY TO ME?

Air compressors may be available at the worksite for several purposes. Pneumatic nail guns or drills may be used to perform weatherization work tasks. Compressed air may also be used to clean dust and dirt from other pieces of equipment.

WHY SHOULD I FOLLOW COMPRESSED AIR SAFE WORK PRACTICES?

Personal injury can occur if workers misuse pneumatic equipment and air compressors. Improper use of compressed air can result in temporary hearing loss or foreign objects in the eye.

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

The downstream pressure in a compressed air line must remain below 30 psi (pounds per square inch) if the nozzle is dead-ended; this can be accomplished by using a pressure relief device at the nozzle or inserting a reducer at the outlet from the compressor. Never direct pneumatic equipment or compressed air towards yourself or others. Never use compressed air to clean debris from yourself or others.

Always wear safety glasses to prevent foreign particles (dust, dirt, paint chips, or slivers of metal) from entering your eyes and ear plugs to prevent hearing loss while operating a compressed air cylinder or pneumatic tool. A dust mask may also be worn when using compressed air for cleaning.

Inspect the air compressor before use. Make sure all parts are in good working order. Inspect the hose for cracks and proper connection to the air compressor. Turn off the air valve when not in use.

QUICK CHECKLIST

Preventative actions to reduce injury from compressed air	Yes	No
Are all hoses properly connected to the compressor?		
Are you wearing safety glasses and hearing protection?		
Is the air valve in the OFF position when not in use?		

Confined Space Entry

Safe work practices

WHEN DOES THIS APPLY TO ME?

You may encounter confined spaces during weatherization. Some confined spaces that may be found around your worksite include sewers, septic tanks, storage areas, cellars/basements, and HVAC systems. The most common confined spaces weatherization crews will encounter are crawl spaces and attics.

WHY SHOULD I BE CONCERNED ABOUT CONFINED SPACES?

Entry into confined spaces poses many dangers. Vapors from chemicals or sewage can accumulate quickly in confined spaces. A confined space might also contain a material or moving part that could trap or injure you. Entry into confined spaces may block your view of what else is happening around you.

Lack of natural ventilation makes it easier for toxic or flammable materials to accumulate. Something as simple as rusting metal or the operation of fuel-powered engines (such as a generator) can deplete the existing oxygen supply. Decaying organic materials such as plants or animals can create hydrogen sulfide gas.

Many toxic gases don't have any warning properties (you can't see, smell, or taste the gases), so workers about to enter confined spaces have no way of knowing what hazards they might face without first testing the air. The most common confined-space injuries are asphyxiation from lack of oxygen, being overcome by very high concentrations of toxic vapors, or rapid skin absorption of organic solvents.

Other common confined-space hazards involve explosions or fires. Getting in and out of a confined space can cause injuries and hinder rescue efforts in emergencies.

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

A confined space generally has three distinct properties which set it apart from other areas and dramatically increases the risk of injury or illness:

- Limited ways to get into and out of the space
- Not intended for continuous human occupancy
- Bodily entry is possible and work can be performed

Several steps must be taken to make work safer in confined spaces. Careful advance planning for confined-space entry can help minimize the risk of injury. This advance planning must include the following points:

- Worksite supervisor identifying permit required confined spaces
- Developing written standard operating procedures (SOPs) for entering the space. A confined-space entry SOP minimizes danger by trying to control factors that may cause or contribute to accidents or emergencies through careful monitoring, training, and planning.
- Training workers how to monitor air quality and properly safeguard the space before and during entry.
- Training workers who must enter permit-required confined spaces to deal with emergency events.
- Posting a qualified and trained safety attendant, outside the confined space entrance, who is ready to provide assistance if required.
- Training workers to recognize when the hazards of a confined space have changed and when it's necessary to get out of the space.
- Determine if non-sparking tools should be used in the confined space.
- Having an adequate supply of air-supply respirators (if applicable), protective equipment, and life-saving equipment.
- When entering a permit required confined space, all entrants must wear a harness and lanyard.

The hazards of confined-space entry are further reduced by:

- Monitoring confined spaces before entry and during work for oxygen deficiency and flammable or toxic atmospheres. Monitoring must be conducted throughout the space, not just at the entry point.
- Providing appropriate ventilation before and during work.

Written Program for Permit Required Confined Spaces:

The confined-space entry program must be in writing. The written program is the responsibility of upper management within the company. The initial training of attendant, entrant, supervisor, and rescue workers is detailed, as is the documentation of annual retraining. All procedures to be used during activities related to the entry are included. The program must include a description of procedures to:

- Prevent unauthorized entry
- Identify/evaluate hazards prior to entry
- Provide means/practices for safe entry
- Provide equipment for testing, monitoring, ventilation, communication, PPE, lighting, barring and shielding, safe access/egress, and rescue and emergency
- Evaluate conditions during operations

- Provide at least one safety attendant
- Provide adequate response capability
- Designate roles and responsibilities
- Summon rescue/emergency personnel
- Carry out the permit system
- Coordinate operations if multiple employers are represented
- Provide for conclusion of entry
- Review of operation, program, and how to provide training

QUICK CHECKLIST

Preventative actions to reduce injuries while working in a confined space	Yes	No
Is there a true need to enter the confined space?		
Do you need a permit to enter the space?		
Have all hazards of the space been identified?		
Is the space properly ventilated?		
Has air monitoring within the space been conducted?		
Is there an emergency plan in case someone gets injured while in the space?		
Is there a safety attendant present who will remain outside the space at all times?		

Egress

Fire and emergency exits

WHEN DOES THIS APPLY TO ME?

You will be working in many different buildings where you have never worked before. If an emergency situation, fire, or power failure were to occur, you need to know the location of the exits. It is your supervisor's responsibility to make sure that you know the location of the exits.

WHY SHOULD I FOLLOW THIS PROCEDURE?

During an emergency situation, any number of injuries can occur including slips, trips, and falls, burns, broken bones, smoke inhalation, and death.

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

It is imperative that all workers are familiar with the emergency procedures and exits at each work location. Your supervisor should review the emergency procedures at each work site including means of communication, exit routes, and the location of the safe meeting area.

Exits must be easy to open and clearly marked. The route to the exit cannot be blocked (even temporarily) by debris, equipment, or other materials that would reduce your ability to leave.

In the event of a power failure, turn all electrical equipment to the OFF position to ensure equipment will not restart once power is restored.

QUICK CHECKLIST

Preventative actions to reduce injuries and fatalities from emergency situations	YES	NO
Do you know the locations of the nearest exits in your work area?		
Do you have a means to communicate with other workers if an emergency were to occur?		
Do you know the location of the safe meeting place?		
Are all exit routes clear from debris, equipment, or materials?		

Electrical Safety

Safe work practices

WHEN DOES THIS APPLY TO ME?

In work situations where water and electrical systems may be close to each other, care in electrical safety is required. You will be exposed to electrical power tools, extension cords, outlets, switches, and circuit boards at every worksite during weatherization.

WHY SHOULD I FOLLOW ELECTRICAL SAFETY WORK PRACTICES

Electrocution, electrical burns, or death may occur from the improper use of electrical equipment.



WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

All outlets, switches, and junction boxes should be covered when working in wet areas. Flexible cords must be fastened so that there is no pull on the joints. Any splices must be jointed with suitable devices and properly insulated. Splicing should only be conducted by trained and authorized workers.

When working in wet areas, all electrical equipment must be grounded with a ground fault circuit interrupter (GFCI).

Inspect all cords daily for cuts, frays, or broken prongs. Remove the unit from service if defects are found. Only trained and authorized workers should repair cord defects.

When insulation is installed, a trained and authorized worker should inspect all electrical wiring before installation begins.

QUICK CHECKLIST

Preventative actions to reduce injury from electricity	Yes	No
Are all cords in safe condition (free of cuts and frays)?		
Is cord splicing only conducted by trained and authorized workers?		
Are all power tools grounded when working in wet areas?		
Are all switches, outlets, and circuit breakers covered when working in wet areas?		

Ergonomics

Practicing safe lifting techniques and tool handling

WHEN DOES THIS APPLY TO ME?

Anytime you will be moving materials, the weight, size, and shape of materials to be moved have a direct effect on the strain to your body. Injury can also occur when using the wrong tool for the task (using the end of a screwdriver to drive a nail instead of a hammer).

WHY SHOULD I FOLLOW PROPER LIFTING AND TOOL TECHNIQUES?

By following proper lifting techniques, you can decrease injuries. The following are injuries that can occur from improper lifting:

- Strain to the back, legs, and arms caused by over-reaching and stretching
- Strain to the back caused by twisting positions while lifting or carrying
- Bruises, sprains, and strains from tripping or bumping by carrying stacks that obscure your view
- Slips/Trips/Falls by carrying unstable materials or walking on uneven surfaces

By using the proper tools for the task being performed, you can reduce arm, hand, and shoulder strain. For example, when moving heavy loads, use a lifting or moving device such as a wheel barrel.



WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

Before performing a task, follow this quick checklist:

Preventative actions to reduce injuries from lifting and improper tool usage	YES	NO
Can you handle the weight/shape/size of the object by yourself?		
Can contents or parts shift during transfer?		
Is there someone else to help lift?		
Is there a lifting device or dolly?		
Do you need tools to handle the object?		
Are you using the right tools for the task being performed?		

Proper Lifting Technique:

- Place your feet close to the object, 8 to 12 inches apart for good balance
- Bend your knees to a comfortable degree
- Get a hand hold on the object
- Use your leg and back muscles to lift the load straight up, keeping the load close to your body
- Lift the load to the carrying position, without turning or twisting
- Observe the path you must take, making sure it is clear
- Turn your body with foot position changes
- Set the load down using leg and back muscles by bending your knees
- Release your grip
- When possible, use teamwork to move large and odd-shaped loads. Make sure the load is kept at the same level by all carriers (for example: when carrying carpet, drywall, or plywood).

Use the Proper Equipment:

- Use a ladder; *never* use a chair, boxes or pallets
- Always use a lifting device or dolly if possible

Choose the Right Equipment:

- Make sure tools (e.g., shovels, hammers, pry bars) are in good repair
- The handle length of tool should be appropriate for the job (ensure the handle doesn't dig into the palm of your hand)
- Only use dollies with straps
- Make sure ladders are in good repair and of sufficient height that you do not have to approach the top rung
- Use J-handles when carrying large pieces of drywall

Fire Prevention

Safe work practices

WHEN DOES THIS APPLY TO ME?

Fires or explosions may occur during weatherization work as the result of tasks such as using a cutting torch. Generation of heat or sparks in areas of flammable vapors may cause a fire or explosion. Procedures and precautions should be established and followed prior to this type of work.

WHY SHOULD I BE CONCERNED ABOUT FIRE PREVENTION?

Three elements are needed for a fire to occur: fuel (which could be a flammable liquid, gas, or vapor), oxygen from the air or another source, and heat from a flame or a spark. Once a fire is started, the temperature is determined by the amount of heat produced by the fuel. Some types of fuel burn hotter than others. To put out a fire, you must remove one of the three elements. Flammable and explosive atmospheres develop when reactions occur with oxygen in the air, evaporation of flammables, gas leaks, and dust accumulation.

Fires can also create hidden dangers in the form of chemicals that are given off when products burn. Products such as furniture, pipes, wall coverings, and insulation materials contain chemicals that can give off deadly gases and fumes when burned. For example, polyvinyl chloride (PVC), one of the major ingredients in many plastics, decomposes in a fire to form hydrogen chloride, phosgene, and many other products. In addition to being poisonous, some of these gases also may cause cancer.

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

Constant attention must be given to preventing fires and explosions. Prevention is the responsibility of both the employer and the employee. Standard operating procedures for fire prevention usually include safety rules, equipment maintenance/testing, training, and warning signs. The following are some suggestions on how to prevent fires:

- Maintain adequate supplies of fire extinguishing media appropriate for the hazards
- Making certain that fire extinguishing equipment and supplies are properly positioned

- When using spark-producing tools (cutting torches) always have a fire extinguisher near
- Ensure all workers are trained to use a fire extinguisher
- Conduct routine evacuation and fire response drills
- Conduct frequent walk-through inspections for fire safety purposes
- Inspect fire suppression equipment routinely
- Evacuation routes known to all on-site
- Train workers in hazard recognition
- Handle and store compressed gases properly
- Use non-sparking tools if possible
- Observe no-smoking rules
- For small fires, use a dry chemical or carbon dioxide fire extinguisher. For large fires use water spray, fog, or foam extinguishers.

QUICK CHECKLIST

Preventative measures to avoid fires	Yes	No
Are fire extinguishers located in multiple areas on the worksite?		
Are you trained in the proper use of a fire extinguisher?		
Are all fire extinguishers multiple purpose (rated ABC)?		
Are there any materials in the area that could cause a fire (including chemicals)?		
Is a fire extinguisher available near the use of spark-producing tools?		
Has someone been assigned to perform routine walk-through inspections?		
Are you familiar with emergency evacuation procedures?		

Formaldehyde

Safe Work Practices

WHEN DOES THIS APPLY TO ME?

Formaldehyde may be present in glues used in the production of particle board, plywood, and fiberboard. The glues and adhesives contain urea-formaldehyde (UF). It may also be found in the glues and resins used to install carpeting. Some types of insulation may also contain UF.

WHY SHOULD I BE CONCERNED ABOUT FORMALDEHYDE?

You can be exposed to formaldehyde during weatherization when fumes are emitted from the materials listed above. Formaldehyde exposure can cause irritation to the upper respiratory tract (eyes, nose, and throat). In higher concentrations, you may experience tearing of the eyes, difficulty breathing, burning of the nose and throat, and coughing. It is also suspected to cause nasal and lung cancer.

WHAT CAN I DO TO PREVENT EXPOSURE TO MYSELF AND OTHERS?

Formaldehyde is a colorless, pungent smelling chemical. If you experience any of the symptoms listed in the section above, get to fresh air immediately, alert your coworkers and supervisor, and then seek medical attention.

Before beginning work at a new site, your supervisor should determine whether any new carpet, floor, or wall boards have been installed recently. Your supervisor should also be aware if any of the weatherization material that you will be using contains urea-formaldehyde.

To decrease the levels of formaldehyde, the following steps can be taken:

- Use exterior grade products. These contain phenol instead of urea.
- Use air conditions and humidifiers to maintain temperature levels and to reduce humidity. As temperatures rise, the amount of formaldehyde emitted from the material will increase.
- Only install UF containing materials in well ventilated areas.

QUICK CHECKLIST

Preventative actions to avoid formaldehyde exposure	YES	NO
Has any new carpet, floor, or wall board insulation occurred recently at the worksite?		
Do any of the weatherization materials contain urea-formaldehyde (UF)?		
Are you aware of the symptoms of formaldehyde exposure?		
Is the area or room well ventilated?		

H1N1 Flu

Safe work practices

WHEN DOES THIS APPLY TO ME?

You may be exposed to the H1N1 flu virus during weatherization.

WHY SHOULD I BE CONCERNED ABOUT H1N1?

H1N1 is a contagious disease that is spreading from person to person. It may be spread through coughing or sneezing near people, or touching an object that has the flu virus on it. H1N1 symptoms can range from mild to serious. Symptoms include:

- Fever
- Cough
- Sore Throat
- Runny or Stuffy Nose
- Body Aches
- Headache
- Chills
- Fatigue
- Diarrhea
- Vomiting

Some people who have contracted H1N1 have died due to severe illness.

You may be “high risk” for serious complications if you become sick from H1N1. “High risk” is defined as anyone who is 65 years of age or older, pregnant women, children younger than 5 years old, and people with certain chronic medical conditions (including diabetes, heart disease, asthma, or kidney disease).

If you become ill from H1N1, you can be contagious (or able to spread the virus to others) from the day you got infected until 5-7 days after that.

WHAT CAN I DO TO PREVENT ILLNESS TO MYSELF AND OTHERS?

If you are sick with a fever, do not go to work and stay home for at least 24 hours after the fever is gone. When you cough or sneeze, cover your mouth with a tissue and then throw the tissue away. Wash your hands often with soap and warm water. If hand washing facilities aren’t available, use an alcohol-based rub. Hand sanitizers that do not contain alcohol are not effective against the virus. Do not touch your eyes, nose, or mouth because this is an easy way to spread germs. Avoid close contact with sick people.

If you are sick and have the following symptoms, seek medical care immediately. Inform a family member or coworker so they can transport you to the hospital.

- Difficulty breathing or shortness of breath
- Pain or pressure in the chest or abdomen
- Sudden dizziness
- Confusion
- Severe or persistent vomiting
- Flu-like symptoms improve but return with a fever

QUICK CHECKLIST

Preventative actions to reduce H1N1 exposure	YES	NO
Do you suffer from flu-like symptoms that include a fever?		
Are you going to work with flu-like symptoms?		
Are you covering your cough and/or sneeze with a tissue?		
Are hand-washing facilities or alcohol-based rubs available?		

This information was provided by the Centers for Disease Control and Prevention (<http://www.cdc.gov/h1n1flu/qa.htm>).

Hand and Portable Power Tools

Safe work practices



WHEN DOES THIS APPLY TO ME?

Hand and power tools are commonly used during weatherization to perform many tasks. For example, nail guns and hammers may be used when putting up insulation, anchoring equipment (houses, air conditioning units), or installing drywall. Manual and power saws may be used to cut drywall, plywood, and other materials. Screwdrivers, wrenches, power drills, or a putty knife may also be used for various work tasks.

WHY SHOULD I FOLLOW TOOL SAFE PRACTICES?

Improper use of power tools can result in electrocution, miss-fire, sudden start/stop of the equipment, amputations, and broken bones. Injuries and illnesses such as bruises, broken bones, carpal tunnel syndrome, and trigger finger can occur from the misuse of hand and power tools.

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

The employer is responsible for maintaining the safe condition of tools and equipment used during the weatherization projects. Contact your supervisor if any hand or power tool is defective. Your supervisor should also ensure all workers are trained how to spot defects in the equipment and in the safe operation of powered hand tools.

**NEVER USE A TOOL FOR A JOB IT WASN'T INTENDED FOR!
FOR EXAMPLE: USING A WRENCH AS A HAMMER!**

Electrical Tools:

Check hand-held electrical tools to ensure that each one is equipped with a quick-release to assure that power is shut off automatically as soon as the operator releases the control. All hand-held portable electrical tools must be double-insulated and have a grounded frame; labeling on the unit must verify these design features. Inspect the power tool before use and before it is plugged in. Make sure the cords are

not frayed or cut and the plug is in good working order. Notify your supervisor if any defects were found.

Pneumatically Operated Tools:

If tools are operated pneumatically (air), assure that the unit is secured to the hose to prevent the tool from being disconnected. A tool retainer must be used on tools to prevent the attachment from being expelled. Inspect the tool and air line for cracks, frays, and cuts. Notify your supervisor if any defects were found.

Hand Tools:

Never use hand tools with cracked or broken handles. Never use metal hand tools, such as wrenches or pry-bars, which have bent or cracked handles. Only use hand tools where the handle extends past the palm of your hand. This will prevent undue stress on the hand.

Machine Guarding and Attachments:

Always use appropriate shields, guards, and attachments to tools. For example, portable circular saws must be equipped with guards above and below the base plate or shoe. The lower guard must be operating properly—retracting when the blade is in use and automatically returning to the guard position when the tool is not energized. Nailers, staplers, and other equipment with automatic feed should have a muzzle to prevent the tool from ejecting a piece unless the muzzle is in contact with the work surface.

Jacks used for support must be rated for load, and the rating must be on the unit. Semi-annual inspection for wear and general condition is required. Assure that jacks are properly blocked when necessary to provide a firm foundation.

QUICK CHECKLIST

Preventative actions to avoid injury from hand and power tools	Yes	No
Have you inspected the tool for defects before use? (If defective, notify Supervisor immediately)		
Are all hand-held electrical tools equipped with a quick-release?		
Are all electrical tools grounded and double-insulated?		
Are all electrical tools properly guarded (if applicable)?		
Are you using the right tool for the job?		
Does the handle of the hand tool extend past your palm?		

Heat and Cold Stress

How to protect yourself in extreme weather conditions



WHEN DOES THIS APPLY TO ME?

Temperature puts extra physical stress on the body. Exposure to heat may cause illness, particularly if an employee is not accustomed to working in hot areas. Heat builds up inside protective clothing, particularly when wearing full body suits, so there is a risk of heat stress even if outside temperatures are moderate. Cold stress is less common, but may occur if work is required outdoors in winter months.

WHY SHOULD I BE CONCERNED ABOUT HEAT AND COLD STRESS?

Heat stress is probably one of the most common illnesses at any work site. Regular monitoring and other protective measures are vital. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and individual characteristics. Individuals react to heat in different ways.

Some factors which predispose someone to heat stress include:

- Lack of physical fitness
- Age
- Lack of fluid intake
- Alcohol or drug use
- Sunburn
- Diarrhea
- Infection

Cold stress can occur when workers do not wear enough clothing, or properly cover their feet, ears, and hands.

WHAT CAN I DO TO PREVENT HEAT/COLD STRESS TO MYSELF AND OTHERS?

Heat:

There are several easy ways to help prevent heat stress:

- Frequently drink lots of fluids. Drink one cup of water every 20 minutes rather than drinking a quart every time you feel thirsty.
- Do the most physical tasks in the coolest parts of the day.
- When first beginning to work in a warm environment, start out slowly, doing about 20% of a full work load. Over four days, increase this work load by 20% each day, till you are working at 100% of the workload. This process is called acclimatization, where you train your body to get used to working with the extra heat.
- Wear loose and breathable clothes, such as cotton.
- Take frequent, short breaks in shaded areas.

If the work environment is very hot, there are personal cooling devices, such as cooling vests and bandanas, which could be worn to keep workers from heat-related illnesses.

The following are signs and symptoms of heat stress:

Heat Cramps
Symptoms: Painful muscle spasms
Cause: Profuse sweating and drinking large amounts of water
Treatment: Provide liquids with electrolytes (sodium, potassium) like diluted Gatorade™
Heat Exhaustion
Symptoms: Weakness; fatigue, dizziness; pale, cool, moist skin; heavy sweating; headache; nausea; and fainting
Cause: Reduced blood volume resulting from dehydration from profuse sweating and insufficient replacement of water and salts
Treatment: If worker is conscious, he or she should rest in a cool place. Replace water and electrolytes lost in sweat. If worker is unconscious, get medical help immediately. <i>Do not give liquids if</i>

the person is unconscious.

Heat Stroke

Symptoms: Very dry, hot skin with red, mottled or bluish appearance; convulsions; confusion; unconsciousness; rapidly rising temperature

Cause: Body becomes overheated because the worker does not sweat. Can be fatal.

Treatment: Call for medical help immediately. Move person to a cool place. Remove PPE. Use wet towels or water and fan to cool while waiting for help.

Remember: treatment of heat-related illnesses is very important to worker health, but preventative measures, like those on the previous page, can keep an emergency from happening.

Cold:

Cold temperatures may also be a hazard. In cold environments, make sure all exposed skin is covered especially your ears, hands, and feet. Take frequent breaks in warm areas. If any body part begins to tingle or go numb, get out of the cold immediately. If the body is overexposed to cold, the following problems could occur:

Signs and Symptoms of Cold Stress

Frostbite

Symptoms: Numbness of hands, feet, or face

Cause: Prolonged exposure to cold environments

Treatment: Frostbitten tissue should be gently warmed and not exposed to further cold

Hypothermia

Symptoms: Lowered body temperature, shivering, or drowsiness. If body temperature is reduced to 80°F (or below), unconsciousness is often followed by death

Cause: Wet, cold, exhaustion; body's response to minimize heat loss becomes ineffective when body temperature goes below 86°F.

Signs and Symptoms of Cold Stress
Treatment: Warm the body. Get medical assistance.

QUICK CHECKLIST

Actions to prevent heat and cold stress	Yes	No
Heat: Are you predisposed to heat stress?		
Have you drunk enough fluids to keep hydrated?		
Are you wearing loose, breathable clothing?		
Are you taking frequent breaks throughout the day?		
Are you beginning to feel any signs or symptoms of heat stress?		
Cold: Are all exposed body parts covered?		
Are any body parts beginning to feel tingly or go numb? (if so, get out of the cold!)		
Has your clothing become wet? (If so, move to a warm place and change out of wet clothes)		

Housekeeping

Safe work practices

WHEN DOES THIS APPLY TO ME?

At every weatherization location, following good housekeeping practices will help reduce injuries.

WHY SHOULD I BE CONCERNED ABOUT HOUSEKEEPING?

Injuries from slips, trips, and falls can increase at the worksite when good housekeeping practices are not followed. You could suffer from sprains, bruises, lacerations, or broken bones. You could also suffer injuries, such as amputations and puncture wounds, when machinery is left on when unattended.



Bad Housekeeping Practices

Image used from <http://www.safetycare-safetycare.blogspot.com>

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

A few times a day, you should inspect the work area for anything that could create a hazard to yourself or others. For example, tools left in the middle of the room or cords stretched across a walkway could cause you, or others, to trip.

Follow these simple tips to prevent injury to yourself and others:

- Always keep the work area clean and tidy
- Do not leave tools and other items laying on the floor

- Remove any debris or extra materials from the work area
- Keep all stairways, passageways, and ladders free from debris and extra materials
- Tape down any cords that are stretched across walkways
- Remove or bend over nails that are sticking out of the floor, walls, or other areas
- Turn off, and unplug, any machinery that is not in use
- Keep all materials neatly stacked. Avoid stacking materials too high because they could tip over.
- Store gasoline and other flammable liquids separate from any other chemicals (including caulk and sealant) used at the worksite
- Do not leave liquids, chemicals, caulking, or sealants uncapped. Make sure that caps are secure when not in use.
- If something spills, clean it up immediately if it doesn't create a hazard to you or someone else.
- When ladders are not in use, place them upright against the wall, or lay them parallel to the wall. Do not leave them in the middle of the work area.
- Never throw waste or debris. Carry it to the waste bin.

Never throw away lumber and other materials that can still be used. Ask your supervisor before tossing any scraps into the waste bin.

QUICK CHECKLIST

Preventive actions to reduce injuries from poor housekeeping	Yes	No
Has all debris and extra materials been removed from the work area?		
Did you leave tools or other items laying on the floor when not in use?		
Did you tape down cords that are stretched across walkways?		
Did you bend down or remove protruding nails?		
Are waste bins located in a centralized area?		
Have all unused ladders been stored in a safe manner?		

Other Sources of Indoor Air Pollution

“Sick Building Syndrome”

WHEN DOES THIS APPLY TO ME?

You may be exposed to a variety of indoor air pollutants in the buildings at every worksite during weatherization.

WHY SHOULD I BE CONCERNED ABOUT INDOOR AIR POLLUTION?

If indoor air pollution is wide-spread in a structure, it may be referred to as a “sick building”. Occupants may have a range of reactions to the exposures, and the general phrase used to describe them is “sick building syndrome”. Syndrome refers to group of symptoms that may not fit a specific diagnosis. Depending on the indoor air contaminant, you can experience allergy-like symptoms including headaches, sinus congestion, sore/irritated throat, dry/itchy eyes, and a dry cough. Indoor air pollution may also increase the severity of allergies and asthma.

The following is a list of indoor air pollutants that may cause “sick building syndrome”:

- A buildup of dust and byproducts of heating and cooling systems.
- Cooling odors/fumes released from new carpets and furniture (refer to the formaldehyde section for more information)
- Renovation and construction activities in existing structures often displace dusts and cause odors that are unusual to occupants.
- Traps in drains may dry out, allowing sewer gases into buildings.

WHAT CAN I DO TO PREVENT SYMPTOMS TO MYSELF AND OTHERS?

If you are experiencing any symptoms related to “sick building syndrome” notify your supervisor immediately. Take frequent, short outdoor breaks and do not stay in the building longer than necessary.

QUICK CHECKLIST

Preventative actions to reduce "sick building syndrome"	Yes	No
Are there unusual odors in the building?		
Are you experiencing symptoms related to "sick building syndrome"?		
Are you taking frequent, short outdoor breaks?		
Are you staying in the building longer than necessary?		

Illumination

Proper lighting for the worksite

WHEN DOES THIS APPLY TO ME?

It is important to have proper lighting while performing job tasks during weatherization.



WHY SHOULD I BE CONCERNED ABOUT ILLUMINATION?

Improper lighting (too bright or too dim) can lead to headaches, eye strain, and an increase of injuries due to slips, trips, and falls.

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

Always ensure that you have proper lighting when performing work tasks. Foot candles is a unit of illumination, which is a measurement of light intensity. Illumination can be measured using a foot candle meter. When using the meter, make sure there aren't any shadows being cast onto the meter. At a minimum, work and rest areas must be illuminated to the levels listed in the following table:

Minimum Illumination:

Foot Candles	Area or Operations
3	Excavation and waste areas, access ways, active storage areas, loading platforms, refueling and field maintenance areas
5	General site areas
5	Indoors: warehouses, corridors, hallways
5	Tunnels: shafts and general underground work areas. (Exception: minimum of 10 foot-

Foot Candles	Area or Operations
	candles is required at tunnel and shaft heading during drilling, mucking, and scaling.)
10	General shops: mechanical and electrical equipment rooms, active storerooms, barracks
30	First aid stations, infirmaries, and offices

These values apply while work is in progress only; lower levels may be furnished during non-work hours. The worksite supervisor will determine the illumination level required at each job site.

Always notify your supervisor if you are having trouble performing your work tasks due to improper lighting.

QUICK CHECKLIST

Preventative actions to reduce injuries from poor lighting	Yes	No
Has the worksite been monitored for proper lighting?		
Are there any areas where the lighting needs to be adjusted?		
Are you suffering from headaches or eye strain?		

Isocyanates

Spray-on Foam Insulation



WHEN DOES THIS APPLY TO ME?

You may be using spray-on polyurethane foam insulation during weatherization tasks. Some spray-on foam insulations contain isocyanates, a chemical that can be dangerous to your health.

WHY SHOULD I BE CONCERNED ABOUT ISOCYANATES?

Isocyanates can irritate your eyes, nose, and throat as well as affect the respiratory and gastrointestinal tracts. Exposure can lead to chest tightness, difficulty breathing, nasal congestions, dry or sore throat, cough, and wheezing. Direct skin contact can cause inflammation.

Exposure to isocyanates can also sensitize workers. This means that after you are initially exposed to products containing isocyanates, you may experience severe asthma attacks if you are exposed again.

WHAT CAN I DO TO PREVENT EXPOSURE TO MYSELF AND OTHERS?

Determine whether or not you are using spray-on foam insulation that contains isocyanates. If so, your supervisor may be able to substitute the product for a less hazardous one. Dow® Great Stuff, Tiger Foam®, and Foam It Green® are all products that contain isocyanates.

The following are isocyanates that may be used in spray-on foam insulation:

- MDI: Methylenebis (phenyl isocyanate)
- TDI: Toluene diisocyanate

- HDI: Hexamethylene diisocyanate
- NDI: Naphthalene diisocyanate
- HMDI: Methylene biscyclohexylisocyanate
- IPDI: Isophorone diisocyanate

If you must use spray-on foam insulation that contains isocyanates (or work in a room where insulation is being sprayed), you should wear the following personal protective equipment:

- Encapsulating suit (a suit that covers all exposed body parts)
- A supplied air respirator with at least a half-face piece*
- Goggles
- Head/Face covering

**Remember that all workers who use respiratory protection must be trained and authorized in the safe use of respirators.*

Read the Material Safety Data Sheet (MSDS) before using the product. (Refer to the MSDS section in this workbook for how to understand and read a MSDS). Only work in areas that are well-ventilated. Do not spray the chemical in the direction of yourself or others.

QUICK CHECKLIST

Preventative actions to reduce isocyanate exposure	Yes	No
Does the spray-on insulation contain isocyanates?		
Are you trained in the proper use of the material?		
Have you reviewed the MSDS?		
Are you trained in the use of respiratory protection and PPE while using spray-on insulation?		
Is the room well ventilated?		

Ladders and Scaffolding

Safe ladder use

WHEN DOES THIS APPLY TO ME?

Ladders and scaffolding are commonly found around the work area. You may be using this equipment to perform weatherization work tasks such as installing insulation, removing leaves and debris from gutters, or painting.

WHY SHOULD I FOLLOW THIS PROCEDURE?

The safe use of ladders and scaffolding can prevent injuries (such as broken bones, sprains, bruises, or a concussion) and death from occurring.

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

Improper use of ladders and scaffolding is a major cause of falls. Extra care should be taken when climbing ladders, or working on scaffolding, while wearing PPE due to restriction of motion and visibility.

To prevent accidents when using ladders, the following practices are suggested:

- Inspect ladders to see if they need repair.
- Only use ladders that are in good condition
- Use ladders with non-slip bases
- Place the ladder so that the side rails are on secure footing.
- Use the proper ladder for the job; never use boxes, barrels, or other unstable bases to obtain additional height.
- Use a step ladder tall enough for the job. Do not stand on the top rung!
- If the ladder is 16 feet or longer, ask another worker to hold/support the ladder while you are using it.
- Do not use metal ladders near energized electrical equipment
- Extend extension ladders 3 feet above the level to be reached
- Tie off extension ladders to prevent slippage

- Avoid carrying items in your hands when climbing ladders; use a 'tag' line to convey items up and down
- Never lean out to the side of a ladder past your navel!

If you identify a potential defect in a ladder, inform the supervisor immediately. Ladders must be inspected frequently, tagged if defective, and immediately removed from service.

The following information is taken from the OSHA e-Tool: Ladder Safety.

Loads

Self-supporting (foldout) and non-self-supporting (leaning) portable ladders must be able to support at least four times the maximum intended load, except extra-heavy-duty metal or plastic ladders, which must be able to sustain 3.3 times the maximum intended load.



Angle

- Non-self-supporting ladders, which must lean against a wall or other support, are to be positioned at such an angle that the horizontal distance from the top support to the foot of the ladder is about 1/4 the working length of the ladder.



- In the case of job-made wooden ladders, that angle should equal about 1/8 the working length. This minimizes the strain of the load on ladder joints that may not be as strong as on commercially manufactured ladders.

Rungs

- Ladder rungs, cleats, or steps must be parallel, level, and uniformly spaced when the ladder is in position for use. Rungs must be spaced between 10 and 14 inches apart.



- For extension trestle ladders, the spacing must be 8-18 inches for the base, and 6-12 inches on the extension section.
- Rungs must be so shaped that an employee's foot cannot slide off, and must be skid-resistant.

Slipping

- Ladders are to be kept free of oil, grease, wet paint, and other slipping hazards.

Other Requirements

- Foldout or stepladders must have a metal spreader or locking device to hold the front and back sections in an open position when in use. (See image below.)



- When two or more ladders are used to reach a work area, they must be offset with a landing or platform between the ladders.
- The area around the top and bottom of ladder must be kept clear.
- Ladders must not be tied or fastened together to provide longer sections, unless they are specifically designed for such use. (See image below.)



- Never use a ladder for any purpose other than the one for which it was designed.
- For more information, see also: 29 CFR 1926.1053, Ladders.

QUICK CHECKLIST

Preventative actions to avoid injury from ladder and scaffolding use	Yes	No
Has the ladder been inspected prior to use and all defects found (if any)?		
Have all defected ladders been removed from service?		
Are you using the right sized ladder for the task you are performing?		
Are metal ladders being used around energized electrical equipment?		

Lead

Safe work practices

WHEN DOES THIS APPLY TO ME?

If you are weatherizing a building that was built prior to 1978, you may be exposed to lead-based paint. Lead could also be present in the house dust and outside soil.

WHY SHOULD I BE CONCERNED ABOUT LEAD?

Lead is a toxic metal, and when you are exposed to it, it accumulates in the blood and body. The effects of lead exposure depend on the amount you are exposed to (or concentration), and the duration of time.

In adults, the following symptoms could occur after a short exposure:

- Loss of appetite
- Nausea
- Vomiting
- Stomach cramps
- Constipation
- Fatigue
- Headache
- Joint or muscle aches

The following symptoms could occur after a long-term exposure to lead:

- Nerve disorders
- Memory and Concentration Problems
- High Blood Pressure
- Hypertension
- Reproductive Problems
- Damage to Urinary System

If you are exposed to lead dust, soil, or paint, you may bring it home with you on your clothes or shoes. If you have children at home, and bring home lead on your clothes or shoes, you are exposing your children to lead. Lead is very dangerous to children because it can cause the following:

- Brain Damage
- Nerve disorders
- Behavior & Learning Problems
- Hearing Problems
- Headaches

WHAT CAN I DO TO PREVENT EXPOSURE TO MYSELF AND OTHERS?

Before beginning work at a new site, you should determine if the building was built prior to 1978. If it was, you can assume that it contains lead-based paint. Lead-based paint could be found on window sills, walls, baseboards, and etc. Household dust and outside soil could also be contaminated with the metal from the lead-based paint. You can be exposed to lead during weatherization activities such as sanding, cutting, demolition, or disturbing household dust and outside soil.

You may be exposed to lead when you place your hands or other objects covered with lead dust into your mouth, if you eat paint chips or soil that contains lead, or if you breathe in lead dust during renovations.

Reducing exposure at work:

To reduce exposure, minimize dust in the work area. Ensure that all workers follow good housekeeping practices. Minimize work that may disturb house dust and avoid removing lead-based paint from surfaces. Do not vacuum paint chips/dust unless the vacuum is equipped with a lead-approved HEPA filter. If you must scrape paint, wet it down to minimize dust. Always wash your hands thoroughly with soap and warm water before eating, smoking, drinking, or touching your face.

Reducing exposure at home:

To avoid exposing your children to lead, change your clothes and shoes before entering your home. Wash your work clothes separately from every other member of the households clothing.

Never use compressed air to clean off your clothes!

If the worksite building was built prior to 1978, all contractors must provide the building owners, tenants, or child-care facilities a copy of the Environmental Protection Agency's lead hazard information pamphlet "Renovate Right: Important lead Hazard Information for Families, Child Care Providers, and Schools". This document is available in English and Spanish at <http://www.epa.gov/lead>.

QUICK CHECKLIST

Preventative actions to reduce lead exposure	Yes	No
Was the worksite building built prior to 1978?		
Could any work tasks disturb paint, house dust, or soil?		
Are measures being taken to minimize worker dust exposure?		
Do you understand the effects of lead exposure?		

This information was provided by the Environmental Protection Agency (<http://www.epa.gov/lead>) and the Housing and Urban Development (<http://www.hud.gov/offices/lead/lbp/hudguidelines/index.cfm>)

Lock-out Tag-out Procedures

The control of hazardous energy

WHEN DOES THIS APPLY TO ME?

Mechanical equipment, steam/water valves, and electrical sources must be locked out before maintenance or repair begins. A lock-out includes placing a lock and tag on the equipment's energy isolating device according to the written standard operating procedure (SOP) for that particular machine. The lock-out procedures are used to prevent worker injury during the work task. The equipment is also locked out of operation so that it will not be turned on by someone who is unaware of the work being done on the equipment.

KNOW THE SITE LOCK-OUT PROCEDURES BEFORE ATTEMPTING ANY OPERATION!

Common examples of equipment requiring lock-out include the following:

- Installing and/or removing electrical wiring
- Installing gas safety cut-off valves
- Maintenance of mechanical equipment with moving parts (fans, air handling systems, power saws)

NEVER ASSUME A MACHINE, PIPE, OR ELECTRICAL UNIT IS LOCKED OUT JUST BECAUSE IT SHOULD BE.

WHEN IN DOUBT, LOCK IT OUT!

WHY SHOULD I FOLLOW LOCK-OUT PROCEDURES?

Hazards to worker safety and health include but are not limited to: electrocution, electrical burns, chemical burns, broken bones, lacerations, amputations, or being caught in or crushed by mechanical, pneumatic, or other moving parts.

The risk of electrocution is lessened by locking out an electrical circuit. Locking out a steam or hot water source will prevent burns or accidental contact with the contents of the piping system.

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

- Never attempt to lock-out a machine without the proper training from your supervisor.
- Never attempt to operate or perform maintenance or servicing tasks on a piece of equipment that has been locked out unless you are authorized to do so.
- Never attempt to remove someone else's lock and tag.

The following is the minimum recommended elements of a lock-out procedure:

- Get lock-out approval/permit (lock-out tag).
- The first person to work on a piece of equipment should ensure the primary power source is turned off and install a personal lock with a lock-out clamp. This clamp must be installed to prevent anyone from accidentally turning on the equipment. After applying the clamp and lock, attempt to turn on the equipment to ensure the power source has been disconnected.
- Each person who works on the equipment must go through the steps listed above.
- Each person must remove his or her lock after completing the job and all personnel are out of the danger area. After the last lock and clamp are removed, the warning tag can be removed and the equipment re-energized.
- A lock must be removed only by the person who installed it. Any exceptions are detailed in the standard operating procedure (SOP) and must be included in the site-specific training.
- Critique any problems and revise SOP.
- Annually, review and update SOP if needed.



Lock-out requirements are described in the OSHA Standard: 29 CFR 1910.147, The Control of Hazardous Energy (Lock-Out/Tag-Out).

Example of a Lock-Out Tag

LOCKED OUT

This tag must always be used and completely filled out before it is used.

Do Not Start! Do Not Open! Do Not Close!
Do Not Energize! Do Not Operate!

- 1. Employee name _____
- 2. Date lock placed _____
- 3. Time lock placed _____
- 4. Was starter pushed to determine equipment to be worked on did de-energize? Yes No
- 5. Has the undersigned verified that the correct main breaker has been locked out? Yes No
- 6. Has the equipment been isolated from other energy systems such as hydraulic or pneumatic which could endanger others? Yes No

Comments _____

QUICK CHECKLIST

Preventative actions to reduce injury by controlling hazardous energy	Yes	No
Is everyone involved in the lock-out properly trained?		
Does everyone involved have a lock and clamp?		
Has the energy source(s) been controlled before work begins?		
Is there a written SOP for the lock-out?		

Mold

Safe work practices

WHEN DOES THIS APPLY TO ME?

You may be exposed to mold spores and growth during weatherization. “Mold” is the word often used to describe growth on surfaces after they have become wet with water or sewage.

WHY SHOULD I BE CONCERNED ABOUT MOLD?

Background Information:

Mold can be found anywhere. Surfaces like paper, which easily absorbs moisture, can support mold growth. It can also grow on building materials like wood, insulation, drywall, under porches, behind furniture, or carpet. Mold can grow on food and even furniture. It only needs three things to survive: an organic material to grow on (its food source), oxygen, and water. An organic material is any carbon-based substance. Buildings are full of organic materials, and oxygen is always in the air, so when a building experiences a moisture problem – like a leak in the HVAC system – mold can grow.

Molds create spores in order to reproduce. Once these spores finish developing, they are released from the mold and float through the air until they come to rest on a surface. If spores land on a surface that is both organic and damp, then mold may begin to grow. As mold grows, it slowly destroys the surface that it landed on.



Mold growing on wall

Health Problems:

All molds can potentially cause health problems in humans. However, some molds may be more likely to cause problems than others. Out of thousands of mold and fungi species, less than one hundred are associated with documented health problems in animals and humans. Some people may be allergic to different molds, causing reactions like itchy, watery eyes or even, in severe cases, an asthma attack. Workers may also have headaches, sinus congestion, sore/irritated throat, and a dry cough from mold exposure. Molds can also release mycotoxins – or toxins from molds or fungi – that can cause health problems.

WHAT CAN I DO TO PREVENT MOLD EXPOSURE?

Someone typically suspects mold either because it is visible, there is water damage, or there is an unusual odor. If you suspect there is mold growth on the worksite, do not disturb or try to remove the mold. Notify your supervisor immediately. If it is necessary to work in an area that has mold growth, the use of personal protective equipment (PPE), such as an N-95 respirator, may be necessary. Any worker wearing a respirator must be trained and authorized in the use of respirators.

Some visible signs of mold include:

- Darkened wallboard
- Fuzziness on upholstered surfaces

Signs of water and potential damage include:

- Discolored ceiling tiles
- Standing water

- Condensation between panes of glass
- Condensation on pipes



Condensation on pipes

Odors may also result from molds. These are referred to as “mVOCs” or *mold-related Volatile Organic Compounds*. These may smell like dirty socks or stale, damp spaces.

QUICK CHECKLIST

Preventative actions to reduce mold exposure	Yes	No
Are you trained to identify mold?		
Is there apparent condensation, mold, or water damage?		
Is there a musty, dirty sock, or stale smell in any of the rooms?		
Are you trained and authorized to wear respirators if they are required to work in mold contaminated areas?		
Do you suffer from increased allergy symptoms at the worksite?		

Motor Vehicles

Driving safely on the worksite



WHEN DOES THIS APPLY TO ME?

Automobiles, pick-up trucks, and forklifts may be in used at the worksite to help perform weatherization work tasks. Proper operation will reduce the potential for accidents.

WHY SHOULD I BE CONCERNED ABOUT SAFELY OPERATING VEHICLES?

If a worker drives a motor vehicle without the proper training, property damage and bodily injury may occur.

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

Only trained and qualified workers, authorized by the company, shall operate equipment. Operators who have not previously operated equipment while using PPE should familiarize themselves with the restriction the PPE imposes before operating in close proximity of people or other critical situations. Safety glasses may restrict vision, while bulky clothing and gloves may affect vehicle handling.

General Requirements for Motor Vehicles (off-highway use only):

All vehicles in use should be checked at the beginning of each shift to assure that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use. If any defects are found, notify your supervisor. All defects should be corrected before the vehicle is placed back in service. The following should be included in the vehicle inspection:

- Service brakes (including trailer brake connection and fluid level)
- Parking and emergency stopping system (brakes and hand brake)

- Tires
- Horn and steering mechanism
- Coupling device
- Seat belts
- Operating controls
- Safety devices (back-up alarms, fire extinguisher, mirrors, etc.)
- Lights, reflectors
- Windshield wipers and defroster

When operating vehicles equipped with the Roll Over Protection System (ROPS), workers must wear seat belts for the system to be effective. When leaving a machine, operators should step to the ground instead of jumping from the equipment because of extra hazards due to PPE. Blades, buckets, or other similar devices should be lowered to the ground and the engine shut down before leaving the equipment. Operators must be prepared to shut down and immediately leave the area when signaled to do so. Equipment is to be used only for its intended purpose and must not be overloaded or abused. Equipment must not be used to carry passengers unless it is equipped with seats to do so.

It is important to remember that when people are working in a group:

- A signal person should be designated to provide when-to-move signals to the operator to avoid confusion and unexpected movement.
- All workers in the area of the equipment should remain in view of the operator at all times and out of the “swing area” and path of the equipment, unless the operator knows they are there.

QUICK CHECKLIST

Preventative actions to reduce injuries when driving motor vehicles	Yes	No
Are all motor vehicle drivers trained and authorized?		
Have all motor vehicles been inspected at least daily?		
Are you in the view of the vehicle operator?		
Are you out of the "swing area" and path of the vehicle?		

Material Safety Data Sheets (MSDS)

How to read and interpret them

WHEN DOES THIS APPLY TO ME?

You will be using many different types of caulking, sealants, and cleaning agents during weatherization tasks.

WHY SHOULD I BE CONCERNED ABOUT MSDSs?

Before you use a chemical for the first time, you should read the MSDS to gain knowledge on the hazards, proper use, and personal protective equipment needed.

HOW DO YOU READ A MSDS?

MSDSs are usually broken down into sections: Material Identification, Hazardous Ingredients, Physical and Chemical Properties, Fire and Explosion Data, Health Hazard Data, Reactivity Data, Precautions for Safety Handling and Use, and Special Precautions. The following information will help you understand how to read a MSDS.

Section I: Material Identification

Manufacturer's Name ACME Company	Emergency Telephone No. (311) 555-0100
Address 8501 Sutherland Drive, Anywhere, USA 99999	
Chemical Name and Synonyms Does not apply.	Trade Name and Synonyms Remover & Thinner
Chemical Family Remover & Thinner	Formula Does not apply

Section I identifies the product and manufacturer or supplier. The name of the product that appears in this section must be exactly the same as the name on the container label. The manufacturer's name, address, and phone number are also listed. If

more than one name is used for a specific chemical, both names should be listed. Chemical formulas and the NFPA fire diamond showing degrees of hazard may be listed for quick identification but are not required. Finally, the date of the preparation must be indicated. This date is important because MSDSs prepared before November 25, 1985, when the new requirements went into effect, may not be in full compliance with the law; also, the date will help determine whether the most recent revision is available at the site.

Section II: Hazardous Ingredients

Paints, Solvents, & Preservatives	CAS Registry No.	Percent	TLV (Units)
Solvents: Denatured Alcohol	64-17-5	80	1,000 ppm
Solvents: Butyl Acetate	123-86-4	20	150 ppm

Any chemical comprising 1% or more of the product (or 0.1% if it is a carcinogen) and known to have hazardous properties must be listed in this section. Next to each hazardous ingredient, the MSDS preparer must list the OSHA Permissible Exposure Limit (PEL), which is the amount to which a worker can be legally exposed. The PEL may be listed in parts per million (ppm) or in milligrams per cubic meter (mg/m³). Legal limits have been set for only about 500 substances, so the ingredient you encounter may not have an OSHA PEL.

The Chemical Abstracts Service (CAS) registry number is a specific number for each chemical. One six-digit number is assigned to each chemical.

Another organization which recommends exposure limits is the National Institute for Occupational Safety and Health (NIOSH). NIOSH limits tend to be the lowest and should be listed if one has been set. The manufacturer may also list its own recommended limit. In general, the lower the exposure limit (PEL or TLV), the more hazardous the substance is. You may see the notation "skin" after a PEL or TLV. This notation indicates that the chemical can be easily absorbed into the body through the skin.

Percentages of ingredients may be listed but are not required by law, which makes it difficult to determine if all ingredients have been listed. It is also more difficult to evaluate the hazards of the chemical without percentages. For this reason, the employer should request percentage information from the chemical supplier.

Finally, trade secret claims have to be identified on the MSDS for any hazardous ingredients for which information is being withheld. These claims are usually indicated by the phrase "Proprietary Information," "Confidential," or something similar.

Section III: Physical and Chemical Characteristics

Boiling Point (°F) 165°F	Specific Gravity .824 at 25°C
Vapor Pressure 43.2 mmHg 20°C	Percent, Volatile by Volume (%) 99
Vapor Density Heavier than air	Evaporation Rate (=) (Butyl Acetate = 1) Faster than Butyl Acetate
Solubility in Water Slightly	Appearance and Odor Colorless, Mild Odor

This section tells you whether the material is a solid, liquid, vapor, or gas. The description listed here should match the appearance of the material you are using.

The percent volatile is an indication of how much could evaporate into the air; the value is given in percent of the volume. For example, a container of degreaser would have a value of 100%. The value for a paint product might be 40%.

Evaporation rate indicates how fast the material will evaporate compared with a reference compound such as butyl acetate. If the rate is less than 1, the material evaporates less rapidly.

The appearance and odor may help you to identify what you are working with. Remember that the odor or smell is a poor measure of the concentration of the substance in the air. Although the nose can detect the presence of some chemicals, many substances can reach hazardous levels with no noticeable odor. Some people have a poor sense of smell. Also, you may lose your ability to smell a particular substance over a period of time due to the nerve endings in the nose blocking out the odor (olfactory fatigue).

Section IV: Fire and Explosion Data

Flash Point: 61°F (0C)
Explosive Limits 1.8-19%
Extinguishing Media Carbon Dioxide, Regular Foam, Dry Chemical
Special Firefighting Procedures Wear self-contained breathing apparatus in enclosed areas.
Unusual Fire and Explosion Hazards Vapors are heavier than air and may travel along the ground or be moved by ventilation and ignited by sparks, flame, and other ignition sources.

Section IV provides information on how to prevent and fight fires and explosions. This section will also list the type of fire extinguisher which should be used and whether special protective equipment is needed for fighting fires. This information on the MSDS may be inadequate to respond to emergency situations because of the number of chemicals that may be involved.

Under state Right-to-Know laws and the new federal Community Right-to-Know law, firefighters have the right to review workplace chemical inventories and MSDSs and to inspect the workplace in order to plan for and prevent fires and explosions.

Section V: Health Hazards

Threshold Limit Value 840 ppm (estimated)
Effects of Overexposure Irritation of nose and throat, redness and irritation of eyes. Excessive breathing of vapors can cause nausea and respiratory irritation.
Emergency and First Aid Procedures If swallowed, call physician. Flush eye; contact with water. If exposed to excessive vapors, remove to fresh air.

This section should list any harmful effects that may be caused by the chemicals listed in the Hazardous Ingredients section. The health hazards may be acute (short-term) or chronic (long-term).

In addition to listing the health hazards, the MSDS must also detail the routes of entry, signs and symptoms of exposure, medical conditions aggravated by exposures, and emergency and First Aid procedures.

Section VI: Reactivity Data

<p>Stability</p> <p>Unstable X Stable</p>
<p>Conditions to Avoid</p> <p>None</p>
<p>Incompatibility</p> <p>Strong oxidizing agents</p>
<p>Hazardous Decomposition Products</p> <p>Carbon Monoxide or Carbon Dioxide</p>
<p>Hazardous Polymerization</p> <p>Will Occur May Occur X Will Not Occur</p>
<p>Conditions to Avoid</p> <p>None</p>

Section VI provides information on conditions that could cause the product to react dangerously or decompose and release dangerous materials. A complete MSDS will tell you whether the substance is likely to break down or react with other substances, what conditions are likely to cause the substance to change its composition, and what new hazards might result. This information can be very valuable if a substance makes contact with heated surfaces or is mixed with other chemicals. This information usually pertains to immediate reactions.

Section VII: Precautions for Safe Handling and Use

<p>Steps to be Taken in Case Material is Released or Spilled</p> <p>Clean up in normal manner for flammables. Absorb in absorbent material.</p>
<p>Waste Disposal Methods</p> <p>No waste normally. Incinerate or normal disposal for flammables, in accordance with local, state and federal regulations.</p>

This section will explain what steps to take in the event of a release or spill, how to dispose of waste material, what precautions to take in handling and storing the material, and any other precautionary measures that might be appropriate. In this section many MSDSs will simply contain the warning “Avoid breathing gases and vapors.” This section should provide information on whether to evacuate, what type of emergency respirators to have on hand, and how to clean up large and small spills.

Section VIII: Control Measures

<p>Respiratory Protection (Specify type)</p> <p>None needed under normal usage</p>							
<p>Ventilation</p> <table border="0"> <tr> <td>Local: Ordinary</td> <td>Mechanical: Acceptable</td> <td>Special: None</td> <td>Other: None</td> </tr> </table>				Local: Ordinary	Mechanical: Acceptable	Special: None	Other: None
Local: Ordinary	Mechanical: Acceptable	Special: None	Other: None				
<p>Protective Gloves</p> <p>None needed with normal use</p>							
<p>Eye Protection</p> <p>None needed under normal conditions</p>							
<p>Other Protective Equipment</p> <p>None needed</p>							

Section VIII will generally describe only the minimum measures that are necessary to reduce exposures to hazardous substances. First, it must indicate the type of ventilation that can adequately remove air contaminants. Mechanical or general ventilation means a fan or other source of fresh air which dilutes the contaminated air.

Local exhaust ventilation refers to systems which capture hazardous chemicals at the source of contamination.

This section should also list the specific respiratory protection that is required. The MSDS must also list the specific protective glove that is required. As with respirators, the type of glove necessary depends on the substance and the manner in which it is being used. The MSDS should specify the appropriate material (viton, rubber, polyvinyl alcohol, etc.) to use with the product. Section VIII will also list eye protection and other protective clothing or equipment which should be used.

Section IX: Special Precautions

Precautions to be Taken in Handling and Storing
Keep away from heat and flame. Use with adequate ventilation
Other Precautions
None

Special precautions are noted in this section. Handling and storage precautions might indicate incompatible chemicals or specific storage containers. Section IX may also give a shelf-life warning or discuss the materials' potential to react.

Limitations of MSDSs

Although MSDSs contain important information, there are a number of limitations to their use during an emergency. Some of these limitations are listed below.

- Limited information
- The information may be incomplete or inaccurate
- Space on the form may be inadequate
- Not immediately available
- MSDS may not be located at the weatherization site

QUICK CHECKLIST

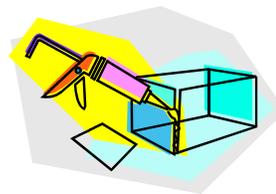
Material Safety Data Sheets	Yes	No
Do you know how to read and understand a MSDS?		
Are MSDSs available on-site for all chemicals used?		
Do you know what to do in an emergency (for example: if someone gets a chemical in their eyes)?		
Do you know what to do if a chemical spill occurs?		

Polychlorinated Biphenyls (PCBs)

Safe work practices

WHEN DOES THIS APPLY TO ME?

When you are weatherizing a building that was built prior to 1978, you may encounter construction materials that contain PCBs.



WHY SHOULD I BE CONCERNED ABOUT PCBs?

PCBs are a mixture of chlorinated compounds. Research has indicated that PCBs cause cancer in animals and is a probable human carcinogen. Human and animal research has shown that PCB exposure can cause problems to the immune, reproductive, nervous, and endocrine system. Skin exposure can cause an acne-like skin condition.

PCBs can be found in electrical transformers and capacitors. It was banned in caulking and sealing materials after 1977. However, if you are weatherizing a building that was built or reconstructed before 1978, PCBs may be present in caulking and sealing materials. You may be exposed to PCBs during renovation by inhaling or ingesting dust contaminated with PCBs.

WHAT CAN I DO TO PREVENT EXPOSURE TO MYSELF AND OTHERS?

Before beginning weatherization tasks, determine if the building was built prior to 1978. If so, it should be assumed that the caulking and sealant contains PCBs.

Avoid removing caulking and sealant with any tools that could generate dust (such as power tools). Before removing caulking or sealant, wet it down to minimize dust exposure. At a minimum, wear safety glasses and gloves.

Always wash your hands before eating, drinking, smoking, or touching your face.

QUICK CHECKLIST

Preventative actions to reduce PCB exposure	Yes	No
Was the building built prior to 1978?		
Do you understand the hazards of PCB exposure?		
Are power tools being used to remove caulking or sealant?		
Are you taking precautions to avoid creating dust?		
Are you wearing the minimum PPE when handling caulking or sealant that was installed prior to 1978?		

The above information was provided by the article: "An Unrecognized Source of PCB Contamination in Schools and Other Buildings" by Robert F. Herrick.

(<http://www.pubmedcentral.nih.gov/picrender.fcgi?artid=1247375&blobtype=pdf>)

Worksite Pests

Safe work practices

WHEN DOES THIS APPLY TO ME?

At any weatherization worksite, you may encounter biting or stinging insects, snakes, rodents, and other nuisance animals.



WHY SHOULD I BE CONCERNED ABOUT PESTS?

Animals such as rats and raccoons can spread diseases like Rabies and Rat Bite Fever. If you were bitten by a tick, you could get Rocky Mountain Spotted Fever or Lyme disease. Bites and scratches can occur when encountering cats and dogs. Workers allergic to biting and stinging insects (wasps, ants, bees, and spiders) may need immediate medical attention.

WHAT CAN I DO TO PREVENT INJURY/DISEASE TO MYSELF AND OTHERS?

Before entering any worksite, ensure all pets are put-up and secured. Building occupants may own a variety of animals including cats, dogs, snakes, lizards, and hamsters. It is important that all of these animals are secured to prevent worker injury.

When exposure to insects, spiders, or ticks can occur, wear long pants, socks, and long-sleeved shirts for protection. You may also use insect repellents. If you or a coworker is bit or stung, treat with over-the-counter products such as Benadryl® and anti-itch creams. If a serious reaction occurs after a bite or sting (chest pain, nausea, sweating, loss of breath, serious swelling, or slurred speech) seek medical attention immediately.

Avoid entering buildings that are rodent-infested. If you must enter the building to conduct work tasks, wear a dust mask, gloves and wash your hands frequently. If you are bitten or scratched by a rodent, wild, or stray animal, seek medical attention immediately. Remove dead animals from the worksite as soon as possible with a shovel and gloved hands.

For protection from snakes, wear heavy gloves and work boots at least 10 inches high when working outside. Watch where you place your hands and feet when moving debris. Snakes may be hiding on fallen trees, limbs, or other debris, so don't place your fingers under debris when moving it. If bitten by a snake, try to pay attention to the color and shape of the snake's head. This will help medical personnel identify what kind of snake you were bit by and the type of treatment you need. If a worker is bitten, keep the victim still and calm to slow the spread of the venom. Do not attempt to cut the wound or suck out the venom. Cover the bite with a clean, dry dressing and seek medical attention.

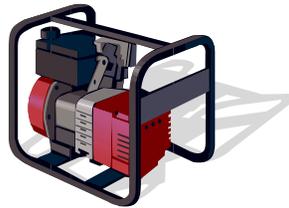
QUICK CHECKLIST

Preventative action to reduce injury and disease from pests	Yes	No
Do building occupants own pets? If so, are they put up and secure?		
Is the building infested with rodents?		
Is there a lot of debris outside the building?		
Are all workers aware of the diseases and injuries pests can cause?		
Are all workers wearing long pants, work boots, heavy gloves, and long-sleeved shirts when working outside?		

This information was provided by the Occupational Safety and Health Administration's (OSHA) Rodents, Snakes, and Insects Quick Card (http://www.osha.gov/Publications/rodents_snakes_insects.html).

Portable Generators

Safe Work Practices



WHEN DOES THIS APPLY TO ME?

Portable generators may be used during weatherization activities to provide electricity for power tools or lights.

WHY SHOULD I BE CONCERNED ABOUT GENERATORS?

- Workers can be shocked or electrocuted from improper use of the power generated.
- Generators emit carbon monoxide, which is an odorless and tasteless gas. Carbon monoxide exposure can cause headaches, fatigue, nausea, and even death.
- Fires can start from improperly refueling a generator or inappropriately storing the fuel used for the generator.
- Portable generators also cause noise and vibration hazards. Loud, excessive noise can lead to temporary or permanent hearing loss.

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

To avoid shock or electrocution:

- Never attach a generator directly to the electrical system of a structure
- Always plug electrical appliances directly into the generator using the manufacturer's supplied cords or extension cords that are grounded (3-pronged)
- Inspect all cords before plugging them into the generator. Cords should be free of any damage, cuts, or frays.
- Ensure cords are appropriately rated in watts or amps for the intended use.

- Do not overload a generator. This can lead to overheating and create a fire hazard.
- Always use ground fault circuit interrupters (GFCIs) on all electrical equipment, especially those used in or around wet or damp locations.
- Make sure the generator is properly grounded and the grounding connections are tight.
- Keep the generator dry. Do not use the generator in wet or rainy conditions.

To avoid carbon monoxide poisoning:

- Never use a generator indoors or in enclosed spaces such as garages, basements, and crawl spaces.
- Make sure the generator has 3-4 feet of clear space on all sides and above it to ensure adequate ventilation.
- Do not use generators outdoors if it is placed near windows, doors, or air ducts, which could allow carbon monoxide to enter the building.
- If you feel dizzy, nauseous, tired, or get a headache while using a generator, get to fresh air immediately. Notify your coworkers and supervisor and then seek medical attention.

To avoid fire hazards:

- Generators become hot while running and remain hot for long periods of time after they have stopped. Fuel (gasoline, diesel, etc.) can ignite when spilled on hot engine parts.
- Before refueling, shut down the generator and allow it to cool.
- Only store and transport gasoline and other generator fuels in approved containers that are properly designed and marked for their contents, as well as ventilated.
- Keep fuel containers away from flame producing and heat generating devices. Do not smoke around fuel containers.

If gasoline or any other generator fuel spills on your bare skin, wash with soap and water immediately. These fuels can irritate the skin, mucous membrane, and eyes, as well as cause nausea, fatigue, headaches, vomiting, diarrhea, and dizziness.

To avoid excessive noise and vibrations:

- Wear hearing protection while around portable generators.
- Place portable generators as far away as possible from work areas and employee gathering spaces.

QUICK CHECKLIST

Preventative actions to avoid injury from portable generators	Yes	No
Are you properly trained in the safe use of portable generators?		
Have all cords been inspected before plugging them into the generator?		
Is all electrical equipment equipped with a GFCI?		
Is the generator in an open, well-ventilated area?		
Is the generator as far away from workers as possible?		
Are generator fuels stored in appropriate and marked containers?		
Do you wear hearing protection while working near the generator?		

The following information is provided by the Occupational Safety and Health Administration's OSHA Fact Sheet for Using Portable Generators Safely

(http://www.osha.gov/OshDoc/data_Hurricane_Facts/portable_generator_safety.pdf)

Radon

A silent hazard

WHEN DOES THIS APPLY TO ME?

Radon can be present at any worksite in the outdoor and indoor air.

WHY SHOULD I BE CONCERNED ABOUT RADON?

Radon occurs from the natural decay of uranium in the soil and water, making the gas a form of ionizing radiation. Exposure to radon can cause lung cancer. According to the Environmental Protection Agency (EPA), long-term radon exposure is the #1 cause of lung cancer among non-smokers and the 2nd overall leading cause of lung cancer (after smoking) in the United States. Smoking, in conjunction with radon exposure, raises your risk of getting lung cancer.

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

Radon can be found in any building. It generally enters a building through cracks in the foundation or walls, or gaps around piping and then circulates throughout the building via the air handling system. The level of radon in the air can only be tested using a radon test kit. The EPA advises that air levels should be no higher than 4 pCi/L (picocuries per liter) and action should be taken when levels are between 2-4 pCi/L. Kits may be available for free at local health departments. However, the shortest test available requires 2 days. For how to obtain radon kits in your state, visit: <http://www.epa.gov/radon/whereyoulive.html>.

To protect yourself on the worksite, make sure all areas of the worksite are well ventilated. Open windows or turn on fans if possible for ventilation purposes.

Radon levels can also be lowered by using polyurethane caulk to seal all openings, cracks, and crevices in the foundation of the building. You can also install a vent fan in the attic. If these techniques do not reduce the level of radon, consult a professional radon contractor by contacting your state radon office at the link listed in the paragraph above.

QUICK CHECKLIST

Preventative actions to reduce exposure to radon	Yes	No
Has the worksite building ever been tested for radon?		
Are there apparent cracks and crevices in the foundation?		
Is there a means of ventilating the area?		

This information was provided by the Environmental Protection Agency's (EPA) website at <http://www.epa.gov/radon>.

Sanitation at Temporary Worksites

Importance of clean drinking water and toilet facilities

WHEN DOES THIS APPLY TO ME?

It is important to provide proper sanitation, including drinking water and toilet facilities, at every weatherization worksite.

WHY SHOULD I BE CONCERNED ABOUT SANITATION?

Clean drinking water and toilet facilities will reduce the incidence of illnesses from bacteria such as E. coli, salmonella, and listeria.

WHAT CAN I DO TO PREVENT ILLNESS?

Water

An adequate supply of drinking (potable) water must be provided at the site. If portable containers are used to dispense drinking water, they must be tightly closed and equipped with a tap; it is not permissible to dip from a common container. The container must be clearly marked and never used for another purpose. If single-use cups are supplied, they must be kept sanitary prior to use and disposed of in a provided trash can.

Maintaining an ample drinking water supply is extremely important in warm weather to help prevent heat stress. If the supply of potable water is low, contact the worksite supervisor immediately. Supervisors may also appoint a worker to maintain the drinking water supply.

If water unfit for drinking (non-potable) is available at the site for firefighting or other purposes, the water lines and hose connections must be clearly marked to indicate that it not to be used for drinking, washing, or cooking. Systems shall be designed to prevent any potential cross-connection with a potable source.

Toilet Facilities

Toilet facilities with doors and inside locks must be provided for workers, unless workers are part of a mobile work crew having transportation available to nearby toilets. Work sites without sewers must be provided with chemical, re-circulating, combustion, or flush toilets, unless they are prohibited by local codes. At least one toilet facility must be

available at temporary field conditions. For other work sites, a minimum of one facility should be available for 20 or fewer employees, one toilet seat and one urinal per 40 employees for 20–200 employees, and one toilet seat and one urinal per 50 employees for more than 200 employees.

Hand washing facilities should also be available at each worksite. This should include running water and anti-bacterial soap. If this isn't feasible, hand sanitizer should be available near the toilet facilities.

If workers will be using chemicals, lubricants, oils, and etc, an eye wash station should be available to allow the worker to rinse out the eye(s) before medical attention is sought. Portable eye wash stations can be bought, or workers can use lukewarm potable water to flush out their eyes.

QUICK CHECKLIST

Preventative actions to reduce illness at temporary worksites	Yes	No
Does the worksite have an adequate supply of drinking water?		
Has a Supervisor appointed a worker to maintain the supply of drinking water?		
Are there enough toilet facilities?		
Are hand washing facilities (or hand sanitizer) available?		
Is there an eye wash station on site?		

Crystalline Silica

An inhalation hazard

WHEN DOES THIS APPLY TO ME?

You may be exposed to crystalline silica while performing weatherization work tasks.

WHY SHOULD I BE CONCERNED ABOUT CRYSTALLINE SILICA?

Crystalline silica is present in small amounts in gypsum board. It can be found in larger amounts in spackle. Crystalline silica is a natural part of the soil and quartz is the most commonly used type.

You may be exposed to silica when sanding, cutting, buffing, or breaking gypsum board or spackle because of the dust generated.



Image from <http://www.cdc.gov/niosh/topics/silica>

Crystalline silica has been identified as a human lung carcinogen. If you have a significant exposure to silica dust, it can result in silicosis (a disabling, even fatal lung disease). When silica enters the lungs, it causes the formation of scar tissue, which reduces the lung's ability to take in oxygen. Silicosis does not have a cure. Once scar tissue begins to form on your lungs, you will be more susceptible to other lung disease such as tuberculosis. In addition, cigarette smoking damages the lungs, and just adds to the damage caused when breathing in silica.

Symptoms of silica exposure:

Chronic/classic silicosis: occurs after 15-20 years of moderate to low exposure. Sometimes symptoms with chronic silica exposure are not obvious. When

symptoms aren't obvious, only a chest x-ray can determine if there is any lung damage.

- Shortness of breath upon exercising
- Fatigue
- Chest pain
- Respiratory failure

Accelerated silicosis: occurs after 5-10 years of high silica exposure.

- Severe shortness of breath
- Weakness
- Weight loss

Acute silicosis: occurs after a few months or as long as 2 years following exposure to extremely high concentrations.

- Severe disabling shortness of breath
- Weakness
- Weight loss
- Death

WHAT CAN I DO TO PREVENT EXPOSURE TO MYSELF AND OTHERS?

Your supervisor should be aware if you are using spackle that contains crystalline silica. For example, it can be found in DAP Spackle with Drydex® and UGL Cerfex Spackling Compound®. You can determine if the spackle you are using contains crystalline silica by reading the Material Safety Data Sheet (MSDS) (Refer to the MSDS section in this notebook for information on how to read and understand MSDSs). You should also assume that all gypsum board contains silica.

If you are currently using materials that contain silica, your supervisor may be able to substitute them for a safer material. If you are going to be exposed to silica, follow these steps:

- Provide engineering controls where feasible by using local exhaust ventilation.
- Wet down the gypsum board or spackle before cutting, breaking, sanding, etc to reduce dust exposure.
- Wear a N-95 respirator if silica dust is generated. Wear a Type CE abrasive-blast supplied air-respirator if you will be abrasive blasting. You must be trained and authorized in respiratory protection before using any masks.
- Wear disposable work clothes (such as a Tyvek® suit)

- Participate in training and health screening program to monitor any adverse health effects from exposure
- Be aware of any operations that could create silica exposures
- Do not eat, drink, smoke, or touch your face or mouth in areas where silica dust is present. Wash your hands and face before performing any of these activities

QUICK CHECKLIST

Preventative actions to reduce exposure to crystalline silica	Yes	No
Are you trained in the hazards of silica exposure?		
Are you using any materials that contain silica?		
Are you trained and authorized in respiratory protection use?		
Are you participating in training and health screening programs?		

Struck-by Hazards

Safe work practices



WHEN DOES THIS APPLY TO ME?

There are many struck-by hazards that you may encounter at every weatherization work site, including vehicles, materials being carried by others and window sashes with broken cords or cords that break when you try to work on the casing.

WHY SHOULD I BE CONCERNED ABOUT STRUCK-BY HAZARDS?

Many injuries can occur if you are struck-by a vehicle or other objects including bruises, broken bones, lacerations, concussion, amputations, and death. Injuries can occur from falling objects, power tool misfires, and air compressors.

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

To prevent injuries from vehicles:

- Remain in view of the vehicle operator at all times
- Make sure all personnel are in the clear before using dumping or lifting devices
- Lower all vehicle blades, buckets, etc when not in use
- Listen for vehicle back-up lights and horns

To prevent injuries from falling or flying objects:

- Wear a hard hat at all times
- Follow good housekeeping procedures by keeping the work area free of debris and all materials stacked to prevent sliding, falling, or collapse.

- Wear safety glasses when using or near power tools such as saws and nail guns
- Never stand or walk under scaffolding
- Secure all tools when performing overhead work on ladders or scaffolding
- Use a debris net , or equivalent, when working on scaffolding
- Never clean clothing with compressed air

QUICK CHECKLIST

Preventative actions to reduce struck-by hazards	Yes	No
Are all horns and lights functional on all vehicles?		
Are all buckets and blades lowered on industrial vehicles when not in use?		
Are you and all employees wearing a hardhat?		
Are you and all employees following good housekeeping practices?		
Have you determined if the windows have rope cords?		
Are all tools secured when working on elevated platforms or ladders?		
Is a debris net, or equivalent, used underneath scaffolding?		

Walking and Working Surfaces

Hazards and solutions

WHEN DOES THIS APPLY TO ME?

You will encounter many different types of walking and working surfaces in the buildings you are weatherizing. Some surfaces may be in poor condition, such as wobbly steps, holes in porch flooring or loose linoleum squares.

WHY SHOULD I FOLLOW THIS PROCEDURE?

Many hazards can be found on walking and working surfaces. You should be able to identify these hazards to decrease the likelihood of getting injured. Surface hazards can increase the chance for a slip, trip, or fall causing bruises, sprains, strains, and broken bones. Surfaces can be hazardous during any of the following situations:

- Wet floor
- Grease/Paint/Solvent spill
- Loose flooring or carpeting
- Electrical cords running across walking/working area
- Environmental conditions such as sleet or ice

Other conditions you should be aware of:

- Any changes in the grade of the surface
- Example: an inclining driveway or sidewalk
- Changes in the walking surface
- Example: from linoleum in a hallway to subflooring in a room where the carpet has been removed
- Sharp edges, nails, or staples during rip-outs
- Example: carpet staples, broken drywall

WHAT CAN I DO TO PREVENT INJURY TO MYSELF AND OTHERS?

- Always take extreme caution when walking on wet/slippery surfaces. Wear footwear with slip-resistance tread. If possible, clean up any spill immediately

after it occurs. If the spill is a hazardous chemical, notify your supervisor so proper clean-up procedures can be followed.

- Keep all walkways clear of debris and equipment. Remove all protruding nails or staples. Always tape down any electrical cords that run across, or through, a walkway.
- During cold weather, when environmental conditions could be harsh, salt or sand should be supplied to provide traction in snow and ice.

QUICK CHECKLIST

Preventative actions to reduce injuries from walking and working surfaces	Yes	No
Are there any changes in the walking surface (grade, type of flooring) that could cause an injury to occur?		
Have you checked for areas that should be avoided or need to have a repair before you travel across the surface?		
Are all spills cleaned up after they occur?		
Are electrical cords taped down?		
Is salt/sand provided for traction in cold weather?		

Health and Safety Plan

INTRODUCTION

The primary goal of weatherization work is to increase energy efficiency; this must be done safely to assure that those doing the work and residents are not harmed as a result.

A health and safety plan is required and must include five parts:

1. Grantee health and safety.
2. Crew and Contractor health and safety.
3. Client health and safety.
4. Potential Hazard Considerations.
5. Deferral statements (when/how decision will be made to put off the work to another time).

Some details of each section are provided here:

- Grantee health and safety
This section applies to the group that gets Department of Energy funds for the program through the state.
- Crew and Contractor health and safety.
The contractor must comply with requirements of the Occupational Safety and Health Administration (OSHA). These rules may be enforced by the US government or State government, depending on where the work is done.

Information in this notebook is a resource for you to assure your health and safety.

- Client health and safety.
Program auditors and contractors generally conduct an evaluation to assure that work will not harm the residents before starting a job. If you have concerns as the work progresses, alert your supervisor immediately.
- Potential Hazard Considerations.
Special attention is required for a number of hazards. Most are considered by the Agency or its auditors. If you have questions or identify a problem, see the supervisor.
- Biologicals - mold may be discovered. Tell your supervisor immediately if you believe mold is present.

- Combustion Appliances and Gas - all appliances must be tested. Work will be delayed if a carbon monoxide hazard is found.
- Fire Hazards are evaluated by the energy auditor.
- Occupant Health Problems may affect work. This is evaluated at the initial visit by an auditor.
- Indoor Air Quality: work to remove asbestos on heating systems requires special training. Do not remove or clean up asbestos if you are not trained to do so, and have the proper protective equipment.
- Radon - record of radon problem in a home will be identified by the agency.
- Formaldehyde and VOCs - these chemicals may get into the air from carpet, plywood and insulation.
- Lead may be in paint on building surfaces, especially if constructed before 1978. The agency overseeing weatherization must assure that the work is done in ways that prevent dust being created, spread around, inhaled or ingested in food, drinks or cosmetics brought into the work area. Personal hygiene is also very important to reduce exposure and spread of lead dust outside the work area. Special work practices are used if lead paint is present or suspected.
- Building Structure - others will inspect the building and determine if it is safe to work in.
- Electrical - auditors will determine if the electrical system can accommodate a new load.
- Refrigerants - the agency and contractor must comply with refrigerant disposal.
- Deferral Standards.
Decisions to delay work will be made by the Agency, based on guidelines.

Plans differ from State to State and from Agency to Agency but each must address these five overall areas. Your contractor will have specific information for your work activities.

Respiratory Protection

During some weatherization activities, respirators may be needed. You will learn about the requirements related to the use of respirators.

RESPIRATORY PROTECTION

Two basic types of respiratory protection are:

- **Air-Purifying Respirator (APR)**, which protects against toxic dusts, gases, and vapors by filtering the air before it enters the lungs.
- **Atmosphere-Supplying Respirator (ASR)**, which provides “breathing air from a source independent of the ambient atmosphere.” ASRs include supplied-air respirators (SAR) and self-contained breathing apparatus (SCBA).

In weatherization projects, it is most likely that you will be using an APR particulate respirator such as:

- Single-use respirators
- Half-mask respirators
- Full-face respirators

APRs are used to protect against specific dusts, mold spores, and toxic chemicals. They work by filtering air before it is inhaled. If APRs are used, all toxic substances must be identified, and the concentration must be known and remain constant, verified by monitoring, and the filter must be selected to protect against those specific exposures. Molds can be identified by taking samples and sending them off to a lab for analysis.

Single use respirators consist of a filter and two straps to hold it in place. APRs that are half-mask or full-face consist of a facepiece with an exhalation valve and one or two filtering cartridges through which the air enters. For weatherization projects, you will need to ensure that you use a cartridge with a HEPA filter when dust exposure is possible.

Vapor and gas exposures require chemical-specific cartridges for the APR and may be used with a dust cartridge.

All respirators should be marked “NIOSH Approved” on the container. Do not use a respirator of any type that has not been approved by NIOSH.

SINGLE USE RESPIRATORS

A single use particulate respirator is a paper filter that is held to the face by two straps and fit to the nose by a self-molding metal strip. These may have an exhalation valve but do not use filter cartridges. They do not provide a high level of protection, but will decrease the inhalation of dusts and mold spores. They generally provide no protection against gases or vapor exposures. (Some specialized single-use respirators have been approved by NIOSH to remove “nuisance” or very low levels of organic vapors or acid gases.)

Single use particulate respirators have two designations – a letter and a number.

The letters describe the resistance to oil mist, as:

- N = Not oil resistant
- R = Resistant to oil
- P = oil Proof

Selection criteria are shown in the NIOSH Pocket Guide, Table 4. Click on: <http://www.cdc.gov/niosh/npg/pgintrod.html#nrp>

Generally, for weatherization, the N series is selected, as oil mist is not a primary concern. The number refers to filter efficiency, or how much of the airborne particulate is removed by the filter. Common values are:

- 95 = removes 95%
- 99 = removes 99%
- 99.97 = removes 99.97%, equivalent to 100%

An N95 single-use respirator is:

- N → not resistant to oil
- 95 → removes 95% of airborne particulate

An R100 single-use respirator is:

- R → resistant to oil
- 100 → removes 100% of particulate

The percent of particulate removed assumes a very good seal between the face and the mask.

The following donning and doffing procedures for single-use respirators come from the CDC (see background reading and materials for more information).

HOW TO DON A SINGLE USE RESPIRATOR



- Select a fit-tested respirator
- Place over nose, mouth, and chin
- Fit flexible nose piece over nose bridge
- Secure on head with elastic straps
- Adjust to fit
- Perform a fit check
- Inhale: respirator should collapse
- Exhale: check for leakage around face
- Bear in mind that facial hair and scars can easily impact the fit of a respirator.

HOW TO DOFF A SINGLE USE RESPIRATOR

- Lift the bottom elastic over your head first



- Then lift off the top elastic
- Discard

Half-Mask and Full-Face APRs with Flexible (Elastomeric) Face Pieces

Two types of filters are used with these APRs that have a flexible, plastic-like face piece:

- Particulate filters are used to protect against dusts, mists, and fumes.
- Chemical cartridges are used to protect against certain vapors and gases.

Filters and cartridges are selected according to specific exposures which are expected. Factors which affect how well the APR works include the size of the particles, concentration of the substance, and type of filter used. The filter(s) must be changed when loaded with the dust (particulate) or substance (chemical cartridge) or if it gets wet. Certain contaminants do not have an appropriate protective cartridge/canister due to their oxygen displacement characteristics or the fact that they are known or suspected carcinogens.

Cartridge and filter colors designate what type of particulates or chemicals are filtered. OSHA regulation 29 CFR 1910.134(j) says:

Identification of filters, cartridges, and canisters.

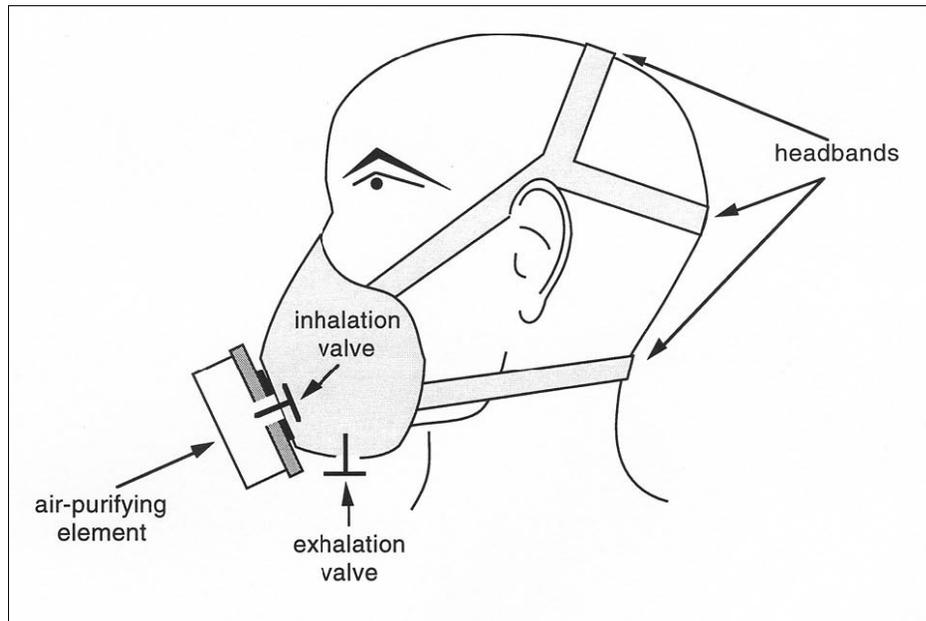
The employer shall ensure that all filters, cartridges and canisters used in the workplace are labeled and color coded with the NIOSH approval label and that the label is not removed and remains legible.

The table below lists ANSI-approved contaminant and color combinations. (ANSI Z88.78-2001 Respirator Filter Color Coding)

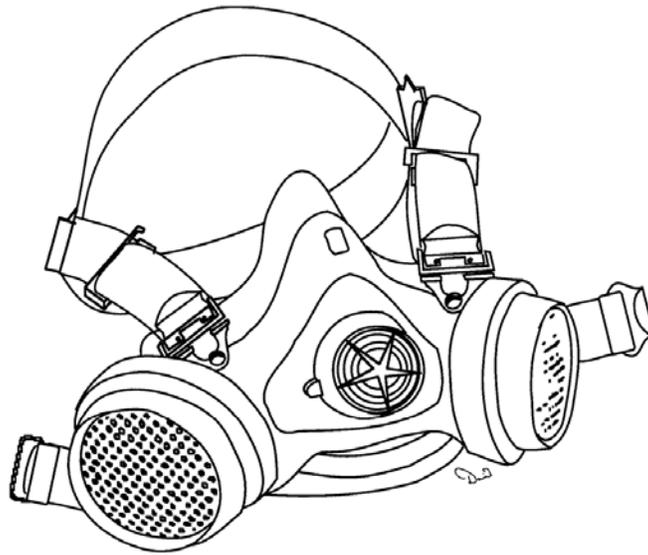
Contaminant	Color Code
Acid gases	White
Organic vapors	Black
Ammonia gas	Green
Ammonia and methyl amine gas	Green
Carbon monoxide gas	Blue
Acid gases and organic vapors	Yellow
Organic vapors, chlorine, chlorine dioxide, hydrogen chloride, hydrogen fluoride, sulfur dioxide, formaldehyde, hydrogen sulfide (escape only) ammonia, and methyl amine	Pale brown (tan)
Acid gases, ammonia, organic vapors, and carbon monoxide	Red
Other vapors and gases or combinations not listed above	Olive
HE (HEPA) for PAPRs	Purple
P100	Purple
P95, P99, R95, R99, R100	Orange
N95, N99, N100	Teal

How do you tell if the cartridge needs to be changed? The respirator standard 1910.134(d)(3) requires that respirators used to prevent gas or vapor exposures be equipped with an indicator showing that the cartridge has expired; this is called an End-of-Service-Life Indicator (ESLI). If no cartridge approved for a specific gas/vapor exposure has an ESLI, then the employer must use objective data to determine a change schedule. Should you smell contaminant before the cartridge has “officially expired,” notify the supervisor immediately and change the cartridge. For dust, a wearer may notice that it is more difficult to breathe as the filter becomes loaded.

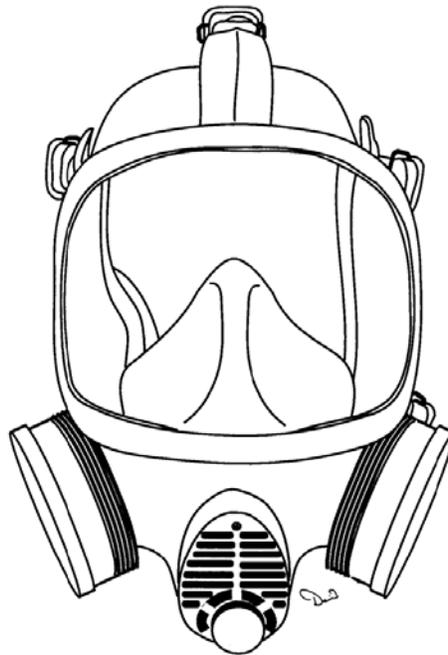
Air enters through the cartridges and exits through a valve. Also, note the proper placement of the headbands for a half-mask respirator. Half-mask respirators without the head harness (only two single straps) must not be used.



Proper Placement of Headstraps for Half-Face APR



Half-Face APR



Full-Face APR

Another special type of APR is a **Powered Air-Purifying Respirator (PAPR)**, which pulls air through filters and blows it into the mask, thereby creating positive pressure. PAPRs consist of a hood or helmet, filter, power source, and face piece. PAPRs can only be used in environments where the oxygen concentration ranges from 19.5% to 23.5%. This is true of **ALL** APRs.

Quarter-mask APRs cover the nose and mouth, but do not extend to the chin. These offer very low protection factors and are **not** recommended for use during weatherization.

INSPECTION, MAINTENANCE, AND STORAGE OF RESPIRATORS

Proper inspection, maintenance, and storage is essential to assure that the respirator is always ready for use. Inspect before and after each use and check at least monthly, even if the respirator has not been in use. A company policy may include more frequent inspections.

For inspecting all respirators:

- Check the condition of the facepiece.
- Check the straps and the points where it attaches to the facepiece.
- Check the headbands to make sure that they can be tightened to provide a good fit, if using a respirator with a reusable facepiece.

Cleaning and disinfecting are essential elements of the respirator program.

To clean and disinfect all respirators with a reusable facepiece:

- Inspect each piece.
- Wash the facepiece.
- Air dry.
- Re-inspect.

RESPIRATOR FIT

A respirator will be effective only if there is a good seal between the facepiece and the wearer's face. Therefore, all persons wearing respirators must first be fit-tested. Fit-testing includes qualitative and quantitative testing, as well as routine positive-and negative-pressure tests. Because many different face shapes exist, the manufacturers have a number of sizes. The purpose of fit testing is to find the manufacturer/size combination which offers the best protection.

Factors such as beards, weight loss or gain, dentures, dental work, or facial injury can change the shape of the face, thus potentially changing the fit and efficiency of the respirator. If any of these factors exist, retesting is required.

A protection factor has been determined in the laboratory for each type of respirator (APR, PAPR, SCBA, etc.) and mask (half or full-face). Never assume you will get this much protection. That is why fit-testing is required.

PERIODIC FIT TESTS

Two types of fit-testing, qualitative and quantitative may be used to determine the size and model of respirator that an individual should wear, as well as how good the face-to-facepiece seal is. These tests should be repeated periodically to document the respirator's effectiveness.

Qualitative Testing (with irritant or smelly substance)

- Purpose: Checks effectiveness of respirator in preventing substances from entering the facepiece.
- Method: While wearing a respirator, an individual enters a chamber or atmosphere where a test substance has been released. The test substance could be smelly (banana oil) or an irritant (special smoke tube). The wearer should not be able to detect the substance.
- Requirements: This test or its equivalent is required by OSHA 1910.134 (e) (5) at least once a year.

There are several important cautions to qualitative fit-testing. Some of the test substances may irritate the eyes or cause coughing. A poor sense of smell or taste may result in an inaccurate test. Fit-testing is often done in "ideal" environments. The fit may change after wearing the respirator several hours or during strenuous activity

Quantitative (Numerical) Testing

- Purpose: Measures effectiveness of the respirator in preventing a substance from entering the facepiece.
- Methods: While wearing a respirator modified with a probe, an individual enters a chamber. A test substance is released, and the concentrations in the air inside and outside of the respirator are measured. (Another version of this method is available which does not require a chamber or a test substance. The dust which naturally occurs in the air is measured both inside and outside the respirator.) The test is repeated while the person performs specific tasks (speaking, running in place, etc.) that may affect fit.
- Requirements: This test is not required by OSHA, but it should be done at least annually if the service is available.

This test provides an objective assessment of the effectiveness of the respirator for the person who will wear it. This test measures the fit factor (FF), which is a comparison of the concentration of the substance outside of the mask to the concentration of the substance inside of the mask. This FF is useful in determining whether the respirator will effectively protect the wearer from specific chemicals.

A disadvantage to this test is that special equipment and trained personnel are needed to administer it, although a microcomputer and software accessories can perform the calculations required.

ROUTINE USER CHECKS

Two types of checks, positive- and negative-pressure checks, should be done each time a respirator is donned and before each use in the field to check the seal of the respirator. They do not replace yearly fitting but provide a routine assessment as to whether the fit is still adequate.

Respirators with Reusable Face Pieces

Positive-Pressure Check:

- Purpose: Checks the apparatus for leaks at valves or other points.
- Method: Wearer covers the exhalation valve with hand and blows out. Air should escape only from around the facepiece.
- Requirements: Should be done before each use.

Negative-Pressure Check:

- Purpose: Checks the facepiece-to-face seal.
- Method: SCBA wearer disconnects the hose mask and places hands over the intake valve and inhales. APR wearer places hands over cartridges and inhales. No outside air should be felt leaking into the facepiece.
- Requirements: Should be done before each use.

Single-Use Respirators

Positive-Pressure Check:

- Purpose: Checks the respirator for major gaps at nose, cheeks, and chin.
- Method: Exhale. Check for leakage around the face.
- Requirements: Should be done before use.

Negative-Pressure Check:

- Purpose: Checks the respirator for major gaps at nose, cheeks, and chin.
- Method: Inhale. Respirator should collapse.
- Requirements: Should be done before use.

Positive- and negative-pressure checks can be done quickly and easily in the field. They do, however, have the disadvantage of relying on the wearer's ability to detect the leaks.

MEDICAL FITNESS TO WEAR A RESPIRATOR

Initial medical fitness screening is conducted by a physician/licensed health (PLHCP) professional using OSHA's mandatory Medical Evaluation Questionnaire (29 CFR 1910.134 Appendix C). The PLHCP may require additional evaluation. The exam helps assure that the employee is physically capable of working with the added stress of a respirator.

Medical examinations are required for all employees who may work in atmospheres containing overexposure to hazardous substances for 30 days or more a year or as required by OSHA 1910.120(f). (OSHA 1910.134 and its appendices do not state this requirement.) These medical surveillance examinations may also be used to verify respiratory fitness.

Examinations should be conducted at least once every twelve months for each employee, unless the physician believes a longer interval (not greater than two years) is appropriate. It is important that the physician understands the worker's job tasks.

Some medical conditions which may prevent an individual from wearing a respirator include:

- Lung disease.
- Claustrophobia.
- Severe high blood pressure.
- Heart disease.

Other circumstances which may prevent a worker from wearing a specific type of respirator include:

- Contact lenses.
- Eyeglasses.
- Mustache.

Special eyeglass kits (optical inserts) are available for full-facepiece respirators.

FACIAL HAIR AND RESPIRATORY PROTECTION

Section 29 CFR 1910.134/1926.103b, Definitions, states:

Tight fitting facepiece means a respiratory inlet covering that forms a complete seal with the face.

Additionally, Appendix A of 1910.134 (mandatory) states:

The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble, beard growth, beard, mustache, or sideburns which cross the respirator sealing surface.

OSHA's interpretation of this section is that there cannot be any facial hair when using any respirator which relies upon a good face-to-facepiece seal, such as any tight-fitting (as opposed to helmet or loose-fitting hood) air-purifying respirator. Even several days' beard growth or heavy stubble can reduce the possibility of a face-to-facepiece seal.

The question often comes up, "Can an employer force a worker to shave his beard because he will have to wear a respirator?" The answer depends in part on whether the workplace is unionized. There have been cases where arbitration has decided on this question in the favor of the employer as well as cases that were settled in the worker's favor. The decision will turn on the facts of each individual case. You should consult your employee representative for more information.

Read an interpretation of OSHA's standard regarding facial hair online at: http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=22273

In a non-union workplace, the employer is free to impose work rules on the employee and change them at any time consistent with the employment contract. Nothing in OSHA regulations prevents the employer from making such a change and, in fact, the law requires employees to obey OSHA standards.

In a unionized workplace, the employer cannot normally change working conditions unilaterally unless the collective bargaining agreement gives him or her that right or unless the union clearly gives up that right. Where this is not the case, the employer must normally bargain with the union for changes in wages, hours and working conditions that occur during the life of the collective agreement.

MINIMUM REQUIREMENTS FOR A RESPIRATOR PROGRAM

OSHA requires that employers who make respirators available to their employees have a written respirator program with work-specific procedures. The program should be evaluated and updated at least annually or as requirements change and modified to reflect changes in the workplace.

A respirator program must include the following points:

- Medical evaluations of employees required to use respirators.
- Fit testing procedures for tight-fitting respirators.
- Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations.

- Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators.
- Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations.
- Training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance.
- Procedures for regularly evaluating the effectiveness of the program.

The employer shall designate a program administrator who is qualified to oversee the respiratory protection program and conduct the required evaluations of its effectiveness. Respirator training and the required medical evaluations are provided to the employee at no cost. The respirator program also may include:

- Need for corrective lenses in full-facepiece respirators.
- Restriction of use of contact lenses.
- Communication needs.
- Guidelines for use in dangerous atmospheres, including confined spaces.
- Guidelines for use in extreme temperatures.

The respirator program will include a description of who is responsible for the various aspects of the program including selection, periodic and routine fit-testing, inspection, cleaning, repair, and maintenance. Persons using respirators under unusual conditions (e.g., a high concentration of acid vapor) should review special requirements with supervisors or the employee safety and health representatives.

Chemical Protective Clothing (CPC)

The employer is responsible for selecting the appropriate protective clothing for the expected hazards. Workers must be trained in use, limitations, and care (29 CFR 1910.132).

GLOVES

Gloves are required for a number of weatherization tasks. For example where mold is present gloves prevent contact with skin and potentially irritating cleaning solutions. Long gloves that extend to the middle of the forearm are recommended. The glove material should be selected based on the type of materials being handled. If you are using a biocide (such as chlorine bleach) or a strong cleaning solution, you should select gloves made from natural rubber, neoprene, nitrile, polyurethane or PVC. If you are using a mild detergent or plain water, ordinary household rubber gloves may be used.

Many gloves are made from latex, a substance which comes from rubber. Unfortunately, many people are sensitive or allergic to latex. If you know you are allergic to latex or if you develop a rash after wearing latex gloves, request gloves made from an alternative material. Nitrile, or synthetic rubber, gloves are often recommended in this case. Nitrile is more expensive than latex, but it also offers better puncture and abrasion resistance and is resistant to more chemicals than latex.

In other activities, such as work with siding, durable work gloves may be required to protect the hands from cuts and scrapes.

EYE PROTECTION

To protect your eyes, use properly fitted goggles or a full-face respirator. Goggles must be designed to prevent the entry of dust and small particles to keep mold spores out of the eyes. Anti-fogging sprays may be useful when working in high humidity.

Safety glasses or goggles with open vent holes are not acceptable.

OSHA requires that anyone using prescription lenses be provided with eye protection that fits over the lenses without disturbing the proper positioning of the lenses.

DISPOSABLE CLOTHING

Disposable coveralls or work clothes may be used to prevent skin and clothing contact with contaminated surfaces or construction hazards. Different types of protective clothing may be worn depending on various factors, such as temperature, type of contaminant.

Protective clothing protects not just the skin, but any clothing underneath that you will be wearing home. It helps prevent you from accidentally carrying contamination from the workplace to your car or home. Weatherization workers will wear protective suits for some tasks, such as insulation. There are two main materials that these disposable suits are made from:

- **Tyvek®.** This is an inexpensive, plastic, breathable fiber and is used to create a disposable suit. It is ideal for work in hot areas, but will provide little to no protection from liquids. It is fairly puncture and abrasion-resistant.
- **Tychem QC®.** Another plastic fiber – similar to Tyvek® – that is coated in the same plastic found in Saran Wrap®. This material provides protection against liquids and a wide range of other compounds. Also inexpensive.

These full-body suits should be worn with both head covers and boot covers.

INSPECTION, MAINTENANCE AND STORAGE OF CPC

It is important to inspect CPC for evidence of chemical damage or aging. CPC which is torn, degraded, or otherwise non-functional will not offer adequate protection to the wearer. The safety and health plan should describe or reference SOPs for CPC inspection, maintenance, and storage.

CPC should always be inspected when it is:

- Received from the distributor.
- Issued to workers.
- Put into storage.
- Taken out of storage.
- Used for training.
- Used for work.
- Sent for maintenance.

An inspection checklist should be developed for each item. Factors to consider are:

- Cuts, holes, tears, swelling, and abrasions in seams of fabric.

- Weakness in zipper or valve seals.
- Signs of contamination such as discolorations or visible chemical.
- Signs of malfunctioning exhaust valves.

Protective equipment and clothing may be contaminated even if they do not appear discolored!

Proper maintenance can prevent CPC deficiencies and prolong its life. A detailed SOP must be developed and followed rigorously.

Proper storage is important in order to prevent suit failures. The written SOP should describe storage before the CPC is issued to the wearer (in a warehouse, on-site, etc.) as well as storage after use. Check the manufacturer's data, as most CPC used now has a shelf life.

DONNING PPE ENSEMBLES

The PPE ensemble used for the work depends on the job tasks.

You should be trained in the donning of the clothing. For some tasks, you will be asked to don clothing in a specific order.

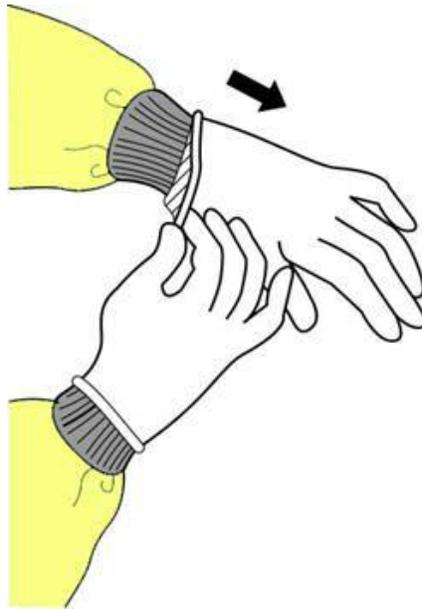
Seams (where clothing meets boots or gloves) may be sealed with tape.

DOFFING PPE ENSEMBLES

Doffing also depends on the PPE in the protective ensemble and you will be trained in what to take off first.

To minimize the spread of contamination, gloves should be removed using one of two standard practices:

Method 1



- Grasp one of the gloves at the cuff and pull it part of the way off. The glove will turn inside out. It is important to keep the first glove partially on your hand before removing the second glove. This protects you from touching the outside of either glove with your bare hands.
- Leaving the first glove over your fingers, grasp the second glove near the cuff and pull it part of the way off. The glove will turn inside out. It is important to keep the second glove partially on your hand to protect you from touching the outside surface of the first glove with your bare hand.
- Pull off the two gloves at the same time, being careful to touch only the inside surfaces of the gloves with your bare hands.
- Dispose of the gloves by placing inside out in the trash.
- Wash hands thoroughly.

Method 2



- Grasp outside edge of glove near the wrist.
- Peel away from hand turning glove inside-out.
- Hold in opposite gloved hand.
- Slide ungloved finger under the wrist of the remaining glove, be careful not to touch the outside of the glove.
- Peel off from inside, creating a bag for both gloves.
- Discard.
- Wash hands thoroughly.

To maximize worker safety and to keep contamination from spreading, PPE should be doffed in the following order when there is no decon shower:

1. Boot covers
2. Boots
3. Full-body protective suit
4. Head cover
5. Protective eyewear
6. Respirator
7. Gloves

When a decon shower is provided:

1. Boot covers
2. Boots
3. Full-body protective suit
4. Head covers
5. Protective eyewear
6. Gloves
7. Respirator

All disposable items (suits, single-use gloves, boot & head covers, N-95 respirators, respirator cartridges) should be properly disposed of in a waste bin. Reusable items (protective eyewear, respirator face-pieces) should be placed in a separate bin for thorough cleaning and sanitizing. Boots should be washed down before leaving the decontamination area. Following removal of PPE, all workers should thoroughly wash their hands with soap and water.

Resources

The following are resources used to provide you with information for this Weatherization Notebook. Refer to the websites below for further information. Some of the material on OSHA's and EPA's websites is available in English and Spanish. All of OSHA's General Industry and Construction Standards are available for a small fee in CD-ROM or book from <http://www.mancomm.com>.

Asbestos and Vermiculite

1. OSHA Asbestos Standard: 29 CFR 1910.1001
2. EPA Asbestos-Contaminated Vermiculite Insulation in English and Spanish:
http://www.epa.gov/asbestos/pubs/verm_questions.html
3. Asbestos.com Caulking Exposure Risks:
<http://www.asbestos.com/products/construction/caulking.php>

Bloodborne Pathogens

4. OSHA Standard: 29 CFR 1910.1030
5. OSHA Information: <http://www.osha.gov/SLTC/bloodbornepathogens/recognition.html>

Chemicals

6. OSHA Standard: 29 CFR 1910.1200
7. OSHA Information in English and Spanish:
<http://www.osha.gov/SLTC/hazardcommunication/index.html>

Cold Stress

8. OSHA Information in English and Spanish:
<http://www.osha.gov/SLTC/coldstress/index.html>

Confined Space

9. OSHA Standard: 29 CFR 1910.146
10. OSHA Information in English and Spanish:
<http://www.osha.gov/SLTC/confinedspaces/index.html>

Crystalline Silica

11. OSHA Information in English and Spanish:

<http://www.osha.gov/SLTC/silicacrystalline/construction.html>

12. NIOSH Information: <http://www.cdc.gov/niosh/topics/silica/default.html>

Egress

13. OSHA Standard 29 CFR 1910.36

Electrical Safety

14. OSHA Standard: 29 CFR 1910.302-308 Subpart S and 1910.331-335

15. OSHA Information in English and Spanish:

<http://www.osha.gov/SLTC/electrical/index.html>

Ergonomics

16. OSHA Information in English and Spanish:

<http://www.osha.gov/SLTC/ergonomics/index.html>

Fire Prevention

17. OSHA Standard: 29 CFR 1910.35-39 Subpart E

18. OSHA Information in English and Spanish:

<http://www.osha.gov/SLTC/firesafety/index.html>

Formaldehyde

19. OSHA Standard: 29 CFR 1910.1048

20. Enforcement Procedure for Occupational Exposure to Formaldehyde:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=1566

21. OSHA Fact Sheet: http://www.osha.gov/OshDoc/data_General_Facts/formaldehyde-factsheet.pdf

22. EPA Information: <http://www.epa.gov/iag/formalde.html>

General Safe Work Practices

23. OSHA Workplace Violence Information:

<http://www.osha.gov/SLTC/workplaceviolence/index.html>

24. OSHA Workplace Violence Fact Sheet:

http://www.osha.gov/OshDoc/data_General_Facts/factsheet-workplace-violence.pdf

25. NIOSH Occupational Violence Information:

<http://www.osha.gov/SLTC/workplaceviolence/index.html>

H1N1

26. Centers for Disease Control and Prevention: <http://www.cdc.gov/h1n1flu/qa.html>

Heat Stress

27. OSHA Information in English and Spanish:

<http://www.osha.gov/SLTC/heatstress/index.html>

Housekeeping

28. Canadian Centre for Occupational Health and Safety:

<http://www.ccohs.ca/oshanswers/hsprograms/cklstcon.html>

Illumination

29. OSHA Standard: 29 CFR 1926.56

Indoor Air Pollution

30. EPA Indoor Air Quality Information in English and Spanish:

<http://www.epa.gov/iaq>

Isocyanates

31. Centers for Disease Control and Prevention:

<http://www.cdc.gov/niosh/topics/isocyanates>

32. OSHA Information: <http://www.osha.gov/SLTC/isocyanates/index.html>

33. "Assessment of Isocyanate Exposure During the Spray Application of Polyurethane Foam," prepared by: Research and Development Department, Construction Safety Association of Ontario, 74 Victoria Street, Toronto, Ontario M5C2A5

Ladder Safety

34. OSHA Standard: 29 CFR 1926.1053

35. OSHA Information in English and Spanish:

<http://www.osha.gov/SLTC/etools/construction/falls/4ladders.html>

Lead

36. OSHA Standard: 29 CFR 1910.1025

37. EPA Information in English and Spanish: <http://www.epa.gov/lead>

38. Housing and Urban Development in English and Spanish:

<http://www.hud.gov/offices/lead/lbp/hudguidelines/index.cfm>

Lock-out Tag-Out

39. OSHA Standard: 29 CFR 1910.147

40. OSHA E-Tools and Quick Cards in English and Spanish:

<http://www.osha.gov/SLTC/controlhazardousenergy/index.html>

Mold

41. EPA Mold Information in English and Spanish: <http://www.epa.gov/mold>

PCBs

42. Agency for Toxic Substances and Disease Registry in English and Spanish:

<http://www.atsdr.cdc.gov/tfacts17.html>

43. "An Unrecognized Source of PCB Contamination in Schools and Other Buildings" by Robert F. Herrick:

<http://www.pubmedcentral.nih.gov/picrender.fcgi?artid=1247375&blobtype=pdf>

Portable Generators

44. OSHA Fact Sheet:

http://www.osha.gov/OshDoc/data_Hurricane_Facts/portable_generator_safety.pdf

Power Tools

45. OSHA Standard: 29 CFR 1910.241-244 Subpart P

46. OSHA Information in English and Spanish:

<http://www.osha.gov/SLTC/handpowertools/index.html>

Radon

47. EPA Information in English and Spanish: www.epa.gov/radon

Scaffolding

48. OSHA Standard: 29 CFR 1910.28

49. OSHA Information in English and Spanish:

<http://www.osha.gov/SLTC/scaffolding/index.html>

Struck-By

50. OSHA Information:

<http://www.osha.gov/SLTC/etools/construction/struckby/mainpage.html>

Vehicle Operation

51. OSHA Standard: 29 CFR 1910.178

52. OSHA Information in English and Spanish:

<http://www.osha.gov/SLTC/motorvehiclesafety/otherresources/index.html>

Walking and Working Surfaces

53. OSHA Standard: 29 CFR 1910.21-30

54. 29 CFR 1926.1051-1053

55. 29 CFR 1926.1060

56. OSHA Information in English and Spanish:

<http://www.osha.gov/SLTC/walkingworkingsurfaces/index/html>