CITY AND COUNTY OF BROOMFIELD SAFETY BEST PRACTICES

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I. General Practices

There are many safe working practices that all City and County employees, officials, volunteers, contractual workers, visitors, and vendors are required to follow. These practices are designed to ensure a safe work environment by reducing the risk of injury to employees and the public, and damage to equipment and property.

A key to accident and injury prevention, fires, and losses is to maintain clean, neat, and orderly workplaces, vehicles and equipment. Using good housekeeping practices can prevent injuries and accidents, lost work time, costly medical fees and low productivity. All areas must be kept clean, dry and clear of obstructions. It is every employee's responsibility to identify a hazard by marking it clearly with signs or barriers so others won't get hurt, and then reporting it to your supervisor. It may be appropriate for employees to eliminate some hazards if it is safe to do so.

A. General Workplace Safety Guidelines

- Report all accidents, injuries, and job-related illnesses. Employees should follow the reporting procedures identified in the <u>Broomfield Safety Policy</u>.
- Injuries should be treated promptly, even minor cuts. Employees should know the location of first-aid kits and seek medical attention at one of the Designated Providers for Workers' Compensation, if necessary. Please refer to the Safety Policy or Human Resources webpage for more information.
- Cooperate with accident investigations to identify root causes and to prevent recurrence.
- Report unsafe equipment, practices or conditions, near misses, or safety hazards that are observed to employee's supervisor.
- Participate in the City and County safety programs.
- Keep a safety conscious attitude and avoid complacency.
- Come to work well rested and alert.
- Get the necessary training to do the job properly and safely.
- Never cut corners or take shortcuts.
- Obey safety signs, warnings, instructions, and directions.
- Never let personal feelings or problems get in the way of safely performing job duties.
- Keep all work areas clean and orderly.
- Have an organized place for tools and materials while working and for storage when finished with a job.

- Keep everything in its proper place and remove debris or obstructions from all work areas, passageways, stairs, and in and around buildings and other structures.
- Repair or replace damaged equipment and furniture. Employees must contact Facilities for help with these requests.
- Employees shall only operate equipment that they are authorized and trained to use.
- Inspect equipment for defects or damage prior to use.
- Do not stand in front of a closed door, which may open suddenly.
- Sand or report icy spots immediately.
- Material should be stored on shelves in a manner to prevent falling; heavy objects and frequently used items should be placed on lower shelves.
- Do not place overly heavy items on unsupported shelving.
- Do not carry anything that blocks vision while walking.
- Ensure proper clearance if carrying or moving something through a doorway to avoid scraped knuckles or arms.
- When walking up or down stairs, use a handrail. Do not skip steps, and turn corners slowly.
- Appropriate footwear and Personal Protective Equipment (PPE) are required at all times.
- Broken glass should be cleaned up immediately without direct contact with the hands and disposed of in a manner so as not to create an additional hazard.
- Do not use boxes, furniture, chairs, or other makeshift platforms to reach objects. Use a ladder or step stool designed for that purpose.
- Never use broken or unstable ladders or step stools.
- Never remove the center prong (ground) from an electric cord/plug.
- Employees should report loose ceiling tiles or lighting covers to their supervisor and Facilities.
- Report poorly lighted areas or areas where lights are not operating properly.
- Never block emergency exits.
- Only use extension cords for temporary, portable electrical needs.

B. Office Safety

 Electrical appliances such as space heaters, coffeepots, cup warmers, and ovens must be UL approved, internally grounded and/or have a 3-prong plug. Coffee pots, cup warmers, and ovens must be located in break rooms - not in office areas. All heat-producing equipment must be unplugged when not in use. Space heaters must be unplugged at the end of each workday.

- Don't overload electrical circuits, and avoid running electrical cords under carpet or areas where they are a tripping hazard. Look for frayed, bare or improperly grounded wires or faulty appliances and take them out of service immediately.
- Use care in handling, carrying, storing or disposing of sharp objects such as pencils, pens, knives or scissors.
- Paper cutters should have a guard and be kept closed and locked when not in use.
- File cabinets should be securely placed and only one drawer pulled out at a time. Fill new file cabinets from the bottom up and never overload top drawers with heavy materials. Keep drawers closed when not in use.
- Push in chairs when leaving work area. Do not use chairs as step stools. Do
 not sit on the edge of a chair or tilt chair back. Use caution when sitting
 down on chairs with caster wheels.
- Know the correct operating procedure for office equipment. Keep hands and other body parts clear of moving parts in machines such as duplicating, stapling and printing machines. If the machine does not work properly, contact an authorized repairperson. If a machine emits smoke, sparks or delivers a shock, unplug it and have it inspected. Post a note on machine warning others of its condition. Turn machines off and unplug before servicing.
- Avoid eye contact with photocopier light. Avoid physical contact with toner.
- Avoid eye strain from computer monitors by taking periodic breaks, changing screen angles, keeping dust off screen, and/or using anti-glare screens or tinted glasses.

C. Ergonomics

The goal of the ergonomics program is to reduce/eliminate stress and fatigue of employees in the work environment. Every employee will be able to participate in the ergonomic program.

In recent years significant improvements have been made in office equipment design and adjustment to reduce the demands of the job, including force, repetitive motion, and awkward postures. In order to minimize chances of these or other cumulative trauma disorders, please follow these basic ergonomic guidelines:

Adjust chair to your needs.

- Chairs should provide sufficient support to an employee's upper legs. It is recommended that there should be approximately 2 fingers width of space between the back of your knees and the front of the chair.
- Adjust the chair back so the lumbar portion fits into the inward curve of the spine. Keep your head centered over your neck and shoulders; concentrate on not leaning your head forward or back or hunching over.
- Adjust the arm rests so your forearms rest easily with shoulders in a relaxed position and elbows are bent at a 90 degree angle
- Adjust chair height so your feet rest flat on the floor (or on a foot rest), thighs should be almost parallel to the floor and the lower leg should be almost perpendicular to the floor.
- Position the computer monitor about 24-inches from your eyes. The top of the screen should be at or slightly below eye level. This may vary depending on the employee.
- Place the keyboard and mouse next to each other. Keep your wrists in a neutral position; straight in line with the forearm. A wrist rest and padded mouse pad can be used for additional support when keying or mousing.
- Move the keyboard/mouse tray to a comfortable height and angle, and lock in place so you don't develop muscle tension in arms and shoulders.
- Avoid twisting at the waist turn the whole body instead.
- Organize your work in a manner that allows your head to be straight in line with your body most of the time.
- Place frequently used office equipment and materials within easy reach.
- Avoid cradling the phone receiver between your head and shoulder. Use a headset or speaker phone if you need your hands free while on the phone.
- Take frequent stretch breaks.
- Vary tasks, if possible and avoid prolonged computer use. Avoid eye fatigue from computer use by optimizing brightness and contrast settings, changing screen angles, keeping dust off screen, and using anti-glare screens or tinted glasses, if available. Report poorly lighted areas or areas where lights are not operating properly. Focus into the distance. Use a document holder if significant typing from documents is required. Position the document holder so that it is directly beside the screen, the same distance from your eyes as the screen, so eyes can remain focused as they look from one to the other.
- Reach for only those items on shelving that can be reached while remaining flatfooted.
- Walk and change directions slowly, especially when carrying items.
- Use carts or ask for help when lifting and carrying heavy objects.

D. Horseplay

It is the responsibility of each employee to perform his/her job in a safe manner. Horseplay will not be tolerated by anyone and should be addressed through these management controls:

- Emphasize that inattention while working can cause accidents. Horseplay creates a distraction by drawing one's attention away from the task.
- Enforce uniformly among all the staff.
- Emphasize that rules were established for everyone's safety. Stress that disregard of the rules can lead to accidents, injuries and discipline up to and including termination.
- Provide examples of situations which will not be tolerated. For instance, playing with electrical current, chemicals, compressed air, and operating equipment recklessly.
- Encourage employees to discuss unsafe practices with each other and to report situations which could cause an accident or injury to his/her supervisor.

E. Reporting and Correcting Safety Hazards

Many different types of hazards may exist in the work environments. Some examples of common safety hazards include slip, trip and fall hazards from uneven or slick surfaces, fire and explosion hazards from flammable liquids or gases, exposure to chemicals, and shock hazards from defective electrical equipment. Employees need to recognize potential safety hazards and take appropriate action to avoid injuries. Please follow these guidelines:

- Be on the lookout for hazards in your workplace.
- Do not operate machines or equipment unless trained to do so. Training should detail the hazards and safe job procedures to follow when operating the machine or equipment.
- Do not use defective equipment. Label the item as defective, remove it from service, or perform the adjustments or repairs if qualified.
- Report safety hazards to the supervisor or another responsible person.
 Describe the exact location and nature of the hazard. If a serious or imminent danger situation exists, take immediate action to mitigate the hazard.
- Correct the hazard on the spot if it is safe to do so. It only takes a few seconds to pick up a hose, clean up a spill, or reinstall a machine guard.
- Warn coworkers and others if certain hazards exist and what precautions should be taken to avoid injuries.

- For hazards that cannot be eliminated, take steps to protect persons and property from accidents. This may include installing barricades, roping off an area, wearing PPE, and taking other temporary measures.
- Never remove or disable a safety device on a machine or piece of equipment. Doing so can result in discipline up to and including termination.
- Some hazards are inherent to a certain machine or operation and cannot be completely eliminated. Other hazards may take significant time and money to correct. Short-term actions may need to be taken before permanent solutions are implemented. In the meantime, be extra cautious and watch out for your fellow employees.

II. Safety Awareness

A. Accidents are Preventable

Certain precautions and developing a proper attitude will reduce the probability of accidents. Several actions which can be taken to prevent accidents are listed:

- Keep mind on task.
- Get plenty of rest and be aware of medication which can cause drowsiness. If medication must be used, consult with a personal physician regarding necessary precautions.
- Follow written instructions and training to reduce the probability of an accident or injury. These programs and instructions were developed with much thought by others who have a thorough understanding of the hazards.
- Take the time necessary to perform the task properly. This involves planning adequate time for the task, following established procedures, and avoiding shortcuts.
- Promptly report situations which can cause accidents or injuries. Take the necessary actions to reduce the exposure or control the hazard. Waiting until someone else reports it may be too late.

B. Setting a Good Example

To help reduce incidents that could result in injury or property damage, it is important that all individuals perform their tasks in a safe manner. Individuals in positions of authority, such as supervisors and management, should set a good example for the staff. The following are some ways for supervisors to set a good example:

- Encourage safe work practices. Obey all safety rules.
- Practice safety both on and off the job.
- Involve employees in making safety decisions.

- Reward or praise safe work practices, whenever possible.
- Inspect equipment and tools for defects before use. Remove defective items from service and report the defects so that repairs can be made.
- Follow instructions for equipment and adhere to safety warnings.
- Operate vehicles safely. Drive defensively, obey all laws, and always wear seatbelts.
- Report to work in good physical and mental condition. Get plenty of exercise, eat properly, and obtain an adequate level of sleep. Follow prescription medication guidelines and take appropriate actions if side effects occur.
- Wear the required Personal Protective Equipment (PPE) even when you are going to be in the area for only a minute or two.

C. Watching Out for Fellow Employees

To reduce the likelihood of accidents and injuries, all employees must take responsibility for their own safety and also the safety of others. Here are some tips:

- Follow the rules. Safety rules were established for the benefit of everyone. Even though the benefits of the rules may not appear obvious, there is a valid reason for each one.
- Avoid horseplay or other actions which may lead to injury.
- Offer assistance. Helping another employee with a difficult task not only makes the job easier but also enhances good relationships.
- Develop good housekeeping practices. Keep the work area clean, follow safety policies, clean up spills, store items properly, and report hazards.
- Follow the instructions for use and storage of chemicals. Review the Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS). Containers should be labeled and properly stored. Properly label all secondary containers.
- Do not use defective equipment. Label the item as defective, remove it from service, or perform the adjustments or repairs if qualified.
- Operate equipment safely. Follow safe procedures and don't take shortcuts.
- Wear prescribed personal protective equipment and encourage others to wear the necessary protection when in the work area.
- Obey speed limits and drive defensively both on the road and in parking lots.
- Praise fellow employees when they are observed performing work safely.
- Speak up when you observe another employee performing an unsafe action.

III. General Workplace Safety Practices

A. Personal Security and Crime Prevention

Some tips to minimize your chance of being a crime victim include:

- Take precautions about your movements and activities. Think about what you are doing, where you are doing it, the time of day or night, and the area you are in.
- Avoid poorly lighted areas. Park and walk in areas that have high volumes of people and vehicles.
- Time your arrivals and departures to coincide with others, thus minimizing the opportunity for you to be alone.
- If you arrive and find people acting suspiciously, loitering, or having no apparent legitimate purpose for being in the area, get to a safe location. Contact 911 and let the police check it out for you.
- Be aware of your surroundings.

B. Hosting Special Events

Here are some guidelines to follow when hosting special events:

- Contact Risk Management (Finance Department) for insurance requirements and identify the potential loss exposures that may exist for the specific event. Develop plans to manage these loss exposures.
- Establish a traffic control plan which takes into account the maximum volume of vehicles. Map out the event area, designate parking areas, allow for emergency access/egress lanes, ensure adequate barricades and signs are on hand for detours and street closures, and review the plan with traffic control personnel. Ensure employees are properly trained in traffic control and wear high visibility clothing.
- Involve police and fire department personnel during the planning process and during the event, if needed. Address security concerns, potential fire hazards, and response to various emergencies. Involve local hospitals and medical facilities.
- Provide adequate first aid, drinking water, trash collection, and toilet facilities. Anticipate maximum crowds and adverse weather conditions. Establish accident reporting and investigation procedures.
- Train employees, volunteers, and others in their responsibilities prior to the event taking place. Establish a communications plan so key event personnel can maintain contact during the event.
- Inspect the event site prior to the event taking place. Remove, repair, or barricade any potential hazards that could injure event workers, spectators, or participants.

Arrange for cleanup after the event takes place.

C. Violence in the Workplace

This process is covered in the Workplace Safety and Security Program. Click here for access to this document.

D. **Building Security**

This process is covered in the Workplace Safety and Security Program. Click here for access to this document.

E. How to Handle an Upset Customer

As a City and County employee, despite your best efforts to deliver quality service, you will have dissatisfied customers from time to time. Our objective is to educate employees so they can be aware of the signs of a difficult customer and to properly train employees in how to deal with difficult situations. It is important for employees to understand that they cannot control the behavior of others and they only have control of their own actions. However, there are skills that employees can learn to help influence the response of a customer.

Upset customers may be in person, over the phone, or on the computer. There are several types of difficult customers that employees should learn through training to identify. They are angry, impatient, intimidating, talkative, demanding and indecisive. Several skills for dealing with upset customers are:

- Assess the situation.
 - o Determine whether you are dealing with a difficult customer or a temporary situation that is bringing out the worst in someone.
 - o Ask yourself whether the customer has historically behaved differently in similar situations.
 - Ask yourself if your reaction is out of proportion compared to the situation.
- Stop wishing "they" were different.
 - During difficult situations we tend to blame, which often leaves us believing that our values are correct and theirs are not.
- Formulate a plan for interrupting the interaction.
 - Avoid behaving in ways that elicit the negative behavior from the customer.
 - o Structure interactions in order to encourage positive and more productive responses.
- Implement your strategy.
 - o Choose the most appropriate moment to implement your strategy using discretion.

- o Choose a time when the customer is not overwhelmed with other problems.
- o Choose a time when you are available to carry out your plan.
- Practice what you want to say.
- Monitor and modify the progress of your coping.
 - o Acknowledge your own efforts.
 - Remain flexible.
 - Don't let your pride determine your decision.

Employees should contact Human Resources for additional training on how to identify upset customers and diffuse angry behaviors.

F. Bomb Threats

This process is covered in the Workplace Safety and Security Program. Click here for access to this document.

G. Weather Emergencies

H. This process is covered in the Workplace Safety and Security Program. Click here for access to this document.

I. Closure of City and County Offices

This process is covered in the Closure of City and County Office policy. Click here for access to this document.

J. Emergency Phone Numbers

- Emergency (Police, Fire, Paramedics, Haz-Mat Team) 911
- Broomfield Police Department
 - o (Non Emergency/Dispatch) 303.438.6400

IV. Workplace Hazards and Guidelines

A. Material Handling and Lifting

All employees are responsible for knowing and practicing proper handling and lifting techniques. Mechanical equipment should be used to lift heavier materials whenever possible. Please follow the guidelines below:

- Plan the lift prior to performing it. Consider the weight, shape and position of what is being lifted.
- Lift or carry only what you can handle safely.
- Determine if assistance is needed, either human or mechanical.
- Use dollies, carts, or other mechanical aids whenever possible.
- Inspect object for grease or slippery substances.

- Decide on the preferred route. Check for obstacles, clearance and condition. Choose the flattest, straightest and clearest route.
- Check the site where the load will be set down, looking for potential problems in advance.
- Position yourself correctly. Get as close to the object that is being lifted.
- Place feet shoulder-width apart, and bend knees.
- Do not bend at the waist, keep back straight.
- Lift correctly, maintain good footing, and get a firm hold.
- Keep the back as upright as possible.
- Lift gradually by straightening the legs.
- If the weight is too heavy, get help.
- Remember to use leg muscles, not back muscles.
- Safely unload properly. Bend knees and keep back straight.
- Be careful to avoid setting the load down on fingers
- Push the load, don't pull. It is less stressful on the back to push a dumpster than to pull one into place.
- Stretching exercises before work help keep the back flexible.

B. Slips, Trips, and Falls

Slips, trips, and falls account for a large percentage of workplace injuries. Proper action by employees is often the only way to avoid these debilitating and painful injuries. It is important to identify and eliminate unsafe conditions which may lead to falls. There are lots of ways to suffer slips, trips, and falls while working. An employee can lose his/her balance, trip over objects left improperly in the walkway, or fall from an unprotected elevated position. To avoid slips, trips, and falls, follow these rules:

- Wear appropriate footwear with slip-resistant soles.
- Be on the lookout for spills, electric cords, frayed carpets, and other slip and trip hazards.
- Clean up or report unsafe conditions that can cause falls. Warn others in the area that a hazard exists.
- Clean footwear of mud, snow, and other slick substances before entering a building.
- Walk slowly and take short steps when walking on icy or snow-covered surfaces. Be especially careful when entering or exiting vehicles.
- Apply sand or salt to icy spots and report their location to your supervisor.

- Walk, don't run, through work areas. Don't take shortcuts around machinery and equipment.
- Use handrails when going up or down stairs.
- Get help if carrying heavy or awkward objects. Use carts and other mechanical aids.
- Report or replace burned out lights in stairways.

C. Slip and Fall Prevention on Ice and Snow

Numerous injuries result from slips and falls on icy sidewalks, parking lots, roads, and other outdoor locations. Snow removal and frequent sanding or salting of these areas can help. Many times the total elimination of the hazard is impossible and the following measures must be taken to cope with the problem:

- Be alert for potential hazards. Realize that falls can happen at any moment when walking on ice.
- Learn the body mechanics of minimizing injury in a fall. Avoid head contact.
 Spread out the impact of the fall over as much area of the body as possible.
 Don't extend arms to try to break the fall. Don't land on an elbow, wrist, or knee, which can result in broken bones.
- Wear slip-resistant footwear. Slips and falls are often caused by a reduction in friction between footwear and the walking surface. Therefore, footwear choice is very important.
- Wear low heels with soles constructed of slip-proof material. Avoid wearing shoes with leather soles on ice and snow.
- Galoshes and overboots that are worn smooth should be replaced.
- Shorten the stride. Walk with feet spread apart laterally.
- Recognize differences in surfaces. Snow is less slippery than ice. But snow on top of ice may be more dangerous than bare ice. Be on the lookout for black ice on driveways and sidewalks.
- Don't track snow into buildings. Wipe off feet at the entrance so others won't slip and fall on melted snow.

D. Extension Cords

Extension cords are commonly utilized in both office and shop settings. The potential hazards associated with extension cord use are trips and falls, electric shocks, and fires. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

 Extension cords should be used temporarily or seasonally for periods less than 90 days, or during periods of construction. They should not be used as a substitute for fixed electrical wiring.

- Ensure there is a UL listing on any extension cord before using.
- Overuse of extension cords may overload the electrical system, causing short circuits, circuit failures, fires, or machine failures.
- Kinking or excessive bending of the cord should be avoided to prevent wire strands from breaking. Broken wire strands may pierce the insulated covering and become a shock or short-circuit hazard. If a cord is damaged, have it repaired by a qualified electrician or replaced.
- Know which type of extension cord to use. For example, cords for use with
 portable tools and equipment are made in several grades, each of which is
 designed for a specific type of service. Special types of rubber or plastic
 covering should be considered when the cord is to be used in areas where it
 may come in contact with oils or solvents. Do not use ordinary twisted,
 household lamp cords as extension cords.
- Connect flexible cords to devices and fittings with strain relief so that the tension will not be transmitted to joints or terminal screws.
- Cords should not be run through holes in walls or through doorways. Arrange cords so they don't create a tripping hazard. Pick them up when not in use.
- Ensure the ground pin is attached on the plug for those designed to be grounded.
- Plug extension cords directly into the electrical outlets. If necessary, use a single power strip plugged directly into the electrical receptacle.
- Do not drive over any extension cords.
- Use only 3-prong heavy-duty cords.

E. Shop Hazards

Hazards in the shop can take a variety of forms including flammable liquids and vapors, unsafe hand and power tools, trip and fall hazards, compressed air hazards, welding exposures, hazardous chemicals, etc. In order to prevent accidents:

- Good housekeeping is perhaps the most important element in preventing accidents. A clean, neat, and well organized shop is also a safe shop. Keep clutter picked up. Put tools and materials in proper storage when finished with them. Clean up spills, put away materials, and pick up hoses and cords when not in use.
- Be cautious of ignition sources. Flammable vapors, such as gasoline, tend to accumulate near the floor. Any ignition source can cause an explosion. Common ignition sources are static electricity, sparks, light switches, a lit cigarette, and pilot lights on water heaters or other equipment.
- Always wear Personal Protective Equipment (PPE). PPE can prevent serious and permanent injury, but only if it's worn.

- Keep power tools in safe condition. Make sure electrical plugs with grounds have the grounding pin. Keep the tool guards in place and properly adjusted. Replace worn parts.
- Compressed air can be dangerous. Use caution when working with it. Never use compressed air to blow dust off clothes. Air can be injected into the skin and can cause serious injury.
- Review the Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) before using any chemical.
- Follow proper safeguards to avoid injury.
- Ensure adequate ventilation when welding indoors. Use welding curtains, and remove any flammable or combustible materials from the immediate area.

F. Battery Charging

The charging of batteries can create many dangers if the operation is not performed safely. To help ensure safe practices are followed, safety rules should be established and enforced. When designing a battery charging operation, the following safeguards should be considered:

- Designate a specific area for battery charging. This location should have facilities for flushing and neutralizing spilled electrolyte which may contact the body.
- Provide personal protective equipment including eye protection, a rubber apron, and rubber gloves. Employees should be required to wear these items. To help encourage use, the equipment should be maintained in good condition and kept in the immediate area.
- Ensure there is adequate fire protection and protect the charging apparatus from damage caused by moving vehicles.
- Post "No Smoking" signs. Ensure there are no open flames, sparks, or electric arcs in the battery charging area.
- Racks for supporting batteries should be made of a nonconductive material
 or coated to prevent the flow of current. Tools or other metallic objects
 should be kept away from the tops of uncovered batteries.
- Provide material handling equipment such as a hoist for handling large batteries.
- Electrolyte should be handled with a carboy tilter or siphon. Pour acid into water, not water into acid, when charging. Vent caps should be left open to avoid electrolyte spray when charging the battery and also to reduce heat.
- Provide adequate ventilation to reduce the possibility of an explosion associated with hydrogen gas. If this cannot be achieved, electrical wiring and fixtures should conform to Class I, Division I locations.

G. Changing Multi-Rim Wheels

The principal hazard in mounting multi-rim wheels occurs when the rim, locking, or other fasteners are thrown violently through the air (blow-offs) striking persons or property. A blow-off is most likely to occur while a tire is being inflated following its mounting on the rim. Blow-offs that have caused the greatest number of injuries appear to have been due to improper mounting, use of defective parts, or interchange of unmatched parts. Here are a few safety tips:

- Completely deflate tires and remove valve before demounting.
- Apply a rubber lubricant to the bead and rim mating surfaces during the assembly of the wheel and inflation of the tire, unless the tire or wheel manufacturer recommends against it.
- Inflate tires inside a restraining device. Do not rest any part of your body or piece of equipment against a rim wheel that is inside a restraining device.
- Do not try to correct the seating of side and lock rings by hammering, striking, or forcing the components while the tire is pressurized.
- Heat should not be applied to a multi-piece wheel or wheel component.
- Inspect wheel components after tire inflation (while still within the restraining device) to ensure that they are properly seated and locked. If further adjustment is necessary, deflate the tire and remove valve core before the adjustment is made.
- Cracked, broken, bent, or otherwise damaged rim components should not be reworked, welded, brazed, or otherwise heated.

H. Parts Cleaning Tanks

Parts cleaning tanks can present potential fire and health hazards due to the solvents contained. The following safety procedures should be followed:

- Use a non-combustible metal tank which has a fusible-linked lid. In the event of a fire, the link will melt and close the lid to contain the fire and restrict the supply of oxygen.
- Routinely inspect the tank, fusible link, or attached light to ensure the tank has not been damaged.
- Post the cleaning area with "No Smoking" signs and enforce the policy. Use non-sparking brushes when cleaning.
- Read and understand the Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) for the solvent.
- Wear eye protection (splash goggles and face shield) and rubber gloves to reduce the possibility of eye injuries and dermatitis. To reduce solvent exposure, ensure the area has adequate general dilution ventilation or a local exhaust system.

- After washing, remove parts which would interfere with the complete closing of the lid. Leaving large parts in the tank after cleaning and draining will defeat the purpose of the self-closing mechanism.
- Change the solvent on a regular basis to help reduce the amount of scrubbing necessary to clean the part. Use a cleaning solvent that is of low toxicity, non-flammable, or has a high flash point. The supplier should be able to offer advice and recommendations to meet cleaning requirements.

I. Oil and Grease

Oil and grease can cause accidents and injuries in many different ways. Left on the floor, these substances can cause slips and falls. Oil-saturated rags and trash, left in uncovered containers, can cause spontaneous combustion and fires. Oil and grease around oxygen cylinders can result in violent explosions. In order to prevent accidents:

- Clean up grease or oil spills immediately.
- Provide and use covered metal containers for disposing oily rags and trash.
 Approved safety cans with self-closing lids are best.
- Be cautious around oxygen cylinders. Keep fittings clean of any oily or greasy residue that might cause a reaction and explosion.
- Be aware of other oxidizers. Never store oil or grease around such things as potassium permanganate or any other chemical labeled as an "oxidizer."
- Keep oil and grease away from ignition sources. Oils and greases are combustible. Keep open flames away from these substances.

J. Compressed Air

The use of compressed air for cleaning equipment and surfaces is common in many municipal shops and operations. Although it may seem like a fairly safe activity, there are a number of serious hazards associated with its use. For instance, a blast of air at 40 pounds per square inch (psi) can rupture an ear drum or even cause a brain hemorrhage. As little as 12 psi can pop an eyeball from its socket. Eye injuries from flying particles are also common. Air blown into open wounds can create air bubbles that enter the bloodstream and can cause fatal injuries. Whenever you use compressed air for cleaning purposes, always follow these precautions:

- Compressed air can be dangerous. Use caution when working with it.
- Reduce pressure to less than 30 psi for cleaning purposes.
- Install a chip guard on the end of the air nozzle.
- Wear eye protection and other personal protective equipment as needed as the air may blow dirt particles into eyes.

- Don't use compressed air to clean dust off your clothing. Air can be injected
 into the skin and cause serious injury. Manually brush off any dust, dirt, or
 particles from clothing.
- Inspect air hoses, nozzles, and other components of the system to make sure they are in safe operating condition. Repair or replace damaged equipment. Make sure connections and couplings are tight.
- After use, remove air hoses from floors and return them to storage. This
 will eliminate trip hazards and prevent damage to the hose and nozzle. Do
 not drive over air hoses.
- Horseplay is strictly prohibited. Never point an air hose at another person or any part of the body.

K. Handling Compressed Gas Cylinders

The types of hazards encountered with compressed gas cylinders include flammable and explosive mixtures of gases, and sudden pressure release due to rupture. Serious accidents may result from the misuse, abuse, or mishandling of compressed gas cylinders. Observance of the following basic rules will help control the hazards of handling compressed gas cylinders:

- Store cylinders in well-protected, well-ventilated areas. Oxygen cylinders should be separated from flammable gas cylinders and highly combustible material (oil and grease) by at least 20 feet, or by a noncombustible barrier at least five feet high having a fire resistance rating of at least 30 minutes.
- Secure gas cylinders in the upright position with the protective valve cap attached while in storage. Keep cylinders away from areas where they can be knocked down or damaged.
- The shape, smooth surface, and weight of cylinders make them difficult to carry by hand. Move cylinders by rolling them on their bottom edge, never drag them.
- To prevent rusting, cylinders stored in the open should be protected from contact with the ground and against extremes of weather.
- Open cylinder valves slowly. A cylinder not provided with a handwheel valve should be opened with a spindle key, special wrench, or other tool provided by the gas supplier.
- Before making connection to a cylinder valve outlet, "crack" the valve for an instant to clear the opening of particles of dust or dirt. Always point the valve and opening away from the body and not toward anybody else.
- Never use oil or grease as a lubricant on valves or attachments of oxygen cylinders.
- Close cylinder valves when the work is finished.

L. Spray Painting/Finishing

Spray painting operations can present fire and health hazards if certain safety precautions are not taken. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- Be especially careful when working near power and gas lines, steep edges, and other dangerous conditions.
- Ensure that the respirator and cartridges used are suitable for the paint being used. For air purifying respirators, the cartridges should be checked periodically and changed when needed. Respirators should be stored in clean and dry locations away from overspray exposures.
- Equipment that produces sparks or flames should be separated from the spraying area by at least 20 feet or by a partition.
- Electrical equipment and wiring in the spray area should be explosion-proof.
- The quantity of flammable or combustible liquids kept in the spraying area should not exceed the supply needed for one day or shift.
- All spraying areas should be kept as free from the accumulation of combustible materials and paint residue deposits as practical, with cleaning conducted daily if needed.
- Space within the spray booth on the downstream and upstream sides of filters should be protected by approved automatic sprinklers.
- "No Smoking" signs should be readily visible and conspicuously posted in all spraying areas and paint storage rooms.

M. Welding

Welding operations, both gas and arc welding, have numerous potential hazards which can cause serious injury. Arc welding produces ultraviolet rays that can burn other workers standing several feet away. Gas welding also has hazards that should not be taken for granted. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- Welding should be performed outside of the facility, if possible.
- Provide and use welding curtains or other protective measures when welding is being done to shield workers and the public from exposure to welding rays, flashes, sparks, molten metal and slag.
- Always use personal protective equipment when welding. Proper welding hoods, goggles, gloves, and aprons should be worn. Clothing that covers the entire body is necessary to prevent burns from rays of the arc and hot slag or sparks.
- Ensure adequate ventilation is provided. Harmful gases are a by-product of welding which must be drawn off by adequate ventilation.

- Make sure cables are in good repair. Both electrode and ground cable should have secure connections and be well-insulated. Even though low voltages are involved, electrical hazards can still exist.
- Keep compressed gas cylinders away from sources of sparks or heat. When
 cylinders are stored they should be capped and secured to prevent toppling.
 Oxygen and fuel gas cylinders should be separated by at least 20 feet or by
 a noncombustible barrier at least five feet high having a resistance rating of
 at least one-half hour.
- Check hoses periodically to ensure they are in good repair.
- All flammable and combustible materials should be removed or protected. A
 welding flame, sparks, or arc can ignite these materials as well as any
 flammable vapors or dust in the area.
- At the welding area, provide a fully-charged fire extinguisher. Make sure the class of extinguisher is correct for the materials involved, and that all workers are trained to operate the extinguisher.

N. Chain Hoists

Improper hoisting may cause serious accidents. Loads can fall and injure workers or damage equipment and materials. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- Inspect hoists, chains, and slings on a regular basis. Look for signs of broken or worn chains, frayed slings, etc. (All overhead hoists should be part of an annual inspection and maintenance program.)
- The load capacity must be clearly stamped or printed on the hoist and each side of the crane. This load maximum must never be exceeded.
- Check controls to see that the proper reaction results from the operation of the specific control.
- Check hoist cables for signs of kinking, fraying, twisting, etc. Do not use if such problems are observed until the rope/cable is replaced.
- Institute a preventative maintenance program for hoists and cranes.
- Hoists and cranes should only be modified by qualified engineers. New load ratings should be assigned as appropriate.

O. Jacks and Lifts

The most common hazards associated with jack use are collapse exposures from trying to lift beyond the capacity of the jack, jack placement on uneven surfaces, or the load slipping off of the jack. The following are some basic safety precautions to follow when operating a jack:

- Check the load capacity plate or other markings to ensure the jack can support the load. If a properly rated jack is used, it should not collapse under the load.
- Inspect jacks before and after each use. Any sign of hydraulic fluid leakage is sufficient reason to remove the jack from use.
- Place the jack on a level and clean place when using on the floor or ground surface. Make sure that the floor loading capacity is not exceeded. If the ground is used, the jack base should be set on substantial hardwood blocking (at least twice the size of the jack) so that it will not turn over, shift, or sink.
- Never use "extenders" made of wood or metal. Instead, either a larger jack should be used, or higher blocking that is correspondingly wider and longer should be placed under the jack.
- All lifts should be vertical, with the jack correctly centered for the lift, the base on a perfectly level surface, and the head with its shim bearing against a perfectly level meeting surface.
- Place blocking under a load that is being lifted by a hydraulic jack.
 Otherwise, the jack may settle after the load is raised.
- Secure the base of a screw jack as securely as possible since these jacks have a tendency to twist when a heavy load causes the floating head of the jack to bind.
- Never disable or by-pass safety devices.

P. Hand Tools

Of all the equipment placed at our disposal, hand tools are the most commonly used and abused. The National Safety Council indicates that injuries due to the use of hand tools were the most prevalent type of injury - even more frequent than power tools. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- No employee may attempt to use any tool or piece of equipment without proper training and authorization.
- Choose the correct tool for the job. All hand tools must be kept in good repair and used only for their intended purpose. Never use a makeshift tool.
- Use only tools in good condition. Tools having defects or damage that will impair their intended operation or render them in any way unsafe for use must be removed from service immediately.
- When work is being performed overhead, tools not in use must be secured or placed in holders.

- Throwing tools or materials from one location to another, from one employee to another, or dropping them to lower levels must not be permitted.
- Only "non-sparking" tools must be used in locations where sources of ignition may contribute to a fire or explosion.
- Keep saw blades sharp, and store safely when not in use.
- Do not use a hammer with a hardened face on a highly tempered tool such as a drill, file, die, or jig because metal chips may fly.
- Ensure that pipe wrench jaws are sharp and chains are in good condition so they will not slip.
- Do not place tools or equipment on the edge of elevated work areas where they might fall or be knocked off.
- Practice "good housekeeping" a place for all tools and equipment.

Q. Machine Guards

All machinery and equipment should be adequately guarded to eliminate hazards created by points of operations, running nip points, rotating parts, and flying chips. These hazards have been responsible for countless injuries and fatalities. The number of excuses for not guarding is almost as many as there are accidents. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- Know how the machine operates. Check guards before using a machine to
 ensure they are properly maintained and adequately cover the point of
 operation. A hazard point may appear well-guarded when the machine is at
 rest, but a poorly maintained guard or safety device can interact with
 moving parts to produce a hazard.
- Do not operate a machine that is not properly guarded. Some older machines may need to have new guards designed and installed.
- Do not remove machine guards because they seem to interfere with work. This defeats the purpose of guarding and increases the accident potential. Guards are seldom so poorly designed that removal is justified.
- Guards do not ensure that the eyes or face will not be exposed to flying particles, or that the machine will be less noisy. So wear proper Personal Protective Equipment such as gloves, aprons, helmets, hardhats, safety shoes, goggles, face shields, dust masks, vest, and ear protection while operating machines.

R. Portable Power Tools

Portable power tools present additional hazards compared to stationary power tools. Typical injuries caused by portable power tools are burns, cuts, foreign particles in the eyes, and strains. In addition to the specific safety instructions

issued by the equipment manufacturer, the following guidelines are recommended:

- No employee may attempt to use any tool or piece of equipment without proper training and authorization.
- Power tools must be inspected, tested and determined to be in safe operating condition prior to use.
- Continued periodic inspections must be made to assure safe operating condition and proper maintenance. An insulation resistance tester can be used to identify impending failures of electrically-powered tools.
- If available, use rechargeable battery-powered tools to help eliminate electric shock hazards.
- Disconnect the source of power before changing accessories on a portable power tool.
- Guards should be replaced or put in correct adjustment before the tool is used again.
- Do not leave a tool in an overhead place where there is a chance that the cord or hose, if pulled, will cause the tool to fall.
- Use proper eye protection when there is an exposure to flying from particles while drilling, grinding, or sanding.
- Gloves, ties, loose clothing, long hair, or jewelry should not be worn when using revolving tools such as drills, saws, and grinders.
- Only trained and qualified operators should be allowed to use explosiveactuated fastening tools. A demonstration of competence should be required upon completion of training.
- Portable power nailing and stapling tools must be operable only when held against the work surface with a force of at least five pounds more than the weight of the fully loaded tool. In addition, it must be necessary to operate a trigger or switch for each fastener driven.
- Squeeze the trigger only when the tool is on the work surface when operating small air hammers.
- Guards above and below the faceplate of electric saws must be in place and automatically retract to cover the exposed saw teeth. Guards should be frequently checked to ensure that they operate freely and enclose the teeth completely when the saw is not cutting.
- Recoiling or self-storing air hoses that are suspended above work stations are preferred to help reduce tripping or stumbling hazards.
- All hydraulic or pneumatic tools which are used on or around energized lines or equipment must use non-conducting hoses.

- Manufacturers' safe operating pressures for hydraulic hoses, valves, pipes, filters and other fittings must not be exceeded.
- The use of cranks on hand-powered winches or hoists is prohibited unless the hoists or winches are provided with positive, self-locking features. Hand wheels without projecting spokes, pins, or knobs should be used.

S. Grinding Wheels

Grinding wheels can cause serious injuries if not installed, used, or maintained in a safe manner. Permanent eye damage can result from flying objects and grinding wheels have been known to explode, causing serious and even fatal injuries. Any employee using a grinding wheel should follow the safety precautions listed below:

- Secure the grinding wheel to the work bench (or floor if it is a pedestal grinder) so it won't tip over or "walk" while you are using it.
- Perform a "ring test" before mounting grinding wheels to make sure they
 are not damaged. The wheel should have a clear bell-like ring when tapped
 with a non-metallic object (organic bonded wheels do not emit this metallic
 ring). A dull sound indicates that the wheel may be defective and could
 explode. Inspect the wheel for other obvious defects and discard unsafe
 wheels.
- Wheels should match or exceed the speed rating of the grinder.
- Install and adjust guards on the grinder. Tool rests should be maintained 1/8 inch from the wheel and the tongue guards kept at 1/4 inch from the wheel. Make sure that safety guards cover the side spindle end, nut, and outer flange.
- Clean and adjust safety shields prior to using the grinding wheel.
- Wear eye protection such as safety goggles or face shields over safety glasses. Eye injuries are the most common type of injury when using grinders so make sure your eyes are adequately protected.
- Remove flammable liquids and combustible materials from the area around the grinder. Sparks from the wheel could cause fires and explosions. Make sure a fire extinguisher is available if needed.
- Maintain a firm hold or secure the object you are grinding in a clamping device. Use the tool rest for support.
- Don't jam the object into the wheel. Maintain a smooth and steady motion when grinding.
- Don't leave the grinder running unattended.
- Change grinding wheels when they become worn or otherwise defective.

T. Power Saws

Operating a power saw has inherent risk for accident and injury. The worker must be trained to use proper and safe techniques, how to recognize potential accident situations, and what to do when they are encountered. The most frequent accidents involving power saws are blade cuts or abrasions and kickbacks. These can be minimized by proper guarding and by establishing and enforcing safe work practices. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- Circular saws must be equipped with guards that automatically and completely enclose the cutting edge.
- Cracked, bent, or damaged blades should be replaced immediately.
- Power saws must not be left running unattended.
- Radial arm power saws must be equipped with automatic brakes.
- The table of radial arm or swing saws must extend beyond the leading edge of the saw blade.
- All swing cutoff and radial saws or similar machines which are drawn across a table must be equipped with limit stops to prevent the leading edge of the tool from being thrown back toward the operator.
- Each hand-fed crosscut saw and each hand-fed circular ripsaw must be furnished with a spreader to prevent the material from squeezing the saw or being thrown back toward the operator.
- All portable, power-driven circular saws must be equipped with guards above and below the base plate or shoe. The upper guard must cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts. The lower guard must cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard must automatically and instantly return to the covering position.

U. Table Saws

Operating a table saw has inherent risk for accident and injury. The worker must be trained to use proper and safe techniques, how to recognize potential accident situations, and what to do when they are encountered. The most frequent accidents involving saws are blade cuts or abrasions and kickbacks. These can be minimized by proper guarding and by establishing and enforcing safe work practices. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

• Maintain the rip fence parallel to the saw blade. Use a push stick when the width of the rip is two to six inches.

- Adjust the blade height never higher than just enough to cut through the wood.
- Beware of saw blades that may cause unsafe, difficult, or unsatisfactory operation. Conditions to look for include: saw blade out of round, saw blade not straight (out of plane), improper hook or pitch of teeth, cracked blades, dull blades, and gummed blades.
- Do not use a crosscut saw blade for ripping or a ripsaw for crosscutting.
 Using the wrong saw for the job makes the work harder, requires additional force when feeding the stock, and may cause kickback.
- Install the blade guard. Do not operate the saw unless the guard is secured.
- Keep hands out of the line of the cut when feeding a table saw. The guard is a protective device from the sides and from above, but not from the front. Never stand directly behind the board you are cutting.
- Never stop, whether ripping or cross cutting, until the whole board is well past the blade.
- Start buttons should be protected so accidental contact will not start the saw.
- Do not use stock that is twisted, warped, or does not have a straight edge to guide along the rip fence.
- Stock should not be released until it has been pushed all the way past the saw blade. Saw operators often are injured when their hands slip off the stock while pushing it into the saw, or when holding their hands too close to the blade during cutting operations.
- Ensure that housekeeping practices are adequate to reduce hazards from slippery floors and dust buildup. Keep the motor clean of sawdust to reduce overheating and possible fire.

V. Lawn Mowers

Power lawn mowers, especially the rotary type, have proven to be a mixed blessing. Although they save time and effort and leave a lawn neatly trimmed, they also cause many injuries each year. These injuries range in severity from minor cuts to amputations. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- All equipment must be maintained in good, clean condition and inspected at frequent intervals. Defective equipment should be reported to a supervisor immediately.
- Wear PPE including long pants, safety glasses, hearing protection, and safety boots. Persons sensitive to grass, weeds, etc. should wear dust masks.

- Before starting to mow, the operator should pick up rocks, glass, tree branches and twigs, and any other object that could become a lethal missile to employees or the public if thrown out by the mower blades.
- Observe the location of fixed objects, such as pipes, lawn sprinkler heads, and curbs that could damage the mower or break off.
- Watch for vehicle or pedestrian traffic that could be affected by flying dirt or debris.
- All persons must be cleared away from moving operations for at least 100 feet in all directions.
- Disconnect the spark plug wire and allow the engine to cool before cleaning, repairing, or inspecting the mower.
- Use an approved safety can with a self-closing spout, flash arrestor, and a flex spout when adding fuel.
- Mow up and down the face of steep slopes, never across them, because the
 wheelbase is longer than the tread (the unit is more stable that way). Large
 riding mowers are known to overturn as a result of extreme power in the
 rear wheels. Mowers must be operated at a safe speed. Be constantly aware
 of the terrain and especially the steepness of the slope.
- Shut off the engine and be sure the blade has stopped completely before emptying the grass catcher, attempting to free obstructions from the discharge chute, adjusting the cutting height, or performing any operation that could place hands or feet near the blade. When a riding mower is left unattended, the blades must not be engaged, and the key removed.
- Never operate any piece of equipment, regardless of how experienced and/or knowledgeable you are of the equipment, with an inoperable or bypassed safety interlock switch.
- Never carry a passenger on a riding mower.
- Never disable a safety interlock or operate a mower if an interlock is not operational.

W. Weed Eaters

To help prevent injuries to employees and the general public, it is necessary to take certain precautions while operating weed eaters. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- Wear safety glasses, goggles, or face shields which meet the ANSI Z87.1-2003+ standard for high-impact resistance.
- Hearing protection should be worn. It should be properly fitted.

- Dress appropriately. Wear safety shoes or boots. Long sleeve shirts and long pants should be worn to help protect the skin from flying objects and the weather.
- Wear work gloves to help prevent cuts while cleaning the area of cans, bottles, or other rubbish.
- All workers within the right-of-way, including emergency responders (who have additional garment options), are required to wear high-visibility safety apparel that meets performance Class 2 or 3 of ANSI/ISEA 107-2004 or equivalent revisions.
- Refuel trimmers before starting operation or after work breaks to reduce the possibility of fires from a hot motor. Fuel should only be stored in and dispensed from approved safety cans.
- Maintain a safe distance of at least 100 feet in all directions from all bystanders, especially children.

X. Chain Saws

Chain saws are available in a variety of models, sizes and horsepower ratings. But shared hazards exist and similar safety precautions must be taken to prevent injury. As with any equipment, read the manufacturer's instructions or have an experienced trained person demonstrate the safe operation. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- Keep all bystanders at a safe distance from the work area.
- Use anti-kickback devices. Kickbacks are the single biggest cause of chain saw accidents. There are three types of anti-kickback devices including a safety nose cone or quard, a safety chain, or a chain brake.
- Avoid accidental contact with the chain. Cuts can occur when the chain is in operation, being moved, or repaired.
- Wear personal protection including approved eye/face shields, above the ankle leather boots, protective chaps, gloves, and hard hats. Ear muffs or ear plugs may also be needed depending upon the noise level.
- Prevent burns by avoiding contact with hot surfaces such as the muffler or cylinder head. Wearing gloves may be useful in reducing burns.
- Use approved containers for storage and dispensing of gasoline. Ensure the
 engine is off before refueling; fill the tank on bare ground; maintain the
 saw free of excess gasoline, oil, and sawdust; keep all wires and spark plug
 connections tight; and have a fire extinguisher present.
- Maintain a first aid kit on site, and have someone on the crew trained to administer basic first aid.

 Use proper lifting techniques during all aspects of the job including the cleanup operation.

Y. Snow Blowers

Failure to follow certain safety precautions may result in injury to the snow blower operator or other people. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- Read and understand the operating instructions thoroughly or have an experienced individual demonstrate the proper procedures.
- Maintain a safe area of operation keeping bystanders, especially children, away.
- Remove foreign objects in the area which may be picked up and thrown by the blower. Stay alert for holes or other hidden hazards in the terrain.
- Inspect the blower to ensure all shields are in place and not damaged. Tighten any loose nuts, bolts, or screws. Before servicing, disconnect the spark plug wire.
- Wear winter clothing and boots that will assure proper footing on slippery surfaces. Do not wear loose clothing which could get caught in moving parts.
- Use approved safety cans for dispensing and storage of fuel. Never refuel an engine that is running or hot.
- Direct the discharge away from bystanders, glass enclosures, windows, and automobiles.
- Stay away from the discharge opening while operating the blower. Do not attempt to clear a jam with your hands. The stored energy of the blades can suddenly release causing severe injury. Remove jams per the manufacturer's instructions.

Z. Snow Shovels

When it is necessary to remove snow in areas where snow throwers or other equipment cannot gain access, someone must perform this task manually. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- Use individuals who are in proper physical condition to perform the task. Provide rest breaks during the job since it is physically demanding. Adjust the rate of shoveling depending on the weight of the snow.
- Bend your knees, lift with your legs and arms, and step in the direction you are throwing the snow. Use an ergonomically-designed shovel to minimize back strain.

- Push or sweep as much snow as possible, and shovel in layers if the snow is deep.
- Use small quantities of rock salt or ice melt where possible to reduce the volume of shoveling.
- Dress warmly since the cold weather can pose a strain on blood circulation. Wear shoes or boots with slip-resistant soles to prevent slips and falls.
- Avoid snow shoveling soon after eating. Do not smoke immediately before, during, or after shoveling.
- Stop shoveling at once if signs of physical stress such as chest pain, weakness, or dizziness occur and seek medical attention.

AA. Snowplows

Operating a snowplow safely requires that you remain alert to a variety of potential hazards including weather and road conditions, roadside obstacles, personal limitations, vehicle operations, and other drivers. Also, it is critical that you understand and practice proper defensive-driving techniques. Only then can you accomplish your goal of clearing the roadways without causing an accident. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- Inspect your vehicle and equipment before you begin your snowplowing duties. Check mirrors, wipers, lights, chains, plows and wings, spreaders, etc. Document the inspection.
- Dress for the conditions which you expect to encounter.
- If you have to plow in remote areas, have emergency equipment available.
- Know your route and the potential hazards that you may encounter.
 Anticipate narrow roads, drop-offs, fixed objects, blind spots, and other hazardous conditions.
- Keep up with the local weather forecast, and prepare for changing weather and road conditions.
- Wear your seatbelt.
- Follow defensive driving practices. Anticipate the moves of other drivers.
- Remember to increase your following distance behind other vehicles.
- Adjust your driving patterns according to road conditions, traffic, visibility, terrain, and other factors.
- Maintain communications. If an emergency situation arises, contact dispatch, and if appropriate, the local police and fire department.
- Get plenty of rest before an expected storm hits. Avoid alcohol and drugs, including prescription drugs that may cause drowsiness.

BB. <u>Heavy Equipment</u>

The use of heavy equipment such as front-end loaders, backhoes, graders, and bulldozers presents special hazards to the operators of the equipment as well as to others. Heavy equipment, for all its ponderous size, can move surprisingly quickly. In addition, the blades, buckets, and plows that are attached can perform movements that can quickly injure or kill the unwary. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- Operate heavy equipment only if you are properly licensed and adequately trained.
- Review the operations manual for each piece of equipment you operate.
- Conduct daily documented inspections of all key equipment components to ensure safe operation.
- Perform preventative maintenance per the manufacturer's recommended schedule. Document maintenance activities.
- Check the worksite at the beginning of each day. Ensure that you know the locations of all equipment and materials, open trenches and excavations, and most important, the locations and duties of personnel in the area.
- Operate at safe speeds and practice other defensive driving techniques.
- Watch out for other heavy equipment, vehicles, and people in the work area. Make sure others see you and you see them.
- Be especially careful when working near power and gas lines, steep edges, and other dangerous conditions.

CC. <u>Bucket Trucks</u>

Some of the most frequent causes of accidents while using mobile aerial baskets (bucket trucks) include: Failure to observe proper precautions when working around electrical hazards, improper positioning of vehicle or outriggers, overloading the boom, and over-reaching from the basket or other improper working procedures. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- Conduct inspection and testing of all lift control equipment prior to use.
- Ensure aerial baskets are equipped with safety body harnesses and lanyards, as well as a means for attaching the lanyard to the equipment. Wear them!
- Perform dielectric tests annually on basket equipment approved for use on energized equipment.
- Load limits of the basket should be readily visible and not exceeded at any time.

- Lower the boom and cradle the basket before moving the truck. No one should ride in the basket while the truck is moving. An exception to this would be in the instance of short moves where the employee may ride in the basket only if it is returned to the cradle position.
- Examine footing for truck wheels and outriggers to ensure a stable setup. Hand brakes, chocks, and/or cribbing, when needed, should be used to ensure stability. The truck should sit approximately level when viewed from the rear.
- Do not sit or stand on the top or the edge of the basket. Ladders should not be used from baskets. While in the basket, the employee's feet should always be on the floor of the basket.
- Only non-conductive attachments should be allowed on the baskets.
 Extreme care should be taken to avoid contact with poles, cross arms, or other grounded or live equipment.

DD. Forklifts

The forklift, when properly maintained and operated, is a versatile piece of equipment. However, each year there are injuries and deaths related to forklifts. In most cases, investigations have revealed that the cause of the accident could be traced to inadequate maintenance, improper inspection, unqualified operators, or improper operating techniques. In addition to the specific safety instructions issued by the equipment manufacturer, the following guidelines are recommended:

- Wear your seatbelt.
- Use only approved forklifts where hazardous atmospheres may exist.
- Ensure only trained and qualified employees operate the equipment.
- Conduct daily documented inspections.
- Establish and enforce safety rules required for safe operations.
- Post work areas and establish boundary markings where forklifts are operating.
- Remind workers of the hazards associated with forklift operations on a regular basis.
- Don't allow horseplay or unsafe operations, and don't permit excess or unsafe speeds.
- Don't exceed manufacturer's safety and load capacity recommendations.
- Don't operate unsafe equipment. If there is a defect, get it fixed before using.

EE. <u>Lockout/Tagout</u>

A lockout/tagout (LOTO) program should be used for servicing and maintaining machines and equipment in which the unexpected start up or release of stored energy could cause injury. There are many different sources of energy such as mechanical motion, potential energy, electrical energy, pneumatic, hydraulic, kinetic, gravity, and thermal energy which should be evaluated as part of this program. Service manuals should warn of the various hazards. Specific procedures should be developed for each piece of equipment. A generic program will not identify all potential hazards. When developing a LOTO program, the following sequence should be used as a guide:

- 1. Notify all affected employees that a LOTO procedure is taking place. Explain the reason for the procedure and instruct affected employees to refrain from attempting to restart or re-energize equipment that is locked or tagged out.
- 2. Shut down the equipment by normal procedures if the equipment is operating.
- 3. Operate any valves, switches, or other energy-isolating devices to disconnect or isolate from the equipment each energy source such as electrical, mechanical, hydraulic, or pneumatic energy.
- 4. Stored energy may be found in items such as capacitors, springs, elevated machine parts, hydraulic systems, and air, gas, steam, and water under pressure.
- 5. Dissipate or restrain stored energy by using the appropriate method such as grounding, repositioning, blocking, or bleeding down lines.
- 6. Use an assigned lock to lockout the energy isolating device. Procedures should be established for ensuring that only the workers performing the maintenance have the keys for the locks under their direct control.
- 7. Install tags on appropriate isolation devices.
- 8. Ensure that no personnel are exposed. As a check that all energy sources have been disconnected, attempt to operate the item by normal methods. If the equipment operates, the energy sources must be reevaluated to determine proper isolation controls. After testing, return the controls to the off or neutral position. The equipment is now locked out.
- 9. Check the equipment area after repairs to ensure no one is exposed prior to testing. If all is clear, each employee should remove their own lock.
- 10. Operate the energy isolating devices to restore energy to the equipment.
- 11. Refer to OSHA regulation 29 CFR 1910.147 (for additional information concerning LOTO procedures.

FF. <u>Confined Space Entry</u>

A confined space is any area that has limited openings for entry and exit that would make escape difficult in an emergency, has a lack of ventilation, contains known and potential hazards, and is not intended nor designated for continuous human occupancy. The types of confined spaces that may be encountered by Broomfield workers include, but are not limited to, manholes, sewer lines, valve vaults, metering vaults, pumping or lift stations, storage tanks, utility pits, and trenches greater than 4 feet deep.

Confined space entry is potentially one of the most hazardous jobs an employee may perform. Common hazards include oxygen deficiency, flammable and toxic gases, mechanical hazards from moving machinery and equipment, electrical hazards, entrapment, engulfment, and fall hazards. The following safeguards must be taken to ensure any confined space entry work is performed in an accident- free manner:

- Identify confined spaces that employees may have to enter. Post them with danger signs and inform employees of their existence.
- Prepare an entry permit prior to entering any permit-required confined space. Make sure the permit includes the space to be entered, purpose of entry, date, names of all entrants and attendants, hazards, monitoring results, emergency numbers, and other pertinent information. The permit should be approved and signed by the entry supervisor.
- Arrange for safety equipment, including monitoring and ventilation equipment, communication equipment, personal protective equipment, lighting, barriers, and rescue and emergency equipment.
- Isolate the space from potential electrical, mechanical, chemical, and physical hazards. Use lockout/tagout systems when necessary.
- Purge, flush, or ventilate spaces as necessary to eliminate or control atmospheric hazards. Test the atmosphere of the confined space for oxygen deficiency, flammable vapors, and toxic gases.
- If atmospheric hazards could develop during the course of the job, monitor the space continuously to make sure acceptable entry conditions are maintained.
- Authorized attendants must remain outside the space, continuously monitor the activities, and communicate with the entrants. Attendants should remove entrants from the space if hazards develop. Rescue and emergency services should be summoned, if necessary.
- Full body harnesses with retrieval lines attached should be worn by all entrants inside the space to help with a rescue in case of an emergency. The retrieval line should be attached to a mechanical device or a fixed object outside the space.

- Notify rescue and emergency personnel of the hazards they may encounter if called on to perform a rescue.
- Keep communication equipment on hand during the entry to notify rescue and emergency personnel in the event of an emergency.
- For detailed information and procedures to follow for any confined space entries, please Refer to OSHA regulation 29 CFR 1910.146 and Broomfield Utilities, Wastewater, or Water Plant Standard Operating Procedure.
- Use OSHA's definition of a confined space and a permit required confined space. Most confined spaces in municipalities are permit required confined spaces, but aren't treated as such.

GG. Work Zone Protection

Roadside construction is one of the most dangerous occupations in the United States. Road construction also can present motorists with unexpected or unusual traffic situations. To reduce hazards to both workers and motorists, proper training is essential. The following key points should be part of a work zone protection plan:

- Develop an effective and well thought-out written plan. Follow it. The plan should be prepared by individuals who have appropriate training in safe traffic control principles and practices. The plan should allow for changes and give consideration to workers, drivers, and pedestrians. Traffic movement should be inhibited as little as practicable.
- Follow the Manual On Uniform Traffic Control Devices (MUTCD). These are the minimum requirements. Following the MUTCD will help ensure that drivers are given consistent instructions and directions when approaching and while passing through the work zone.
- Use flaggers if other traffic control methods are inadequate. Flagger should be certified.
- All workers within the right-of-way, including emergency responders (who have additional garment options), are required to wear high-visibility safety apparel that meets performance Class 2 or 3 of ANSI/ISEA 107-2004 or equivalent revisions.
- Use established communication methods between flaggers.
- Provide advance warning signs with posted speed limits. Give adequate consideration for limited sight distance or the nature of the obstruction that may require the vehicle to stop.
- Keep the work zone neat and orderly. Designate a tool storage area. Maintain all signs in a clean condition and cover them or have them removed when not needed. Routine inspections of the work zone should be performed.

- Use the recommended type of traffic control device. These may be plastic drums, cones, tubular panels, or barricades. These will help guide the drivers and avoid inhibiting traffic.
- Use detours if a road width of 12 feet cannot be maintained. Provide ample warning.
- Keep pedestrians away from workers' vehicles and equipment. Provide a safe path of travel which is convenient with clear directions while giving consideration to those who may be hearing-impaired or blind. The safe path of travel should be at least four feet wide and seven feet tall.
- Refer to <u>MUTCD</u> 2009 Edition for additional information concerning work zone protection procedures.

HH. Flagger Safety

Flaggers must be alert, physically fit, and project a commanding appearance. These qualities help the flagger when controlling traffic through construction areas. Here are some safety tips for flaggers to follow:

- Maintain a highly visible position but never in the direct path of an approaching vehicle. Protect yourself from injury.
- Remain alert at all times and be on your feet facing oncoming traffic. Stand alone and do not mingle with the work crew or the traveling public. Do not assist the work crew, watch construction operations, or engage in other activities that may distract from flagger responsibilities.
- Help protect project personnel and provide safe, courteous, and authoritative directions to traffic passing through your work area.
- Be courteous when advising drivers of the reason for the stop if it is not apparent. Do not lean on vehicles and talk to occupants. Do not engage in small talk. Do not argue. Be factual, courteous, and brief.
- If drivers refuse to obey your instructions, record the general description of the car and driver, vehicle license number, and circumstances involved. Report this as soon as possible to your supervisor without leaving your post.
- All workers within the right-of-way, including emergency responders (who have additional garment options), are required to wear high-visibility safety apparel that meets performance Class 2 (daytime work) or 3 (nighttime work) of ANSI/ISEA 107-2004 or equivalent revisions.
- Immodest or sloppy clothing is not appropriate.
- Hard hats should be orange or yellow-green.
- Use a "Stop/Slow paddle" at least 18 inches in width, with letters at least six inches high. A bright red flag 24 x 24 inches on a three foot staff may be used as well.
- Remove or cover all signs when not actually engaged in flagging operations.

- Be alert for emergency vehicles. Special care is needed here to allow safe passage.
- Refer to MUTCD 2009 Edition for additional information concerning flagger safety procedures.

II. Trenching and Excavation

Working in trenches and excavations is always hazardous and a cave-in can be fatal. Any employee working in a trench or excavation should follow the following safety precautions:

- Never enter an unprotected trench or excavation. Even a shallow one can produce a crushing or fatal injury.
- A trench or excavation, regardless of depth, must be properly sloped, shored, or provided a trench shield to be safe. If in doubt, check with the Competent Person assigned to your project. Stay within the shield if working in a trench protected by a trench shield.
- Leave the trench or excavation immediately if ordered to do so by the Competent Person.
- Never leave a person unattended in a trench or excavation.
- Be especially cautious in wet soil or if water is present in the trench. Trenches become even more unstable in wet conditions and are more prone to collapse. Previously disturbed soil is also more prone to cave-in.
- Make sure access ladders are provided at least every 25 feet for trenches over 4 feet deep. You may slope the trench so that workers can walk out the ends.
- Do not ride buckets into or out of the trench. Ladders should extend from the trench bottom to at least 3 feet above the top.
- Hazardous fumes and vapors can accumulate in trenches. Trenches are confined spaces. Test them!
- Leaking gas lines can leach through the soil and accumulate in a trench. Exhaust fumes from gasoline-powered equipment can settle in trenches or excavations. If in doubt, get out!
- Place spoil and tools further than 2 feet from the trench edges.
- Cover all holes and excavations during non-working hours. Provide and maintain all necessary barriers, temporary bridges and walks, warning signs, flags, and lights to warn vehicles and pedestrians. Ensure all ADA regulations are also followed.
- Look all ways for traffic when climbing out of a trench.
- If a trench shows signs of collapse, evacuate immediately!

 Refer to OSHA regulation 29 CFR <u>1926.651</u> for additional information concerning trenching and excavation procedures.

JJ. Locating Underground Utilities

Public utility systems are often placed underground; some by the very nature of their function, others for convenience or aesthetics. Utility location is the process of identifying and labeling the underground infrastructure for electricity distribution, telephone service, oil and natural gas, cable television, fiber optics, traffic lights, street lights, storm drains, water lines, wastewater lines, and reuse water lines.

Because of the many different types of materials that go into manufacturing each of these different types of underground lines, different detection and location methods must be used. For metal pipes and cables, this is often done with electromagnetic equipment consisting of a transmitter and a receiver. For other types of pipe, such as plastic or concrete, other types of radiolocation or modern ground-penetrating radar must be used.

Follow these procedures for locating underground utilities prior to any underground excavation work including utility repair, geotechnical investigations, landscaping, post hole digging, installation of signs, and tent placement:

- Make a visual inspection of the work site. Whenever possible, use City and County utility maps and schematic maps of previous excavations. Try to get as complete a picture as possible as to what underground utilities may be encountered.
- Call the Utility Notification Center of Colorado at 1-800-922-1987. When
 informing the center of the intent to excavate, be specific on the address,
 extent and duration of the excavation. Request and schedule an on-site
 meeting with all the utility owners that are subscribers to the center. IF
 THIS IS AN EMERGENCY EXCAVATION TELL THE CENTER NOW. A reference
 number will be issued that may be required later. Remember the law
 allows two working days for a utility owner to respond to a routine location
 request.
- When the utility locators arrive on site, be sure that the entire excavation
 area has been checked and properly marked. Gas and electric locators are
 advised to cross area boundaries. Request a "sign-off" form after the site has
 been marked and ask the locator to sign it. Be sure that all the requested
 utility locators have responded and completed their locations before you
 begin excavating.
- While excavating around any utility use extreme caution. HAND DIG WHEN POSSIBLE. Remember the owner must mark the location within 18 inches horizontally from the exterior sides. (Sometimes they don't and sometimes the location isn't 100% accurate.) IF YOU CUT...NOTIFY THE UTILITY OWNER IMMEDIATELY. Report a mis-staked facility. Notify the Public Works

Superintendent immediately. Document the situation carefully. Keep the "sign-off" form. Take photos and use witnesses.

- After the excavation and repair/installation is complete but before backfilling, make a schematic drawing of the entire excavation documenting all utilities, their purpose, location, size and depth. Record this information for future use.
- Lock out/Tag out procedures should be followed if employees could be exposed to hazardous energy sources.

The American Public Works Association (APWA) Uniform Color Codes for temporary marking of underground utilities are listed below:

- Red electric power lines, cables, conduit, and lighting cables.
- Orange telecommunication, alarm or signal lines, cables, or conduit.
- Yellow natural gas, oil, steam, petroleum, or other gaseous or flammable material.
- Green sewers and drain lines.
- Blue drinking water.
- Violet reclaimed water, irrigation, and slurry lines.
- Pink temporary survey markings, unknown/unidentified facilities.
- White proposed excavation limits or route.
- Not locating underground utilities and then damaging them can result in fines and other penalties, including jail time, that is not covered by CIRSA.

KK. Fall Protection

Falls are among the most common causes of serious work related injuries and deaths. The workplace must be set up to prevent employees from falling off of overhead platforms, elevated work stations or into holes in the floor and walls. OSHA requires that fall protection be provided at elevations of four feet in general industry workplaces and six feet in construction areas. In addition, OSHA requires that fall protection be provided when working over dangerous equipment and machinery, regardless of the fall distance. Follow these guidelines when setting up the workplace:

- Guard every floor hole into which a worker can accidentally walk (using a railing and toe-board or a floor hole cover).
- Provide a guard rail, mid rail, and toe-board around every elevated open sided platform, floor or runway.
- Regardless of height, if a worker can fall into or onto dangerous machines or equipment (such as a vat or tank or rotating equipment), guardrails and toeboards must be provided to prevent workers from falling and getting injured.

- Other means of fall protection that may be required on certain jobs include safety harness and line, safety nets, stair railings and hand rails.
- All fall protection equipment should be inspected before each use and stored in a dry area.
- Refer to OSHA regulation 29 CFR <u>1926.501</u> for additional information concerning fall protection.
- Railing must be able to withstand at least 200 pounds of force in any direction.

LL.Ladders

A good ladder, used correctly, is a safe and convenient helper, but a defective ladder or one that is misused can cause serious accidents. Here are some things to consider when using a ladder:

- Use the right type of ladder for the job you are going to perform. Soft ground or slippery flooring may demand a ladder with safety feet.
- A metal ladder should not be used when working around electrical equipment use a fiberglass ladder for electrical work.
- Make sure to get the right surface grade and load rating for your ladder. It
 must have the proper strength to support the employee, tools and
 materials.
- Make sure the ladder is long enough to reach the work area. Get the type that fits your needs.
- If a step ladder is used, it may not exceed 20 ft in length.
- Be sure that a stepladder is fully open and the divider locked before use.
- Inspect the ladder for defects prior to use. Look for loose, split, cracked, or missing rungs. Make sure safety feet are functional. Clean mud, grease, oil, or other slippery substances from the ladder and your shoes before climbing. If there are any signs of rot, excessive warping, or other defects, do not use it! Repair or discard the ladder immediately.
- Locate the ladder safely away from passageways, doorways, driveways, or other areas where people or vehicles may pass underneath. If you must use a ladder in congested areas, barricade the area around the ladder or have another employee act as a helper.
- Secure the ladder so it won't fall. Place the ladder on a substantial level base or against a solid backing. Tie off the top of the ladder to a secure object. Have another employee steady the ladder if necessary.
- Use the one-to-four (1:4) ratio when using a ladder. To do this, place the ladder so its base is one foot away from what it leans against for every four feet in height to the point where the ladder rests.

- Angle extension ladders at 75 degrees to the horizontal plane. Make sure safety feet are in place. The side rails should extend at least three feet above the top landing.
- Face the ladder when climbing up or down and hold on to the rails with both hands. Carry tools in suitable pockets, tool belts, or have them hoisted up with rope and bucket.
- Don't overreach (do not move body outside the vertical rails) when working on a ladder. When working on a ladder, take every precaution not to slip. Do not put one foot on the ladder and the other on an adjacent surface or object. Never stand on the braces, extension arm or the paint shelf. When getting down, step, don't jump, from the ladder.
- Work from the middle of the ladder. Descend and move the ladder, resecuring it as required.
- Do not leave placed ladders unattended.
- Store ladders under a suitable cover when not in use to protect them from weather conditions. Ladders stored horizontally should be supported at both ends and the middle to prevent sagging, warping, and loosening of the rungs.
- Maintain at least three points of contact with the ladder, one foot and two hands or two feet and one hand.
- Do not exceed the weight limit for the ladder, to include the person on the ladder and any tools or materials they are carrying.
- Refer to OSHA regulation 29 CFR <u>1926.1053</u> for additional information concerning ladder safety.

MM. Scaffolds

Scaffolds allow workers to move about on elevated platforms to conduct work more safely than on ladders which have to be moved often. Falls from scaffolds are one of the highest fatality and injury producing workplace dangers. However, the following simple precautions can eliminate or greatly reduce these risks:

- Use the right type of scaffolding for the particular job you are performing. Competent persons should supervise the erecting, moving, dismantling, and alteration of scaffolds.
- Conduct a thorough inspection of scaffolds prior to use. Pay particular attention to guard rails, connectors, fastenings, footings, tie-ins, and bracing.
- Ensure the anchoring or footing is sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Do not use unstable objects such as boxes, loose bricks, or concrete blocks to support scaffolds or planks.

- Install and secure guardrails to prevent falls. Install toe boards to prevent tools and materials from falling.
- Scaffolds should be capable of withstanding four times their intended load.
- Never overload scaffolds. Pile materials being worked over ledger and bearer points to minimize platform loading.
- Don't stockpile excessive materials on scaffolds. Remove all unused materials and tools at the end of each work day.
- Barricade the area around the scaffold if necessary to prevent people and vehicles from passing under or near the scaffold.
- Provide a ladder or similar safe access to the scaffold.
- Do not work on scaffolds if covered with ice or snow or during storms or high winds.
- Clear all planking of snow and ice before starting to work, and sand wet planking to prevent slipping.
- Refer to OSHA regulation 29 CFR <u>1926.451</u> for additional information concerning scaffold safety.

NN. Barricading Floor Openings

Many serious and fatal accidents have occurred when employees fall through floor openings or are struck by falling objects. In order to prevent injuries, floor openings need to be adequately barricaded or protected. Here are some guidelines:

- Never leave an uncovered or unprotected floor opening. Cover the opening with plywood or other material that is strong enough to withstand the weight of people and equipment that may pass over it.
- Secure the cover so it doesn't come loose and isn't removed by another employee.
- Label the cover with a "Danger: Do Not Remove" or similar warning. Warn other employees of the potential hazard.
- Install a standard railing and toe board around open-sided floors, platforms, pits, and ramps. A standard railing should have a top rail, intermediate rail and posts with a vertical height of 42 inches from the top rail to the floor. Toe boards should be four inches in height from their top edge to the floor, securely fastened, with not more than a ¼ inch clearance above floor level.
- Guard skylight openings by standard skylight screen or fixed standard railing on all exposed sides. Skylight screens should be capable of withstanding a load of at least 200 pounds with grillwork openings not more than four inches long or slat work with openings not more than two inches wide.

 Refer to OSHA regulation 29 CFR 1910.23 for additional information concerning protective measures for floor openings.

V. Physical Protection

A. Personal Protective Equipment (PPE)

Employees can be exposed to a variety of workplace safety hazards during the course of carrying out their duties and responsibilities. Many of these hazards are an inherent part of the job that cannot always be eliminated. Employees must be kept adequately protected to prevent occupational injuries and illnesses while performing their work assignments.

Personal Protective Equipment (PPE) includes all clothing and accessories designed to create a barrier between the employee and contact with harmful agents in the work environment. Examples of PPE include safety glasses, hardhats, respirators, hearing protectors, safety footwear, gloves, reflective safety vests, etc. Examples of harmful agents include hot objects, flying particles, hazardous chemicals, falling objects, excessive noise, and anything else that could cause injury or illness if it came in contact with an employee.

The City and County has adopted the Colorado Intergovernmental Risk Sharing Agency (CIRSA) Personal Protective Equipment Guide. The primary focus of this guide is to identify the potential hazards and types of PPE necessary to perform specific municipal jobs, tasks or operations in a safe manner. Hazards vary from task to task, and managers and supervisors must evaluate each situation to determine the appropriate PPE and if additional types of PPE may be necessary. This guide provides a list of PPE for the most common identified tasks, jobs or operations.

The CIRSA PPE guide lists the standards and regulations for the use of PPE. Each employee will be provided with the appropriate PPE for his/her position. Each supervisor must maintain a complete list of all PPE required in their work area(s). If an employee does not have the appropriate PPE for an assigned task or operation, the operation should be paused until the proper PPE is obtained and used.

Please follow these general guidelines for PPE selection and usage:

- Identify those jobs where PPE is needed. More than one type of PPE may be needed to protect you while performing a given task.
- Select the proper type of PPE for the job. Hard hats, safety glasses, gloves, etc. come in all types of sizes and shapes and have different protection factors. Make sure you have the right type of PPE to protect you from the specific hazards of your job.
- Ensure proper size and fit of the PPE provided. Some types of PPE must be adjusted to provide adequate protection.

- Wear the proper work clothing to decrease the likelihood of injury. For example, shorts and sandals may be fine for swimming pool workers but totally unsafe for street employees doing paving work.
- Keep PPE in a clean and sanitary condition.
- Inspect PPE before and after each use. Repair or replace damaged or broken parts as needed.
- PPE is of absolutely no value if it's not used, not used properly, or not used regularly.
- PPE should be used as the last resort to protect and employee from a hazard. Engineering controls, safe work practices, and administrative controls should be exhausted first.

B. Hard Hats

Each year many employees receive head injuries from falling objects or by bumping their heads against fixed objects. Hard hats should be worn any time there is a potential for injury to the head from impact, flying or falling objects, electrical shock, or burns. Supervisors should make hard hats available to all workers and ensure they are worn properly. Some tips for proper selection, wear, and storage of hard hats include:

- Wear your hard hat where hard hat signs are posted, and where hazards from falling objects and other head injuries could occur. They only help prevent injuries if they are worn.
- Ensure hard hats meet American National Standards Institute (ANSI) standards Z89.1 for Industrial Head Protection or ANSI Z89.2 for Electrical Workers. Hard hats have a shelf-life and should be replaced when needed.
- Select hard hats based on a hazard assessment of the workplace. Models designed to reduce electrical shock hazards should be worn by employees exposed to electrical conductors that could contact the head.
- Bump caps or hats must not be used as a substitute for protective hard hats.
- Inspect hard hats routinely for signs of deterioration on the shell or webbing.
- Do not use damaged or defective hard hats. Discard and obtain a replacement.
- Adjust the headband to ensure proper fit and comfort.
- Do not compromise the shell by drilling holes for ventilation, painting or applying decals that could hide defects, or doing anything that could negate electrical resistance.
- Do not store hard hats in direct sunlight or in other environments where they can become damaged.

C. Safety Shoes and Boots

Employees regularly working in areas or jobs where there is a danger of toe, foot, or leg injury or when so instructed by their supervisor, are required to wear approved safety shoes or boots. The City and County provides an allowance towards the purchase or replacement of approved safety shoes/boots for full-time, part-time, and temporary employees. (Employees should contact their supervisors for information on allowances provided in their area.) The City and County shall provide safety shoes to regular full-time employees engaged in activities including, but not limited to, the following:

- Grounds maintenance activities involving the use of mowers, trimmers, and other power equipment.
- Construction inspection, testing and surveying.
- Laboratory testing and field sampling.
- Traffic sign handling and fabrication.
- Utility service and repair.
- Motor vehicle service and repair.
- Equipment service, repair, and tear down.
- Handling any heavy objects.
- Working around heavy equipment.
- Emergency services.
- Temporary and part-time employees working in these assignments must provide their own safety footwear.
- Safety footwear must meet Z41 ANSI standards for personal protective equipment.
- Toe protection other than safety toe footwear must have an impact value not less than that required by safety toe footwear.
- Foot protection must not have holes due to wear, rips or tears that reduce the intended protection.
- The employee must wear suitable footwear such as boots or galoshes when working and walking in snowy, slippery, icy, or other abnormal footing conditions.

D. Hand Protection

City and County employees perform a variety of jobs that can result in serious injuries to the hands and fingers. Hazards such as those from skin absorption of harmful substances, cuts or lacerations, abrasions, punctures, chemical burns, thermal burns, and harmful temperature extremes can be prevented or minimized by using gloves and other hand protection. Evaluate the hazards of

the job and select the glove that fits well and provides the best protection. Listed below are some common types of work gloves and the types of hazards they guard against:

- Disposable gloves may be used by police, fire, and paramedics to prevent skin contact with blood or other bodily fluids. After use, they need to be properly disposed to prevent contamination.
- Cotton or fabric gloves are generally used to improve your grip when handling slippery objects, doing general labor, digging, landscaping, etc. They also help insulate your hands from mild heat or cold.
- Latex, nitrile, vinyl, or neoprene gloves protect against irritating or corrosive chemicals. Make sure you read the glove manufacturer's instructions and the Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) for the chemical you are handling to verify the glove will provide adequate protection. Also, inspect and air test these gloves before use to make sure they do not leak. If any leaks are found, discard them and get a new pair.
- Leather gloves are used to guard against injuries from sparks or scraping against rough surfaces. Leather gloves with long gauntlets may be used for welding and similar spark producing operations.
- Gloves for firefighting should meet the design and performance standards of National Fire Protection Association (NFPA) 1971 for structural firefighting or 1976 for proximity firefighting.
- Insulating gloves, made of rubber and perhaps a heavy outer layer of leather or canvas to prevent tearing, are designed for use with high voltages common in electric utilities. These gloves must meet the American National Standards Institute (ANSI) J6.6-1971, "Standard Specifications for Rubber Insulating Gloves" or American Society for Testing and Materials (ASTM) D-120. Gloves that are purchased need to be marked that they meet the above standards.
- Insulating gloves need to be visually inspected and air tested prior to each day's use.
- Gloves will not protect you against all hazards. Gloves will offer little or no protection from saws, chain drives, flywheels, rotating shafts, and pinch or cutting points, and could get caught in moving parts. Use machine guards and keep your hands away from the point of operation.

E. Respiratory Protection

In certain situations, respiratory protection may be required to prevent, or minimize, harmful exposures to airborne contaminants. Attempts to limit exposures through the use of feasible engineering and administrative controls should always be done first. When engineering and administrative controls are

not fully effective, or while they are being instituted, respiratory protection may be required.

Respirators are ideally used when short-term operations or maintenance activities are performed, and ventilation alone is inadequate to limit airborne contamination exposure to the worker. It is best to perform operations involving chemicals in a well-ventilated space. Respirators either filter out or absorb the chemical(s) that are present, or supply fresh breathing air to the worker via a tank or airline.

Each employee who needs a respirator to perform his/her job will be issued one by the City and County, and will be trained how to use and maintain it. The training will include:

- Instruction in the nature and extent of the airborne contaminant and a description of the consequences that could occur if the respiratory equipment is not used or used improperly.
- Explanation of why particular respirators have been chosen and what protection factors they provide for the employee.
- Proper wearing, adjustment and fit testing.
- Discussion and practice of the respirator in use, what to do and how to use a respirator for emergency conditions.
- The importance of proper respirator cleaning, inspection and storage methods.

Here are some rules and guidelines for respirator use:

- Employees who are required to utilize respirators will be qualitatively fittested annually. Employees will also be fit tested in the event that the facial sealing surface may have changed (e.g., weight gain or loss, dental work, facial surgery, etc.). Individuals that require corrective lenses may obtain lenses made for use with respiratory protection. Contact lenses should not be worn in conjunction with respiratory protection.
- The qualitative fit test procedure will utilize an irritant fume. If the irritant produces an involuntary reaction (cough) by the employee, the respirator is rejected and another must be selected. Respirators successfully tested by the procedure may be used in contaminated atmospheres not exceeding the protection factor of the respirator.
- Respiratory protection must be of a type approved either by the National Institute of Occupational Safety and Health (NIOSH) or the Mine Safety and Health Administration (MSHA).
- Individuals who wear positive and negative pressure respirators must have a medical evaluation that states that they are capable of wearing a respirator under their given work conditions.

- If a filtering face piece dust mask is used voluntarily for comfort, no medical evaluation is required.
- If you are having difficulty wearing a respirator due to conditions such as claustrophobia, asthma, or high blood pressure, contact your supervisor.
- Cartridge or Filter Respirators should not be used in an oxygen-deficient environment.
- The appropriate cartridges must be used to filter out or absorb the harmful chemicals present.
- All respirators must be inspected routinely by the user before and after each use and after cleaning to check the condition of the face piece, head bands, valves and hoses as well as the canister, filter or cartridge fit. Respirators that do not pass inspection will be replaced or repaired immediately.
- An adequate respirator-to-face seal must be established for the worker to receive protection from chemical exposures. In order to promote an effective seal, the worker should be clean-shaven.
- When the worker experiences difficulty in breathing or can smell the chemical with the respirator on, the cartridges should be changed.
- A cartridge respirator should be assigned to one person for his or her exclusive use and maintained by that person through inspection, cleaning, or replacement.
- When the worker experiences difficulty in breathing or can smell the chemical with the respirator on, the cartridges should be changed.
- Supplied Air Respirators (SAR) or Self Contained Breathing Apparatus (SCBA) are used when chemical exposures are very high and/or there is inadequate oxygen. It is important that these are inspected at least monthly to ensure they are ready in the event of an emergency.
- Respirators must be stored in a convenient, clean, and sanitary location. The respirator will not be stored in direct sunlight, dust, heat, extreme cold, excessive moisture, or damaging chemicals. The respirator will preferably be stored in the original container or in a clean plastic bag.
- Refer to OSHA regulation 29 CFR <u>1910.134</u> for additional information concerning employee respiratory protection.

The following records must be maintained by each department:

- The types and models of respirators in use.
- A record of employee respirator training and fit testing.
- Inspection and maintenance reports.

 A copy of the Medical Certification that was given to the employee by the doctor when he/she was evaluated for respirator use under their given work conditions.

F. Hearing Protection

Noise is a physical stressor. If the ear is subjected to excessive noise for a sufficient period of time, some loss of hearing may occur. Factors that can influence the effect of the noise exposure include variation in individual susceptibility, total energy of the sound in decibels (dBA), frequency distribution of the sound in hertz (Hz), whether the noise is continuous or intermittent, total duration of exposure, and distance from the source.

Employees must wear approved ear protection (hearing protective devices - HPD) when working in areas with excessive noise or when using equipment that generates excessive noise. Protecting your hearing is vital since once you notice that your hearing sensitivity has been reduced, the damage is often irreversible. In order to prevent noise-induced hearing loss, please follow these rules and guidelines:

- Isolate, muffle, or install sound absorbing materials around high noise sources.
- Purchase equipment that is less noisy and provide regular maintenance and lubrication to noise-producing equipment.
- If these measures are unsuccessful in limiting noise, employees will be provided with Hearing Protective Devices (HPD) such as earplugs or earmuffs. They work by providing a sound barrier to your ear canal that prevents much of the noise from reaching the middle ear.
- All areas within the City and County that require hearing protection will be posted. Those areas have a time weighted average (TWA) of 85 dBA or greater.
- Monitoring should be conducted when information indicates that noise levels may be greater than a TWA of 85 dBA.
- Other activities that may require HPDs include operating lawn mowers, weed-eaters, leaf-blowers, chippers, rototillers, chain saws, metal grinders, saws, vacuums, heavy-equipment, paving tampers, compactors, pumps, belt-presses, and firearms. Ear buds for iPods and other such devices are not hearing protection, but add to the sound/noise exposure.
- Make sure you know how to properly use HPDs. The vendor supplying HPDs should be able to provide training on proper care and use.
- HPDs should be comfortable and conveniently located for use. If they are ineffective or uncomfortable, contact your supervisor.
- Maintain HPDs in a clean and sanitary condition.

 Refer to OSHA regulation 29 CFR 1910.95 for additional information concerning employee hearing protection.

G. Eye Protection

Of all the major organs prone to occupational injuries, the eye is perhaps the most vulnerable. Each year, thousands of workers suffer eye injuries that impair or destroy vision. Most of these injuries can be prevented by following established safety guidelines and using appropriate protective eyewear. Be aware of eye hazards at your worksite. Among the most common eye hazards are flying particles from machine operations such as: grinding, chipping, and sawing; sparks and harmful light rays from welding; and splashes from corrosive or irritating chemicals.

Follow these established safety rules and procedures to minimize the risk of eye injuries:

- Protective eyewear must be worn at all times, in all areas, and on all jobs designated by the supervisor.
- All areas that require eye protection must be posted.
- Wear the appropriate eye protection for the hazards involved such as safety glasses, goggles, face shields, or welding helmets. Wear side protection when there is a hazard from flying objects approaching from the side.
- Eyewear should meet American National Standards Institute (ANSI) standard Z87.1-2003. Eyewear passing high impact test requirements will include a "+" mark.
- Ensure proper fit of your eye protection and make sure they are clean and in good condition before and after each use. Use a disinfectant to clean the lenses.
- For prescription lens wearers, wear safety glasses that meet the ANSI standard or wear eye protection, such as goggles or a face shield that can be worn over prescription lenses. Prescription frames will be marked Z87.2.
- The City and County provides an allowance towards the purchase of prescription safety glasses for employees who require prescription glasses.
- It is important to note that regular prescription glasses will not protect against on-the-job hazards. The frames used in ordinary glasses, even shatter proof lenses, are not strong enough to keep the lens from being pushed through the frame and into the eye.
- Safety glasses with metal frames should not be worn in areas where there is a possibility of electrical contact or in explosive atmospheres where nonsparking tools are required.
- Helmets protect against sparks, splashes, and intense light. They are often required for jobs like welding because they are impact-and heat-resistant.

The glass or plastic windows may also be tinted to protect against intense light.

- It is important to always wear safety glasses or goggles with a face shield. Face shields protect the face and neck from splashes, heat, glare and flying objects.
- Wear eye protection with filtered lenses for welding operations. Make sure the lens shade number is appropriate for the work being performed to protect your eyes from injurious light radiation.
- Protective eyewear must be worn at all times, in all areas, and on all jobs designated by the supervisor. Safety glasses must NOT be substituted for the required equipment. The required equipment must be worn over the safety glasses.
- Goggles or face shields must be worn on all chipping, grinding, sandblasting, buffing, and wire brushing operations, in breaking rock or concrete, or in any other situation where flying particles occur.
- Welders and employees working around welding operations must wear gloves and approved face shields or goggles to prevent flash burns.
- Chemical eye goggles must be worn when there is a danger of eye damage from heat or chemical reactions. This also applies to employees whose job duties require them to work with pesticides.
- Replace faulty eyewear immediately. Never use eye protection that has cracked or pitted lenses.
- Contact lenses can absorb and trap particles and gases that could be injurious to the eye. Therefore, it is recommended that contacts not be worn in areas of high heat, dust, corrosives, chemical fumes, vapors or splashes.
- Know the location of safety showers and eyewash fountains whenever you are using acids or caustic chemicals. If chemicals are splashed in the eye(s), flush the affected eye(s) for at least 15 minutes.
- Seek first aid and medical attention in the event of an eye injury.
- Refer to OSHA regulation 29 CFR 1910.133 for additional information concerning employee eye protection.

H. Reflective High-Visibility Clothing

All workers within the right-of-way, including emergency responders (who have additional garment options), are required to wear high-visibility safety apparel that meets performance Class 2 or 3 of ANSI/ISEA 107-2004 or equivalent revisions. ANSI Class 2 reflective coats or vests are required daylight hours (1-hour after dawn and 1 hour before dusk). ANSI Class 3 reflective coats or vests must be worn during nighttime hours (dusk to dawn). All vests must be securely tied, not loose fitting, and worn on the outside of all other garments.

I. Cold Exposure

There are three types of physical consequences caused by cold exposure: hypothermia, frostbite, and frost nip. Hypothermia involves a drop in the body's core temperature producing shivering and possibly disorientation, illness, unconsciousness, or death. Hypothermia is a serious condition that needs immediate attention. It may occur with or without frostbite or frost nip.

Frostbite is a condition where deep bodily tissues are frozen and may cause irreparable damage. Frost nip involves the freezing of the skin's surface; most commonly the extremities. Guidelines for prevention of cold exposure include the following:

- Dress in layers.
- Continue movement to promote circulation.
- Avoid clothing that absorbs moisture, such as cotton, where insulating properties are diminished.
- Maintain dry clothing. If you do get wet, keep moving until you can get a change of clothes in a warm environment.
- Wear a hat or a hood; much body heat is lost to the upper extremities.
- Maintain a protective envelope of warmth especially in windy conditions by using all draw-strings, wearing clothing that can block the wind, and covering as much skin surface as possible.
- Institute a buddy check, in very cold conditions, to let your partner know if skin surface is becoming pale or waxy or if erratic behavior is occurring. If working alone, call the office or dispatch regularly to give a status report.
- Make sure your vehicle is outfitted for a winter storm emergency.
- For treatment, bring the person into a warm environment until totally warmed, do not rub or massage an affected part.

J. Heat Exposure

There are five major symptoms related to heat exposure, and it is possible to have more than one at a time. Heat cramps are characterized by spastic contractions of arms, hands, legs, and feet associated with profuse sweating. Heat exhaustion is characterized by weakness, nausea, pale, clammy skin with sweating; may experience chills. Heatstroke is a medical emergency characterized by elevated body core temperature, a lack of consciousness, and dry skin (call 911). Dehydration occurs when loss of fluids exceeds fluid intake and kidneys produce more urine than they should. Heat rash (also known as prickly heat rash) is characterized by red bumps on the skin when wet clothing disallows evaporation. The following are ways to prevent heat exposure symptoms:

- Drink adequate fluids at least once an hour during hotter periods. The thirst mechanism is not a good indicator of how much to drink when it's hot. Water should be cool, not ice cold.
- Take breaks in a shaded place or indoors where it is cooler. Breaks should be more frequent the hotter it is, and the more vigorous the activity.
- Workers should be allowed to acclimatize to hot conditions. Workers should not be expected to work eight hours in the heat the first warm day of spring. Getting used to heat may take four to seven days of gradually increased work periods.
- Factors such as alcoholic consumption, fatigue, obesity, and age increase susceptibility to heat exposure symptoms.
- Wear light clothing which allows air movement instead of taking off your shirt. Clothing should be light in color to reflect heat.
- Wear sunscreen and a brimmed hat during work outside, even on cloudy days.
- Try to schedule your hot work during the cooler part of the day, if at all possible.

K. Sun Protection

- Wear high SPF sunscreen and/or sun blocking clothing to minimize UV light exposure during outside work, even on cloudy days. Apply at least 30 minutes before exposure (see application instructions).
- Wear light, loose-fitting clothing and a vented wide-brimmed hat to keep sun off the head and neck, while allowing perspiration to evaporate.
- Wear appropriate UV blocking sunglasses.

L. Working On or Near Water

Ponds, lakes, rivers, or streams present special hazards to employees performing work activities on or near the water. Please follow these guidelines when working on or near water:

- The employee must wear a U.S. Coast Guard-approved personal flotation device (PFD) when the possibility of drowning exists. The PFD must be of the type that will roll the wearer face up if unconscious.
- The PFD must be visually inspected for damage before each use.
- A ring buoy or approved similar device with at least 90 feet of safety line should be readily available for rescue operations and within 200 feet of the water.

M. <u>Blood-Borne Pathogens and Infectious Disease Prevention</u>

Employees may access the Broomfield Blood-Bourne Pathogens policy document here.

Please refer to the <u>Broomfield Exposure Control Plan</u> for additional information concerning employee protection from blood-borne pathogens and reporting of potential exposures.

N. Automated External Defibrillator (AED)

Each year, approximately 500,000 Americans die of cardiac arrest. When started promptly, CPR can help by supplying oxygen to the brain and other vital organs. In many cases, CPR by itself cannot correct the underlying heart problem. An Automated External Defibrillator (AED) is needed to correct the problem and return the heart back to a normal rhythm by providing an electric shock to the heart. AEDs are located in many City and County facilities, and these procedures should be followed to use them:

- As soon as you find the victim, send someone to call 911.
- Open AED unit, turn on; follow verbal directions.
- City and County AEDs are inspected by North Metro Fire Department. They
 require all AED users to have a current certification (certifications last for
 one year) and AED users should conduct two reviews a year. Supervisors or
 Facility Coordinators will schedule reviews, but employees are responsible
 for keeping their certifications current. Public Works Facilities Operations
 employees are responsible for regular maintenance of AEDs.

VI. Vehicle Safety

A. General Driving Safety

Most vehicle accidents are preventable by following all guidelines for vehicle safety and by practicing defensive driving. Only fully qualified and properly licensed persons will be permitted to drive or operate City and County vehicles. The following requirements also apply:

- All equipment must be operated in accordance with manufacturer's specifications and designed use to ensure the safety of the operator, other employees, and the public.
- Certain jobs require a valid State of Colorado operator's license with applicable endorsements for a Commercial Driver's license (CDL).
- Drivers must be at least 18 years of age. (DOT requires 21 years of age for CDL)
- Driver and passengers must wear seat belts and shoulder harnesses when available.
- Passengers must not ride on any part of a vehicle or trailer other than in approved seats with seat belts.
- Employees must obey all state and local motor vehicle laws, including strictly observing speed limits on public roads and highways.

- Never leave a vehicle unattended and running. Keys must be removed, vehicle transmission placed in gear or park and emergency brake set when driver leaves the vehicle.
- Trucks transporting materials must secure them to prevent movement in transport. All cargo that extends beyond the end of the bed must be clearly marked with a red cloth not less than sixteen (16) inches square. Red lights must be used at night.
- Vehicles must remain within 10' of the gas nozzle while refueling. Fueling must only be done when the engine is shut off.
- Turn the front tires toward the curb when parking facing downhill, turn the front tires away from the curb when facing uphill. The tire should be touching the curb in both circumstances.
- Back only when it is necessary. If not possible, have someone be a spotter or walk around and visually check rear of vehicle before backing up.
- Maintain the vehicle in safe condition, and report any malfunction or maintenance needs immediately.
- Report all motor vehicle incidents promptly using the City and County's incident report form. For all accidents involving personal injury and/or property damage, a police report must be included.
- Know how to contact police dispatch or 911 using the radio in radioequipped vehicles.
- Do not operate a vehicle when taking medications that may impair driving and report all medication use to supervisor.
- Be cautious when stepping out of the vehicle onto a curb or uneven ground surface.
- Use defensive driving techniques at all times.
- Defensive driver training should be given within the first 3 to 6 months to new employees with driving responsibilities. Please refer to the <u>CIRSA Driver</u> <u>Evaluation Form</u>. Additionally, some type of refresher driver safety training should be given to all drivers at least every 3 years. Employees and supervisors may use the <u>CIRSA training page</u> as a resource.
- Additional driver training should be provided or a supervisor check ride conducted for operators of specialized equipment such as snowplows, backhoes, dump trucks, fire trucks, police vehicles, etc., prior to operating municipal equipment.

B. Use of Seatbelts

Here is a <u>link</u> to the Use of Seat Belts and Safety Restraints Policy from The Employee Handbook.

Buckle up! It's the law in Colorado. The law mandates the wearing of seat belts and shoulder harnesses while operating or riding in a motor vehicle. It's your responsibility to ensure that all passengers are safely buckled up before you leave your parking space.

The City and County also requires seat belts to be worn while operating mowers with rollover protection (ROPS), carts, fork trucks, backhoes, and any vehicle that is equipped with seat belts or harnesses. All vehicles used to transport employees must have seats and seat belts firmly secured and adequate for the number of employees to be transported.

City and County vehicles that have defective or otherwise inoperative seat belts must be removed from service until the deficiency has been corrected.

C. Wireless Car Phone Safety

To provide a safe environment for everyone while using the roads, the following rules and recommendations apply to wireless phone use:

- Give full attention to driving. Signal and pull safely off the road if an employee must make or take a phone call or do any type of texting. Find an area where the vehicle will not obstruct traffic and other drivers will have good visibility of the vehicle. If possible, ask a passenger to make or take the call.
- When behind the wheel, safe driving is the driver's responsibility, and it should always be the driver's first priority.
- For more information about wireless phone regulations, please refer to Colorado Revised Statutes CRS 42-4-239.

D. <u>Defensive Driving</u>

- 1. Defensive Driver A defensive driver is one who commits no driving errors and makes allowances for the lack of skill or improper driving practices of the other drivers. He/she adjusts his/her driving to compensate for unusual weather, road, and traffic conditions, and is not coerced into an accident by the unsafe actions of pedestrians and other drivers. By being alert to situations that can cause accidents, he/she recognizes the need to take action to prevent them from occurring. He/she knows when it is necessary to slow down, stop, or yield his/her right-of-way to avoid accidents. Defensive drivers may prevent accidents by:
 - Following all applicable traffic laws and ordinances.
 - Operating at speeds appropriate for the existing road conditions, traffic, and weather.
 - Maintaining adequate clearance and following distances so that he may stop without causing a collision.
 - Yielding the right-of-way in order to avoid an accident.

- 2. Backing Backing collisions account for approximately one in every four vehicle accidents. Here are some pointers on how to avoid backing accidents:
 - All backing accidents are preventable.
 - Avoid backing up if at all possible by planning a route that eliminates the need for backing. Park in spaces where you can pull out in a forward direction. If you miss an exit or turn, don't back up. You can usually find another place to turn or go back around the block. This will only take a couple extra minutes.
 - Don't depend solely on mirrors look back if it is possible. It may be advisable to get out of the vehicle and check the rear of the vehicle and the proposed backward pathway to spot hidden hazards.
 - Use a helper to assist in backing up. Maintain visual contact with the helper. Stop if you don't see the helper.
 - Back slowly and give other drivers the opportunity to see you. Do not back into traffic if such backing can be avoided.
 - Continuously check both sides, the front, and back of your vehicle for adequate clearances as you back. Use your rearview and side mirrors as necessary.
 - When in doubt, secure the vehicle, get out and check surroundings.
- 3. Ice and Snow Winter driving can be especially dangerous in Colorado. Even though drivers can't control the weather, road conditions or other drivers, drivers can control their driving habits and the condition of their vehicles. Here are a few tips for driving on ice and snow:
 - Inspect the vehicle to make sure it is in safe operating condition and equipped for winter driving. Pay special attention to tires, wipers, washer fluid, antifreeze, exhaust and heating system, brakes, and lights.
 - Equip the vehicle with emergency gear such as shovels, chains, flares, extra clothing, food, candles, matches, sleeping bags, and other items in case you get stranded.
 - Allow extra time to reach the destination. Check weather conditions before leaving. Notify others of the destination, travel routes, and estimated departure and arrival times.
 - Clean ice and snow completely from windows, lights, mirrors, and roof of vehicles.
 - Drive at reduced speeds if road conditions or visibility is poor. Allow for extra stopping distances on ice and snow.
 - Drive in a smooth, controlled manner. Avoid jerky movements, sudden starts, and stops.

- Watch out for the other driver. Allow tailgaters to pass. Be especially cautious when entering intersections. Other vehicles may be unable to stop at traffic lights or stop signs.
- Avoid travel routes that are particularly hazardous.
- Allow for additional following distance.
- 4. Intersections More collisions occur at intersections than anywhere else. Listed below are some safe driving habits to follow:
 - Watch as you approach intersections for pedestrians, vehicles turning, and emergency vehicles that may be proceeding against your perceived right-of-way.
 - Proceed only when it is safe to do so. Remember to look left, right, then left again before entering the intersection.
 - Keeping a safe distance behind the other vehicle at the intersection will help keep you from having a rear-end collision if the vehicle suddenly stops.
 - If you are the first car waiting to turn left, stop before the intersection and keep your wheels pointed straight ahead until you actually enter the intersection to make the turn. This way you won't be pushed in the oncoming lane of traffic if you are hit from behind.
 - When making a right on red, come to a complete stop first and only proceed when it is clear and safe to do so.
- 5. Safe Following Distances Please follow these recommendations to maintain safe following distance from the vehicle in front of you on roadways:
 - Use the "three second" rule to maintain a safe following distance.
 Watch the vehicle ahead. As it passes a fixed object, begin counting,
 "one thousand and one, one thousand and two, one thousand and
 three." If you reach that fixed object before you finish your count, you
 are following too close and need to increase your following distance.
 - Increase your following distance to more than three seconds under certain conditions. Examples of one second additions to your following distance include poor visibility, slick roads, heavy vehicle or pedestrian traffic, night driving, or following motorcycles or oversized vehicles.
 - Scan your mirrors. Every three to five seconds, scan your mirrors to alert you to tailgaters and motorists moving into position to pass you or turn into your lane. If you have a tailgater, you will need to increase your following distance to allow more room to stop, thus preventing the tailgater from running into you if you stop suddenly.
 - Use the "three second" rule when accelerating from a stop. When in a line of traffic at a red light or stop sign, allow that same three second following distance. If the vehicle in front of you suddenly stops, this

allows you room to stop without hitting the vehicle. It also minimizes the chance of being hit from behind by another driver who was following too close. This can often cause a "chain reaction" of vehicles hitting each other in line.

- If someone pulls into the space in front of you, thus decreasing your following distance, back off and re-establish a safe following distance to that car. You'll still arrive in time and be much more relaxed.
- 6. Use of Alcohol or Drugs Colorado law prohibits a person from driving a vehicle while impaired by alcohol or drugs. Broomfield's Personnel Merit System and Substance Abuse policy specifically prohibit employees from working under the influence of alcohol, illegal drugs or intoxicants during work hour. The Substance Abuse Policy can be accessed here. The Personnel Merit System can be accessed here.

E. <u>Vehicle Maintenance & Inspection</u>

The Fleet Division must establish a preventative maintenance program for City and County vehicles and mobile equipment. All inspections and work performed should be documented in a recordkeeping system maintained by the Fleet Supervisor. Data included in the recordkeeping system should include the vehicle or equipment number, mileage, parts used and repairs performed.

Daily safety inspections should be made of all vehicles before operation to detect any obvious safety hazards. However, such inspection is required of vehicles over 10,000 lbs. under DOT regulations if the vehicle leaves the City and County limits. These inspections must be documented and records retained per DOT regulations.

F. Attaching and Pulling Trailers

The following procedures should be followed to avoid common mistakes and accidents associated with attaching and pulling trailers:

- 1. When hitching a trailer to a truck:
 - Confirm that towing vehicle hitch and trailer receiving tongue are compatible.
 - Confirm that trailer is fairly level when attached to towing vehicle hitch.
 - Attach electric brake safety wire to hitch before attaching trailer.
 - Attach safety chains to towing vehicle.
 - Raise and lock the tongue jack before driving.
 - Inspect trailer lights for proper operation.
 - Inspect trailer tire pressure and condition.
 - Confirm that tow vehicle is adequate for the trailer and load.

2. When loading a trailer:

- If trailer has "tail" jacks, be sure they are down before loading equipment. Be sure they are up before driving.
- Position equipment over trailer axles to evenly distribute load weights on trailer.
- Always use a minimum of two tie-down straps for each piece of equipment.

3. When towing trailers:

 Roads can become slippery during rain or snowstorms. Respect the weight of your trailer and begin slowing down early when coming to intersections.

4. When using trailers with electric brakes:

- Test battery by pulling out break-away switch and check to see brakes are engaged.
- Test brake system before leaving yard by activating electric brake switch in towing vehicle.

G. Fixed Objects

Collisions with fixed objects are always preventable. They usually involve failure to check or properly judge clearances. The driver must be constantly on the lookout for such conditions and make the necessary allowances. These are the most frequent factors which lead to collisions with fixed objects:

- Driver was traveling unfamiliar streets or encountering new traffic situations on regularly traveled routes.
- Driver was not entirely in his proper lane of travel.
- Driver did not check or properly judge clearances.
- Driver did not use an available spotter when backing.

H. Front-End Collisions

Drivers can prevent front-end collisions by maintaining adequate following distance. This includes being prepared for the abrupt or unexpected stop of the vehicle ahead due to an obstruction on the highway or streets, either in plain view or hidden by the crest of a hill or the curve of a roadway. These are the most frequent factors which lead to front-end collisions:

- Driver failed to maintain safe following distance and have his vehicle under control.
- Driver failed to keep track of traffic conditions and note slowdown.
- Driver misjudged rate of overtaking.

- Driver came too close before pulling out to pass.
- Driver failed to wait for car ahead to move into the clear before starting up.

I. Opposing Vehicles

It is extremely important for the driver to take the correct action with vehicles approaching from the opposite direction. An opposing vehicle may enter the driver's traffic lane and right-of-way, and require action to avoid a collision. These are the most frequent factors which lead to collisions with opposing vehicles:

- Driver was not entirely in his proper lane of travel.
- If an opposing vehicle enters the driver's traffic lane, such as during a passing maneuver, it may be possible for the driver to avoid a collision by slowing down, stopping, or moving to the right to allow the passing vehicle to re-enter his own lane.
- Driver should only take the above actions if they do not cause additional danger.

J. Rear-end Collisions

Drivers risk being struck from behind by failing to maintain adequate following distance. Rear-end collisions are preventable, but can be caused by the following actions:

- Coming to an abrupt stop at a grade crossing, to park, or to load or unload.
- When a traffic signal changes.
- When someone fails to signal a turn at an intersection.
- If brake lights are not operational

K. Railroad Crossings

Collisions with trains at railroad crossings are always preventable. Never attempt to cross tracks directly ahead of a train, or stop or park too close to the tracks.

L. Mechanical Failure

Some accidents caused by mechanical failure can be prevented by the driver. It is the driver's responsibility to report any defective or unsafe vehicle conditions, and to seek and obtain immediate repairs. Continued operation of a defective or unsafe vehicle might result in an accident. Any accident caused by mechanical failure that results from abusive driving is also preventable.

M. Miscellaneous Vehicle Safety

Projecting loads, loose objects falling from the vehicle, loose tarpaulins or chains, or doors swinging open can cause accidents and injury. Always secure loads and check doors and tailgates to ensure they are securely latched before operating the vehicle.

N. Non-Collision Accidents

Many accidents, such as overturning or running off the road, may result from evasive action by the driver to avoid being involved in a collision. The actions of the driver prior to the accident should be investigated. The investigation may reveal excessive speed or lack of proper defensive driving technique.

O. Parking

Poor parking procedure, double parking, failure to properly block wheels, failure to set the emergency brake, or failure to turn wheels toward the curb may allow a parked vehicle to move or roll away. These accidents are always preventable.

P. Passenger Injuries

Vehicle passenger injuries caused by faulty operation of the vehicle are always preventable. Abrupt stops, turns, or acceleration should be avoided. The actions of the driver prior to the accident should be investigated. The investigation may reveal excessive speed or lack of proper defensive driving technique.

Q. Passing

Failure to pass safely indicates faulty judgment and the possible failure to consider one or more of the important factors a driver must observe before attempting the maneuver. Drivers should never pass another vehicle:

- Where view of road ahead is obstructed by hill, curve, vegetation, traffic, or adverse weather conditions.
- While facing rapidly or closely approaching traffic.
- Without signaling a change of lanes.
- By pulling out in front of other traffic that is approaching from rear or side.

R. Pedestrians

Drivers must yield the right-of-way to pedestrians. Be prepared for pedestrians to occasionally take unusual routes at mid-block or from between parked vehicles, and take precautions to prevent accidents. Always follow posted speed limits and warning signs. Be particularly careful in school zones, shopping areas, residential streets, and other areas with special pedestrian traffic.

S. Turning

Turning movements, like passing maneuvers, must be performed correctly to avoid accidents. Always signal prior to turning, properly position the vehicle for the turn, check the rearview mirrors, check pedestrian lanes, and take any other appropriate defensive driving action. Sudden turns by other drivers should always be anticipated.

T. Weather

Adverse weather conditions are not normally an excuse for being involved in an accident. Rain, snow, fog, sleet, or icy pavement increases the hazards of driving. Always adjust driving technique to minimize risks associated with poor weather conditions. And always use safety equipment such as tire chains and snow tires to maximize traction on icy roads.

U. Bicycles and Motorcycles

Bicycles and motorcycles have the same rights as automobile drivers, so use extra caution when sharing the road with them. Look carefully for cyclists before crossing through a bike lane or merging into traffic. And never pass a cyclist and then make a right turn. Also be aware of hand signals from cyclists that will indicate their direction of travel.

VII. Hazardous Materials

A. Hazard Communication Standard

OSHA issued the Hazard Communication Standard (29 CFR 1910) which states that as an employee, you have a "Right to Know" which hazards you face on the job, and how to protect yourself against them. The purpose of this standard is to ensure that hazards in the workplace are identified, evaluated and that information concerning these hazards is communicated to employers and employees. This transmittal of information is accomplished through a comprehensive hazard communication program.

The OSHA Hazard Communication Program is in the process of becoming compliant with the Globally Harmonized System (GHS). This is an internationally agreed-upon system designed by the United Nations to standardize chemical classification and labeling.

The Hazard Communication Program has been designed to inform employees of hazardous or potentially hazardous chemicals they may be exposed to during their employment. This is accomplished through the use of chemical inventory, primary and secondary container labeling, Material Safety Data Sheets or Safety Data Sheets, and employee training. Virtually all City and County employees are affected, including office personnel, yet the potential for exposure varies by the employee's position. If there are chemical hazards in the work area or operation, employees must be educated so they may protect themselves during the use, handling and storage of chemical products.

Chemicals are defined as lubricants, degreasers, solvents, soaps, detergents, fertilizers, pesticides, paints, toners, lacquers, and any other liquid, powder or granule used to perform a task.

B. Hazardous Chemicals Inventory

Each City and County Department must maintain a complete inventory of all chemicals used in the work place. A binder containing a complete inventory of all those chemicals, as well as Material Safety Data Sheet (MSDS) or Safety Data

Sheet (SDS), must be kept in the Department's office or other designated place that is readily accessible to all employees using the chemicals. This binder must be updated at least annually, or whenever new chemicals are purchased. It is the purchaser's/user's responsibility to notify the Supervisor when additional chemicals are introduced to the work area, and when chemicals are no longer in use.

The names of the chemicals must not be removed from the list even though the chemicals may no longer be in use. The list must function as an inventory of all chemicals that have been used in the work area.

C. <u>Labeling Chemical Containers</u>

Chemical containers must be properly labeled so that workers know what they are working with and know how to protect themselves. If chemicals are transferred from an original labeled container into an unlabeled secondary container, the secondary container must be labeled with relevant information if it will be used on more than one shift by more than one worker. Original container labels should have the following information:

- The chemical or mixture's trade name should be on the manufacturer's label. This name should correspond to the name on the MSDS or SDS provided by the chemical supplier.
- The name and address of the manufacturer should be on the label. A warning of the potential health effects or hazards related to the use of the chemical should also be on the label.
- National Fire Protection Association (NFPA) 704 is a system used for quickly communicating the hazards of a chemical on a label. This system is also known as the safety diamond. There are three colors and a white area used on the safety diamond: (1) red for flammability; (2) blue for health; (3) yellow for reactivity, and (4) white for special notice. The higher the number (0-4) in each of the colored spaces of the diamond, the greater the hazard in these criteria. So, if you had a "4" in the red space of the diamond, the chemical would be very flammable and sparks, heat, and smoking should be kept away.
- Words are also used to characterize the degree of hazard. The use of the word "danger" suggests the highest degree of hazard, "warning" suggests a moderate degree of hazard, and "caution" suggests the lowest degree of hazard.
- Chemical labels must remain readable and not defaced so there is no confusion about the chemical. If a chemical product in your worksite has no label, contact the appropriate supervisor.
- For detailed chemical labeling information and procedures, please refer to the <u>Broomfield Environmental & Wastewater Laboratories Chemical Hygiene</u> <u>Plan</u>.

D. <u>Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDS)</u>

Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDS) are supplied by the chemical manufacturer or supplier to educate workers on the hazards of using the product. A binder containing a complete inventory of all those chemicals, as well as MSDS or SDS, must be kept in the Department's office or other designated place that is readily accessible to all employees using the chemicals. This binder must be updated at least annually, or whenever new chemicals are purchased.

The MSDS or SDS gives detailed information on what Personal Protective Equipment (PPE) should be worn and what conditions should and should not be present during chemical use and storage. The length of an MSDS or SDS may range from one page to nearly 30, yet each must provide at least 14 critical pieces of information organized in separate sections. Here is the information that may be obtained from an MSDS or SDS:

- The product identification, name, and class of the chemical(s).
- A list of hazardous ingredients, the percentage of each, and occupational exposure limits. The lower the exposure limit, the greater the health hazard.
- Physical data including the boiling point, vapor density, and evaporation rate. If a large percentage of the product has a high vapor pressure or evaporates quickly, there is a likelihood of inhaling this product accidentally during use.
- Reactivity data describing the stability of the chemical, conditions to avoid, and incompatible chemicals. If the chemical is reactive, it may combine with other chemicals, air, or water to form an explosive or heat-causing reaction.
- Fire and explosion data that classifies flammability and gives the flashpoint and Lower Explosive Limit (LEL) of flammable liquids. If the product is a flammable liquid, keep flames, sparks, and heat away. Unusual fire and explosion hazards and special fire fighting procedures are also included in this section.
- Safe handling and use, which includes recommended PPE and any ventilation requirements.
- Emergency response information providing procedures for first aid, rescue, spill cleanup, and disposal should an uncontrolled release occur. Also, the emergency phone number to contact if additional information is required.
- Refer to OSHA regulation 29 CFR <u>1910.1200</u> for additional information concerning MSDS or SDS.

E. Chemical Exposure Training

Any person who has the potential for exposure to chemicals must receive initial training on the Hazard Communication Standard and the safe use of those chemicals. Whenever a new chemical is introduced, additional training must be provided. Regular safety meetings should also be held to review the information presented in the initial training.

When employees are required to perform non-routine tasks involving chemicals, special training sessions must be conducted to provide information about the chemicals, the potential for exposure, and the proper protective measures to implement.

The following subjects must be covered during initial training for employees who have the potential for exposure to chemicals:

- The employee's rights under the Hazard Communication Standard.
- Any operations in their work area where chemicals are present.
- The physical and health hazards of the chemicals in their work area, hazard classification for the chemicals, and severity ranking.
- Procedures and practices to protect themselves from the hazards associated with the chemicals in their work area.
- Protective measures such as PPE, ventilation, work practices, and emergency procedures.
- Explanation of the labeling system, chemical inventory listing, MSDS or SDS, and how these are interrelated
- The location of the chemical inventory listing, MSDS and SDS library, and other information on workplace hazards.
- Chemical warning properties that can indicate the presence or release of a chemical such as visual appearance, odor, and other sensory information.
- Acute versus chronic health effects.

Occasionally, non-routine operations are conducted such as periodic cleaning of tanks or jetting out of sewers which contain hazardous materials. When chemicals are used in a non-routine operation, additional training must be provided to cover the following subjects:

- Objectives of the task.
- Review of the chemicals to be used and their MSDS or SDS before starting the task.
- Physical and health hazards associated with the chemicals and task.
- Ensure that employees know what exposure may be created during the operation, and how to minimize the potential for exposure.

- Methods to detect the presence or release of the chemicals.
- Emergency procedures in the event of exposure or release.
- Proper selection and use of PPE.

Outside contractors may potentially expose other workers to chemical hazards while performing their work. The following steps must be taken when utilizing outside contractors:

- The appropriate supervisor(s) with the City and County must provide the contracted employees with the MSDS or SDS for the City and Countypurchased chemicals that the contractor may be exposed to during their operations. This excludes materials that would only potentially be contacted in an emergency.
- If contractors bring materials on-site that could potentially expose City and County employees, the contractor must supply MSDS or SDS of these products to the appropriate supervisor.
- All contracted employers who use chemicals must verify that their employees have been trained under the OSHA Hazardous Communication Standard; 29 CFR 1910.1200 or 1926.59 for construction.

F. Environmental and Wastewater Laboratory Safety

Safe work practices for the Broomfield Environmental and Wastewater Laboratories are listed in several documents. The Chemical Hygiene Plan lists hazards and control measures associated with operations within the laboratory workspaces and storage areas. The Field Operations Job Hazard Analysis lists hazards and control measures associated with field activities. The personal protective guidelines in these documents should be followed in all circumstances.

Laboratory personnel often use highly concentrated chemicals that can cause damage in a short period of time. One example is the use of acids or bases which can burn the skin or eyes. Due to the nature of the acute hazards, it only takes one incident to have a serious effect. Here are a few general laboratory safety guidelines that should always be followed:

- After handling laboratory chemicals, wash hands and all areas of potentially exposed skin before eating, drinking, smoking, applying lip balm or cosmetics.
- Creating a siphon through mouth suction in a laboratory is strictly prohibited.
- Avoid working alone if performing any operation that may be considered hazardous. If there is a mishap, you may not be discovered until you are in a medical emergency situation.
- Perform hazardous operations and chemical transfers in a laboratory hood if possible.

- Ensure that work areas are kept clean and orderly so that items are not tipped over, spilled, or accidentally mixed. Any liquid on the floor should be captured immediately before causing a slip hazard.
- Discard broken glassware to avoid the possibility of container failure, cuts, infection, or chemical absorption into the skin. The skin's natural defense mechanisms are negated when cut.
- Know how to use the Personal Protective Equipment (PPE) appropriate for the job performed. And know the location of your eye wash station, emergency shower, and first aid kit.
- Label all containers of chemicals. This is vital if the chemical container is used by more than one person during more than one shift.

G. Chemical Spills

When a chemical spill occurs, all people should immediately evacuate and isolate the area, notify supervisors and other employees, and have a qualified person assess the potential for damage or exposure. If this person determines that the spilled material is too hazardous or of too large a volume, emergency response personnel should be contacted by calling 911. If it is deemed appropriate for personnel to clean up the spill, follow these guidelines:

- The name and address of the manufacturer should be on the label of the spilled chemical. A warning of the potential health effects or hazards of the chemical should also be on the label.
- Consult the Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) for appropriate spill response procedures or call CHEMTREC at (800) 424-9300.
- Wear the appropriate personal protective equipment, including gloves and SCBA, if necessary.
- Dike or surround the spill with a barrier of absorbent material such as kitty litter. Add enough absorbent and mix the slurry until a solid, uniform mixture results.
- Shovel the absorbed mixture into a chemically-resistant disposable container, and decontaminate the spill area.
- Consult the MSDS or SDS for the chemical or product to determine appropriate disposal procedures for waste.
- Remove chemical waste promptly to reduce potential exposure to workers either at a staging area or by ultimate disposal. Note: Spills of concentrated acids or caustic solutions should be neutralized before being placed in a chemically resistant disposable container. Add the appropriate absorbent slowly until the mixture stops foaming.
- If there is inadequate information to determine how the spill should be cleaned up, or if hazardous vapors or fire develops, the appropriate

professionals should be contacted. In these cases, the area should remain evacuated.

 For detailed chemical spill response information and procedures, please refer to the <u>Broomfield Environmental & Wastewater Laboratories Chemical</u> <u>Hygiene Plan</u>.

H. Handling Corrosives

Corrosives are used in many applications. They may include strong acids and bases which can explode, cause fires, or cause bodily injury very quickly depending on the manner of exposure. To reduce the possibility of an accident with corrosives, follow these safe practices:

- The name and address of the manufacturer should be on the label. A warning of the potential health effects or hazards related to the use of the chemical should also be on the label.
- Read and understand the Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) for the particular chemical. The MSDS or SDS will explain the chemical properties, personal protective equipment needed, and emergency procedures.
- Learn the specific emergency procedures for your work area including the location and proper use of spill controls, eyewash stations, and safety showers.
- Store acids and bases separately. They are an explosive combination. The MSDS or SDS will help determine if the substance is a base or acid.
- Corrosives should be stored in tightly closed approved containers away from flammable and combustible liquids and dispensed with approved nozzles and dispensers.
- Inspect storage containers regularly for damage which can cause leaks. Check that caps and spouts are in good condition.
- Do not smoke when working with or handling corrosives. To reduce the
 possibility of accidental ignition, do not carry lighters, matches, or other
 sparking devices in the vicinity of corrosives.
- Dispose of liquid corrosives properly. Pour used corrosives into approved labeled containers for proper disposal and never into drains, sewers, trash receptacles, or onto the ground.
- Flush eyes for 15-20 minutes if they come in contact with a corrosive. Contact lenses, if worn, should be removed to help during the rinsing. Do not use neutralizers or ointments since they may cause more damage.
- Immediately after flushing, obtain professional medical treatment.
- Remove contaminated clothing and rinse skin for 15-20 minutes. Do not wear contaminated clothing until it has been washed or decontaminated.

Do not use ointments or neutralizers after rinsing, but cover the burn area with sterile dressing and seek professional treatment.

- Immediately seek fresh air if a corrosive is inhaled, and get medical attention.
- For detailed chemical handling information and procedures, please refer to the <u>Broomfield Environmental & Wastewater Laboratories Chemical Hygiene</u> <u>Plan</u>.

I. Flammable Liquids

Flammable liquids, such as gasoline and paint thinners, can cause serious fires and explosions if they are not used, stored, or disposed in a safe manner. Employees need to be aware of the hazards and take these proper safety precautions when working with flammable liquids:

- Read the Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) for the particular chemical you are using. Pay particular attention to the sections dealing with fire and explosion hazards, special precautions, and safe handling and use.
- Avoid ignition sources including open flames, cigarettes, sparks from welding operations, and static electricity when working with flammable liquids.
- Use flammable liquids in areas that have proper ventilation so hazardous vapors do not accumulate.
- Bond and ground containers when transferring flammable liquids.
- Store flammable liquids in UL listed or FM approved safety containers that have self-closing spouts, flash arresters, and are properly labeled.
- When not in use, store flammable liquid cans and containers in approved flammable liquid storage cabinets.
- Keep portable fire extinguishers on hand when using flammable liquids.
- Dispose of used flammable liquids in an approved manner. Don't dump them down the sink or into a sewer. Contact your supervisor for proper disposal methods.
- Limit the quantity of flammable liquids stored to what is needed for short term use.

J. Waste Handling for Hazardous Materials

The City and County has a goal to reduce, reuse, recycle, and replace hazardous materials with non-hazardous substitutes. Minimizing the use of hazardous materials and reducing waste generation at its source are important considerations for all City and County operations.

Hazardous materials, substances, or waste are those which are intrinsically dangerous or otherwise pose a safety hazard. This includes materials which are ignitable, explosive, chemically reactive, toxic, or biologically active. Federal and Colorado laws impose strict regulations concerning hazardous materials. These regulations require special storage, movement and disposal systems, and documentation that identify them as hazardous when being shipped. Compliance with these regulations is the responsibility of every City and County employee and contractor. The goal to avoid future liabilities dictates that the City and County takes a conservative approach in handling hazardous material.

Environmental Services (ES) manages waste generated by the City and County. ES generates annual waste stream profiles for waste items and stores and manages Hazardous Waste, Universal Waste and Toxic Control Substances Act (TSCA) (toxic) waste at the Broomfield Recycling Center (BRC) in a regulated storage area. ES also ships waste, signs manifests as a Department of Transportation (DOT) certified shipper and ensures all waste is disposed in accordance with regulatory laws. All land disposal and destruction certifications are maintained on file.

The City and County currently contracts with Veolia Corp. to provide emergency response for hazardous materials. It is the responsibility of the City and County to ensure on an annual basis that the emergency response contractor has no outstanding safety or environmental violations.

More specific and detailed information about Hazardous Materials, Substances, or Waste may be obtained on the Environmental Protection Agency (EPA) website.

The following table identifies potential hazardous materials, substances, or waste that may be generated by City and County operations. Compliant handling, storage, and disposal procedures are also provided.

Material, Substance, or Waste	Approved handling, storage, and disposal
Automotive batteries, brake fluids, spent oil and filters, antifreeze, spent diesel or gasoline.	The Fleet Department has containers where spent automotive batteries, antifreeze, waste oil and filters, brake and transmission fluids, diesel and gasoline are accumulated. Multiple contractors periodically empty these containers for recycling or disposal of the contents.
Oil-based or solvent-based paint, paint thinners and strippers, solvents, other flammable substances, certain cleaning products.	Most of the cleaning products used by Facilities Maintenance are non-hazardous. The graffiti removal solvents currently used are non-toxic and non-hazardous. Surplus paint, paint strippers, or other hazardous products must be handled by ES at the BRC.
Acids and bases (cleaning products, drain cleaners, laboratory operations).	Acids and bases can be neutralized and disposed through the City and County wastewater system, but there can be no other

	additional constituents such as solvents or heavy metals. Disposal must be completed within 90 days of identifying the material as waste.
Laboratory chemicals (Wastewater and Environmental Laboratory).	Surplus, spent, or expired hazardous laboratory chemicals are accumulated in designated areas according to the Chemical Hygiene Plan . Collection, packaging, transport, and disposal are performed by a certified and licensed contractor.
Asbestos.	Asbestos must be collected and disposed by a certified and licensed contractor.
Lawn and garden chemicals (pesticides, herbicides).	Hazardous or toxic chemicals are not routinely applied by the Parks Department. Extermination of prairie dogs in open space areas is an exception. Parks performs this task with toxic chemicals according to State of Colorado Agriculture Department pesticide licensing requirements. Any surplus hazardous or toxic materials, or empty containers that held these materials, must be handled by ES at the BRC.
Batteries (alkaline, lithium, NiCad, etc.).	Spent alkaline batteries can be disposed with regular sanitary trash. Spent lithium, NiCad, or other rechargeable batteries are handled by ES at the BRC.
Pool chemicals (chlorine powder or tablets, pH-adjusting chemicals).	Pool chlorine tablets are consumed during normal pool operations, so no surplus needs to be disposed. The pool pH adjustment formerly done with chemicals has been replaced with non-hazardous carbon dioxide.
Electronic waste (e-waste) including cell phones, computers and peripheral devices (contain heavy metals), and transformers or capacitors (may contain PCB's).	E-waste is handled by ES at the BRC and covered by the City and County's (draft) Electronics Recycling and Surplus Disposition Standard Operating Procedure. PCB- containing transformers or capacitors must be handled by ES at the BRC.
Mercury thermometers, thermostats, light fixtures, fluorescent tubes and bulbs, sodium vapor and halogen bulbs.	Mercury thermometers, thermostats, light fixtures, fluorescent tubes and bulbs, sodium vapor and halogen bulbs are handled by ES at the BRC.
Compressed gas cylinders and aerosol cans.	Empty compressed gas cylinders should be returned to the vendor. Empty aerosol cans should be depressurized (punctured) and disposed in the metal recycling bin at the BRC.
Medical waste (sharps, needles, razor blades, expired meds, biological, infectious).	Spent microbiological media from the Environmental Laboratory is autoclaved at 121° C for 30 minutes in red biohazard autoclave bags to destroy bacteria. The

autoclave bags have a temperature indicator patch that displays when contents have been autoclaved. The bag and contents may then be placed into the normal sanitary trash container for disposal.

Health & Human Services (HHS) needles and razor blades must be stored in red plastic sharps containers. All other sharps (broken glass, etc.) must be stored in puncture-resistant cardboard boxes. Sharps containers must be labeled with the date when the container is full.

All HHS Biohazard bags containing biological waste must be labeled with the date they were put into use. Only bags with the preprinted universal biohazard symbol and the words "biohazardous", or "infectious" can be used.

Each year during May and October, ES hosts household hazardous and e-waste drop-off events at the Norman Smith Service Center. These events provide an environmentally compliant system for City and County residents to dispose of surplus household hazardous materials and e-waste items. These events are not to be used to dispose of hazardous waste or e-waste generated by City and County departments or commercial entities.

K. Specific Materials

1. Pesticides

The use of pesticides can be hazardous to the user, bystanders, and the environment if certain precautions are not taken. The user is responsible for the safe use and disposal of the product. To minimize risk, please follow these safety practices:

- All employees who apply pesticides must have proper training.
- Carefully read the label. Follow the instructions for mixing, handling, and applying the pesticide. The Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) should be understood and readily available for emergency purposes.
- Use the least toxic pesticide for the task. Keep unauthorized individuals away from mixing, storage, and dispensing areas. Only employees with a pesticide applicator's license, or who are under the supervision of an employee with such a license, may apply restricteduse pesticides.
- o Maintain the pesticide in the original container. The label should be readable, and the container should be in good condition. There should be no leaks or damage to the container.

- o If pesticides must be mixed, do it outdoors if possible. Avoid skin contact and inhalation of dust or vapors.
- o Rubber gloves, rubber boots, goggles, and a respirator must be worn when handling and applying toxic pesticides. Use designated mixing tools which are kept with the chemicals.
- Mix on a level work surface to reduce the possibility of spills. If a spill does occur, wash skin with soap and water and hose the area off. It may be necessary to remove clothing to thoroughly wash or shower and rinse hair. Clothing should not be worn until washed.
- o Never eat, drink or smoke when spraying or dusting. Cover animal food and water containers which may be in the area.
- Apply pesticides early in the day, but not on a windy day. Stay out of the drift. Avoid spraying near waterways to prevent contamination. After using the pesticide, wash with soap and water immediately. This should be performed before smoking, eating, or drinking.
- All pesticides must be stored in a separate storage area (room or cabinet), identified as such, and under lock and key. This room must be properly ventilated.
- Pesticides must be stored in the original container they come in and not transferred to an unmarked container.
- All pesticides should be disposed according to MSDS or SDS instructions and environmental regulations (refer to the Hazardous Waste section).
- o If pesticide is spilled on clothing, remove immediately, wash clothing separately or dispose of properly. Never wash contaminated clothing with other clothing.

2. Gasoline

Gasoline is highly flammable and easily ignited. In fact, a single cup of gasoline has the explosive power of five sticks of dynamite. Because gasoline is so easily ignited, you must use great care when handling it. A spark from static electricity can ignite gasoline. Static electricity is more of a problem under low humidity conditions, but you should always be aware of the potential problem and take steps to avoid sparks from static electricity.

Gasoline is poisonous if swallowed. If you accidentally swallow gasoline, call a doctor at once. Do not induce vomiting. If you get gasoline in your eyes, flush with water for at least 15 minutes and call a doctor. Gasoline on your skin may not initially appear to be a problem, but prolonged or repeated liquid contact can lead to irritation or dermatitis.

Breathing gasoline fumes is also dangerous. Exposure to vapor concentrations can cause respiratory irritation, headache, dizziness, nausea

and loss of coordination. Higher concentrations may cause loss of consciousness, cardiac sensitization, coma and death resulting from respiratory failure.

A few basic principles for safely handling gasoline include:

- o Gasoline should not be used for cleaning purposes. A non-toxic/non-flammable solvent should be used.
- o There must be no smoking, open flames, or open lights within 50-feet when gasoline is used.
- Store gasoline only in approved and labeled containers. Approved containers are red in color and labeled "Gasoline - Flammable".
- o If storage of gasoline is operationally necessary, keep only a limited supply of gasoline on hand, clearly marked and stored in an approved area in an approved flammable storage cabinet.
- When transporting containers, be sure they are secured in the vehicle. Fill containers no more than 95 percent full to allow room for thermal expansion. Be sure your containers have secure lids.
- o Do not leave gasoline containers in direct sunlight, in the bed of a truck or inside a vehicle, or in the trunk of a car.
- When fueling equipment, make sure the engine has stopped and lights are out. Never refuel a hot engine or an engine that is running. Shut down the engine and let it cool off for at least 10 minutes. The highest temperatures attained by a small engine occur immediately after shutdown, so it is not safe to refuel immediately after shutdown. If area around tank opening is hot, wait until it cools to fill tank. Avoid spillage and overflow.
- Never remove the cap from a gasoline tank while the engine is hot.
 Combustible vapor can flow out and come in contact with manifolds, exhaust pipes and other hot engine parts.
- Place your hand on a metal part of the machine, away from the fuel tank, to discharge any static electricity before you open the fuel tank and fuel can.
- Do not enter or exit vehicles while refueling. Avoid sliding on or off the seat of a vehicle while fueling; a static charge and spark can result.
- o Do not use electronic equipment such as cell phones near gasoline. A spark from the electronics could ignite the gasoline.
- When filling gasoline containers at a service station, place the container on the ground. Do not fill fuel cans in a pickup truck bed that has a bed liner. Remove cans from truck and place on ground

- while filling with fuel. Hold the nozzle in constant contact with the container while filling.
- Never store gasoline containers or equipment with gasoline tanks near a flame. Natural gas water heaters or furnaces are sometimes located in storage rooms; never store gasoline or gasoline-powered equipment in the same room.
- Store any gasoline-soaked rags in metal containers designed for that purpose.
- Gasoline vapors are heavier than air.

3. Liquid Propane Gas

Liquid Propane Gas (LPG) is in gas-phase at normal room temperature and atmospheric pressure. It liquefies under moderate pressure, readily vaporizing upon release of this pressure. It is this property which permits transport and storage in concentrated liquid form, as well as use in vapor form. To work safely with LPG, please follow these guidelines:

- o The potential fire hazard of LPG vapor is comparable to that of natural gas, except that LPG is heavier than air.
- Containers should be designed, fabricated, tested, and marked (or stamped) according to DOT or APIASME regulations. LPG containers that do not display the required mark or stamp should not be used.
- Portable containers should be protected against physical damage by recessing, protective housings, or by proper location on the vehicle while in transit. A ventilated cap or collar to permit relief valve discharge should exist for protection in the event of a vehicle impact.
- DOT containers should be equipped with pressure relief valves or fusible plug devices.
- o Containers showing serious denting, bulging, gouging, or excessive corrosion should be removed from service.
- o Containers should be located in a place and in a manner to minimize the possibility of damage to the container and fittings.
- LPG-powered trucks (forklifts) with permanently mounted containers should be refueled out-of-doors. These trucks should not be parked and left unattended in areas of excessive heat or near sources of ignition.
- o Ignition sources should be controlled during LPG transfer operations. For example, internal combustion engines, smoking, open flames, welding, etc., should not be permitted within 15 feet of a point of transfer while filling operations are in progress.
- The maximum quantity allowed in one storage area should not exceed 735 lbs. of water capacity. If additional storage locations are

required on the same floor within the same building, they should be separated by a minimum of 300 feet.

4. Swimming Pool Chemicals

A swimming pool utilizes chemicals to adjust pH or provide disinfection. Certain exposures to these chemicals can harm skin, lungs, or eyes. The Colorado Department of Health has published the Swimming Pool and Mineral Bath Regulations. In this guide, criteria are established for chemical handling and other pool conditions and practices. The following items should be considered in relation to chemical safety at pools:

- Construct chemical feed equipment for pH adjustment with materials resistant to chemical action and equipment of adequate size and design to allow for routine cleaning and maintenance.
- Provide an automatic or mechanical means of adding disinfectants to swimming pool water. Disinfectants added manually are permissible under emergency conditions which require the pool to be closed until the chemical is thoroughly dispersed.
- Obtain a Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) for all pool chemicals. Review the applicable MSDS or SDS before using any chemical. Wear the prescribed personal protective equipment indicated on the MSDS or SDS.
- Store chemicals with lids secured in their original containers in a cool, dry, well-ventilated area away from sunlight. Sanitizers or oxidizers must not be stored in the same area as pool equipment.
- Do not store liquid chemicals above or adjacent to dry chemicals.
- o Store acids in a separate area from bases.
- o Add chemicals to water, not water to chemicals.

VIII. General Fire Safety

Fire safety involves knowing what can cause a fire, how to prevent it, and what to do if there is a fire. A fire can only occur if there is sufficient heat (a source of ignition), a source of fuel, and oxygen. Ignition can be caused by open flames, electrical sparks (including static electricity), electrical heating elements, smoking, or other heat sources. Any combustible or flammable material, including vapors, can support a fire when coupled with sufficient oxygen. Smoke can be an even greater threat than flames, since more victims die as a result of smoke inhalation.

A. Employee Responsibility

All employees are responsible for recognizing and mitigating fire hazards in the workplace. Please follow these fire safety procedures:

- Employees should perform their work in a manner that will prevent fires.
- Employees should learn to recognize, report, and correct all fire hazards.

- Employees should know how to respond to a fire emergency.
- Employees should become familiar with the uses and locations of the fire extinguishers in the work area.
- All designated exits must have clear access and egress, both inside and outside, at all times. No snow or ice buildup, trash, or parked vehicles should block these exits.
- Fire doors to a stair enclosure or exit must be equipped with a reliable selfclosing mechanism and must not - at any time - be secured in the open position.
- Proper inspection, testing and maintenance of fire protection systems must be done to assume proper operation and prevention of alarms.
- Electrical appliances such as space heaters, coffeepots, cup warmers, and ovens must be UL approved, internally grounded and have a 3-prong plug. Coffee pots, cup warmers, and ovens must be located in break rooms - not in office areas. All heat-producing equipment must be unplugged when not in use. Space heaters must be unplugged at the end of each workday.
- Do not overload electrical circuits. Electric cords should be UL approved and in good repair. Frayed electrical cords and faulty appliances should be reported to supervisors immediately and not be used until properly repaired or replaced.
- Extension cords should be of sufficient size to handle the electrical load they are to carry. Extension cords are for temporary use only! Extension cords must not be used as a substitute for permanent wiring and must be 3-prong style. Do not run over cord or place them under materials, furniture, rugs, etc. Do not plug power strips into power strips.
- Be aware of combustibles and flammables in your workplace. Keep trash, debris, oily rags, etc. picked up and placed in approved metal containers with lids.
- Minimize flammable liquid quantities, and store them in approved containers and approved flammable storage cabinets when not in use.
- Flammable liquid containers should be tightly capped. When being transferred from one container to another, both containers should be grounded and bonded.
- Keep doors to flammable storage cabinets closed at all times except when actually removing materials from the cabinet.
- Gasoline must only be stored in a flammable storage cabinet in an approved container that is red in color and labeled "Gasoline - Flammable".
 Containers holding other liquids must be of a different color and labeled with the name of the liquid contained inside.

- Be cautious with open flames including cigarettes and welding torches. Determine if there are other ignition sources that could ignite flammable vapors and gases.
- Clothing should be changed if it becomes soaked with flammable liquid.
- Keep work areas well ventilated to minimize explosive concentrations of flammable vapors.
- Gas lines on welders should be purged when not in use.
- Know where fire extinguishers are located.
- Follow instructions on how to properly use an extinguisher.
- Take all fire alarms and reports of fire seriously. Although most of us have become accustomed to "just another false alarm", one day a real fire emergency could present itself. By conditioning ourselves to respond to each fire alarm or report of a fire condition in a prudent manner, we will be better prepared for the real thing.
- The fire department will turn off and reset the alarm. Wait for the fire department clearance before re-entering the facility.
- Do not store combustible materials under stairways that are designated emergency exit routes.

B. <u>Fire Extinguishers</u>

Portable fire extinguishers offer a first line of defense against fires. It is therefore important to understand the following general guidelines in the proper use, maintenance, and testing of portable fire extinguishers for maximum effectiveness:

- Fire extinguishing equipment appropriate for the class of potential fire hazard must be maintained in all City and County work areas.
- Fire extinguishers must be unobstructed, prominently displayed and secured, and easily accessible to employees without subjecting the employees to possible injury per City and County Fire Code requirements. Extinguishers should be hung on walls, not set on floors.
- The class and size of extinguisher (Class A, B, C, or D, or K) selected for a
 work area should be appropriate for the degree of fire hazard present. For
 example: Class A for ordinary combustibles; Class B for flammable or
 combustible liquids; Class C for energized electrical equipment; Class D for
 combustible metals; Class K for cooking oils and fats.
- Visual inspection of fire extinguishers should be conducted monthly by Public Works/Facilities Operations. This should be done to ensure they are charged, there is no other obvious damage or corrosion noticeable, and that there are no obstructions limiting access to the extinguishers.

All extinguishers will have an annual inspection by a qualified inspector. An
appropriate tag will be attached to each extinguisher listing the date it was
last inspected, the type of inspection performed, and the name of the
person performing the inspection.

Follow these steps if a fire occurs:

- If fire or smoke is present or you hear an explosion, the fire alarm should automatically be activated. In the event that the fire alarm sounds, it should always be considered an actual emergency and evacuation measures should be taken immediately. If possible, close any or all doors leading into such an area.
- If fire or smoke is present or you hear an explosion in the building and the alarm has not sounded, activate the manual fire alarm (pull station). Employee(s) must immediately warn others of the fire and evacuation measures should be taken immediately. If possible, close any doors in the area where the fire is located.
- The Fire Department must be notified immediately by dialing 911 or calling City and County Dispatch using the City and County radio system. Make these calls from a safe area.

Employees should not attempt to extinguish the fire:

- If alone and can otherwise escape,
- If fighting the fire will block or hamper egress,
- If the fire could rapidly grow,
- If the fire involves energized equipment, hazardous materials, flammable liquids or flammable gas,
- If the employee has not received training in the use of fire extinguishers.
- If the fire is beyond the beginning/incipient stage.

If the employee(s) is/are familiar with the general principles of fire extinguisher use and the hazards involved with incipient stage firefighting, follow these steps to use a fire extinguisher:

- Pull the fire extinguisher pin and stand back about 8 feet from the fire
- Aim the hose at the base of the fire.
- Squeeze the trigger. Make sure your first shot is on target; Fire extinguishers will only last 3-20 seconds, depending on the size of the extinguisher.
- Sweep the base of the fire with the spray.