ACCIDENT PREVENTION FUNDAMENTALS

Fundamentals of Accident Prevention

Accidents are Preventable

Unfortunately, many people, either through ignorance or misunderstanding, believe that accidents are the inevitable results of unchangeable circumstances, fate, or a matter of bad luck.

It must be emphasized that accidents do not happen without cause and the identification, isolation and control of these causes are the underlying principles of all accident prevention techniques.

There are many methods of determining the causes of accidents. Below is one that is used by the National Safety Council.

Causes of Accidents

Causes of accidents can be divided into three major categories:

1. Unsafe acts of people;
2. Unsafe physical or mechanical conditions; and,
3. Acts of nature (floods, hurricanes, etc.).

According to National Safety Council statistics, 88% of all accidents are a result of unsafe acts of people. Approximately 10% of all accidents are caused by unsafe equipment or unsafe surroundings. The other 2% of all accidents are caused by acts of nature. Therefore, elimination of unsafe acts of people will be the main thrust of any effective safety program.

Unsafe Acts of People

Some causes of unsafe acts include:

- Failure to follow a proper job procedure;
- Cleaning or repairing equipment that is moving, electrically energized or pressurized;
- Failure to use appropriate personal protective equipment such as gloves, goggles, hardhats or seatbelts;
- Failure to wear safe personal attire;
- Failure to secure or warn;
- Improper use of equipment;
Improper use of hands or body parts;
Making safety devices inoperative;
Operating or working at unsafe speeds;
Taking unsafe position or posture;
Unsafe placing, mixing or combining materials;
Using tools or equipment known to be unsafe;
Driving errors; and,
Horseplay.

Unsafe acts can usually be attributed to one of the following:

- Lack of knowledge;
- Improper attitude; and,
- Lack of safety awareness.

Unsafe Physical or Mechanical Conditions

Most unsafe or hazardous conditions can be grouped into one or more of the following classifications:

- Defective or unsuitable tools, machinery, equipment or materials;
- Sloppy housekeeping;
- Unsafe or lack of methods or procedures; and,
- Employee not mentally or physically compatible with job requirements.

Acts of Nature

- Floods
- Hurricanes

Control of Accident Causes

There are three main methods utilized to control accident causes: engineering, education and training, and enforcement. These three methods are sometimes referred to as the “Three E’s of Safety,” and are outlined below.
The Three E’s of Safety

*Engineering*

Causes of accidents or unsafe conditions can sometimes be eliminated through the application of engineering controls. When an operation is mechanically and physically safe, it is unnecessary to be as concerned as one would about the uncertain behavior of people. **Machines are less apt to fail than people.** It may be necessary to make mechanical revisions or modifications to eliminate existing, unsafe conditions and, in some cases, to prevent unsafe acts. Design of machine guards, automobile brakes, traffic signals, pressure relief valves and hand rails are varied examples of safety engineering at work.

*Education and Training*

Just as safety engineering is the most effective way of preventing accidents involving unsafe mechanical and physical conditions, safety education is the most effective tool in preventing accidents by human causes. Through adequate instruction, personnel gain useful knowledge and development of safe attitudes. Training is a particularly important accident prevention control; it gives each employee a personal safety tool by developing habits of safe practice and operation.

*Enforcement*

Usually, accidents can be prevented through adequate safety engineering and education. However, there are some people who are a hazard to themselves and others because of their failure to comply with accepted safety standards. It is these persons for whom the strict enforcement of safety practices is necessary, backed by prompt corrective action. No organized accident prevention can be successful without effective enforcement because accidents are frequently the direct result of violations of safety principles. To be completely effective, accident prevention controls cannot be applied “hit or miss.”

All engineering, education, training, supervision and enforcement measures will be directed toward the solution of specific problems. These problems are identified based on the collection of facts relating to unsafe acts or unsafe conditions.
Elimination of Unsafe Conditions

One of the most effective means of preventing accidents is the elimination of unsafe conditions. To stress safety while permitting unsafe conditions to exist is bound to create an obstacle to the cooperation required from employees. Employees are encouraged to report any unsafe conditions to their supervisors. The supervisor must take the initiative to abate unsafe conditions and protect employees and the public without the need for instruction from upper management. If abatement is beyond the supervisor’s scope of authority, the matter must be brought to the attention of management, the director and/or Risk Management.

The following unsafe conditions must not be permitted to exist:

- Obstacles and impediments to the safe movement of personnel, vehicles or machines, such as blocked fire exits;
- Unsafe working and walking surfaces;
- Worn, damaged or misused tools;
- Failure to provide proper equipment and rigging for the hoisting and movement of heavy objects;
- Operation of equipment with guards for moving parts of machinery removed and/or defeated;
- Allowing employees to work without using required personal protective equipment such as goggles, gloves, hardhats, adequate footwear or seatbelts;
- Worn and/or damaged or unguarded electrical wiring, fixtures and power cords; and,
- Absence of required signage warning of particular hazards in the area.

The important factor in eliminating unsafe conditions is doing so before an accident occurs. Near-miss occurrences need to be investigated and corrected as they are a warning of a condition that may eventually lead to an accident. A near-miss occurrence is an incident resulting in neither an injury nor property damage. However, a near-miss occurrence has the potential to inflict injury or property damage if its cause is not corrected. Too often an unsafe condition is allowed to exist simply because it has not caused an accident yet.

Reporting Unsafe Conditions

All City employees are to keep alert for and report unsafe conditions. If an unsafe condition is identified, it is to be reported to a supervisor immediately.
The supervisor will generally evaluate the risk of personal injury, public liability and/or damage to property or equipment and may call the City-wide Safety Unit for guidance and support. The supervisor should initiate steps for immediate correction of the unsafe condition.

If the problem is not corrected in a timely manner or the hazard is not secured, the employee is to call the **Risk Management/Safety Office at (305) 416-1732** to report the unsafe condition.

**Correcting Unsafe Actions**

Regardless of the degree of safety built into a job, unsafe actions on the part of employees will always be a cause of injuries. Teaching employees safe work habits means showing them how to do their tasks with less risk to themselves and less damage to equipment. Much of this instruction can be boiled down to a few simple principles or job rules. By concentrating on these safe habits, by showing “why” as well as the “how” of safety and by constantly supervising employees’ safe work habits, they will become the accepted method for the employee to perform tasks.

Actual demonstrations of the right way of doing tasks should be conducted, accompanied by the basis for preferring one work habit to another. Equally important as this initial instruction, is the review of subsequent performance. When the right way has been presented and agreed to by the individual worker, it is essential that failure to comply be corrected.

Flagrant or repeated disregard of safety rules should be met with appropriate disciplinary action. No matter how skillful an employee may be in performing their duties, if the employee does not perform them safely, that employee is placing themselves and others at risk.

**Job Safety Analysis**

By performing a Job Safety Analysis, job tasks are evaluated to identify the hazards involved.

**Procedures for Job Safety Analysis**

1. List sequence of job steps—the job is broken down into basic steps, describing what is to be done in a logical sequence.
2. Search for and list potential hazards—each step is analyzed for hazards that may cause an accident. The objective is to identify as many hazards as possible.

3. Decide on a recommended action or procedure. When the risks and potential hazards associated with each step are identified and their causes understood, then methods of eliminating them should be outlined. There are four basic methods by which this can be accomplished.
   a. **Substitution**: Eliminate the process or operation and provide a substitute action.
   b. **Isolation**: Isolate the process or operation in order to eliminate or minimize the hazard.
   c. **Protection**: Provide mechanical guards to control access to hazards.
   d. **Personal Protective Equipment**: Provide and enforce use of personal protective equipment to reduce the possibility of injury.

4. The data collected from all of the steps will be used to create department-specific safety policies and procedures. The data will assist supervisors in instructing employees in how to perform their job safely.

5. A continuing job safety analysis is conducted for existing or newly acquired job functions. The purpose of this program shall be to define all possible safety hazards involved in the performance of the job, to establish safe work procedures and rules and to determine if safety protective equipment or clothing is necessary for the employee performing the job.

### Safety Inspections

Every employee is responsible for maintaining a safe working environment. The objectives of a safety inspection program are to:

- Maintain a safe work environment through hazard recognition and removal;
- Ensure that employees are following proper safety procedures while working; and,
- Determine which operations meet or fail to meet acceptable safety standards.

Complete walk-through and detail inspections of equipment, work areas and employee operating procedures will be performed on a regular basis. Inspections will be documented and all unsafe conditions, procedures and practices noted.
Employees will inspect their work area and equipment before each shift to identify unsafe conditions. In addition to self-inspections, the City of Miami is inspected by other governmental agencies and commercial insurance carriers. All employees are required to cooperate with these agencies at the time of the inspection.

**Required Inspections**

- Monthly inspections of all fire extinguishing, prevention, alarm and detection systems;
- Annual inspection of all elevators and escalators;
- Annual and periodic inspection of all lifting or hoisting equipment, including cranes and boomed equipment (fixed or mobile);
- All Risk Management Loss Control Inspection Reports are to be responded to in writing, detailing corrective measures to be implemented. Written responses shall be forwarded to the Risk Management Department within ten (10) working days from the date of the report.

**Standards of Compliance**

It is the responsibility of every department to ensure it is in compliance with all Federal, State, County and local standards and ordinances. This includes but is not limited to:

- All electrical equipment has been approved by Underwriter’s Laboratories or Factory Mutual Laboratories;
- Electrical installations are in compliance with the National Electrical Safety Code;
- All fire protection and prevention devices meet the requirements set forth in the appropriate standards as adopted by the National Fire Protection Association;
- All chemicals and flammable liquids are handled and stored in accordance with the requirements of the National Fire Protection Association standards;
- All City facilities and operations are in compliance with EPA standards;
- Department of Transportation regulations for traffic control for work areas are adhered to; and,
- Required permits are obtained prior to beginning new construction or remodeling.
Personal Protective Equipment

IT IS THE RESPONSIBILITY OF EACH EMPLOYEE TO USE PERSONAL PROTECTIVE EQUIPMENT IF REQUIRED FOR THE JOB.

Eye Safety

It is important to keep flying objects, dusts, rust, vapors, heat and liquid splashes out of the eyes and, to do this, safety glasses, goggles or face shields are required whenever there is danger of exposing the eyes to flying particles, caustic substances or harmful light rays. Eye and face protection must be used whenever there is a probability of something entering the eye. All eye protection must meet American National Standards Institute (ANSI) Z87.1 regulations (welders are required to use the proper shaded lenses for the type of work they are performing).

In areas that are designated for eye protection, everyone must wear eye and face protection, including employees performing the job, those working nearby and visitors.

Safety glasses, goggles or face shields must meet the following requirement:

- Provide adequate protection against particular hazards for which they are designed;
- Be reasonably comfortable when worn under the designated conditions;
- Fit snugly without interfering with the movements of the wearer;
- Be durable;
- Be capable of being disinfected;
- Be easily cleanable; and,
- Be kept in good repair.

If you wear prescription eyeglasses to correct your vision, you must wear safety glasses with safety lenses that meet ANSI requirements. Safety glasses/spectacles require special frames. Combinations of normal-street wear frames with safety lenses are not in compliance.

Safety goggles/glasses worn over regular glasses must be comfortable and not disturb the adjustment of corrective lenses. All employees should check their safety glasses before each wearing.
The brow protector should fit against the face. This helps protect against particles entering the eye from above the glasses.

The glasses should fit snugly, not tightly, without eyelashes hitting the lenses.

If there is a headband, it should fit snugly. Headbands that are slack should be replaced.

Lenses should be clean. Clean with water or with special cleaning solution for eyeglasses.

The brow and side protectors should be in good condition.

Glasses used by different employees should be disinfected before being used by another employee.

**Contact Lenses**

Contact lenses are not a substitute for safety glasses. Contact lenses pose a special threat. Hazardous dusts, gases, vapors or liquids can get trapped between lenses and eyes.

Contact Lenses must not be worn in hazardous atmospheric conditions and must not be worn under respirators.

Where a person’s eyes or body may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

**Welding Eye Safety**

Workers or other persons adjacent to the welding areas must be protected from the rays by non-combustible or flameproof screens or shields or they must wear appropriate welding safety goggles.

- Helmets or hand shields must be used during all welding or cutting operations.
- Helpers or attendants must be provided with the proper eye protection.
- All filter lenses and plates must meet ANSI Z87.1 standards for transmission of radiant energy.

**Head Protection**

Head protection equipment (hard hats) should be worn where there is a possible danger of head injuries from overhead impact or falling objects. Hard hats must meet ANSI Z89.1 standards. Hard hats must be worn in designated hard hat areas.
• Wear your hard hat on your head!
• The shell and the suspension of the hard hat should be checked daily to see if is in good condition.
• Do not carry anything in your hardhat; do not use as a bucket or step stool.
• Do not paint the shell. Solvents in the paint may soften the shell material.

Hand Safety

Appropriate hand protection will be required where employees are exposed in injurious chemicals or abrasive materials that have the potential for hand injuries. Gloves of an appropriate type shall be worn when handling rough, sharp and/or hot materials, as well as chemically active substances.

Types of Hand Injuries

There are three types of hand injuries:

1. Traumatic injury following an accident;
2. Contact with substances that damage the skin; and,
3. Repetitive motion problems caused by overuse of muscle groups in the hands.

Types of gloves

• Rubber, vinyl or neoprene gloves are for use with caustic chemicals such as acids, cleansers and petroleum products.
• Leather gloves protect against sparks, rough surfaces and scraping objects. The design depends on the job.
• Metal mesh gloves protect hands from knives, blades or other sharp instruments.
• Plastic-film gloves protect against contact in injury from mild substances.
• Cloth gloves provide traction for holding slippery objects, insulate to protect against moderate heat or cold and protect hands from sharp edges.
• Aluminized fabric or other special materials protect hands against the heat of molten material.
• Insulated gloves are often made of rubber and worn underneath leather gloves as protection against electrical shock and burns.

Other Hand Protection

• Hand Pads protect against rough materials when fine finger movement is not needed.
Barrier creams protect against corrosive substances and can make cleanup easier, but are not substitutes for gloves.
Forearm cuffs made of cloth or special fabrics protect against heat and keep sleeves out of the way.
Hands should be washed frequently.
Keep hands away from face when working with chemicals.
Don’t use hands for feeding materials into saws and other machinery.
Don’t use hands to sweep up metal or wood chips.
Rotate tasks to give hands a rest, where possible.

Foot Protection

Safety shoes must be worn where they are required. Safety shoes must meet ANSI Z41.1 standards.

- There are different types of safety shoes for different jobs.
- Wear shoes that fit properly.
- Steel-toed shoes are required where employees work with heavy objects or machinery that could cause foot injury.
- Safety shoes with sole protection may be required in certain applications.

Standards

- Electricians should wear electrical hazard safety footwear.
- If the job does not require safety shoes, select sturdy work shoes that will give sufficient support.
- Inspect shoes regularly for damage such as: dampness or embedded metal that might impair electrical protection, cuts, cracks, etc., which might expose feet to danger.
- Never wear defective footwear on the job.
- Employees should not repair their own safety shoes (i.e., never repair non-sparking footwear with metal nails).

Clothing

Employees will wear appropriate clothing for the type of work they are performing. The Director will determine acceptable attire.
• Read and follow the manufacturer’s instructions.
• Check for tears, leaks, punctures or signs of wear and tear before putting on.
• Be sure the clothing is not contaminated from the last use.
• Contaminated clothing should be decontaminated or discarded as soon as feasible.
• When operating or working with machinery, make sure all clothing fits correctly.
• Loose fitting clothing can contribute to accidents.
• Beware of heat sickness. Clothing that keeps water and vapors out usually also keeps them in. Avoid dehydration.

Hearing Protection

Noise is more than just a nuisance, it is a hazard. Hearing can be damaged temporarily and permanently. Frequency is the pitch (high or low) of a sound—the number of sound wave cycles each second. Intensity is the loudness of the sound; it is measured in decibels.

Three Basic Types of Hearing Protection

1. Ear plugs
   a. Formable earplugs.
   b. Disposable.
   c. Semi-disposable.
   d. Pre-molded earplugs.
   e. Universal type.
   f. Multi-size type.

2. Canal Caps—made in soft, rubber-like substance.

3. Ear muffs.

Remember:

• Hearing protection must be worn in designated areas.
• Any type of approved hearing protection should have a noise reduction rating (NRR) expressed in decibels. This indicates the amount of noise reduction that the device provides.
• Ear plugs and ear muffs provide important protection against noise.
• Follow manufacturer’s instructions for cleaning and storage.
• Proper fit is essential!
• Employees are not permitted to operate machinery while using personal listening devices, i.e., walkman.
Motor Vehicle Safety and Inspections

General Safe Practices

- Each Driver is responsible for the safe and proper operation of his or her vehicle and shall check the following items daily before putting the vehicle into service:
  - Fuel
  - Water
  - Oil
  - Turn and stop lights
  - Windshield wipers
  - Horn
  - Tires
  - Brakes
  - Housekeeping

- Comply with all traffic ordinances and safe driving practices.

- Drive to prevent accidents in spite of the incorrect actions of others and adverse conditions.

- Where there are two employees in or assigned to a vehicle, one employee shall be stationed where the driver can see and hear to direct the driver while backing.

- Should a backing accident occur when there are two employees assigned to the vehicle, both employees will be charged.

- No City employee shall operate a motor vehicle while wearing a headset, headphone or other listening device other than a hearing aid or instrument for the improvement of defective human hearing.

- No City employee driving or in charge of any motor vehicle shall permit it to stand unattended without first stopping the engine, locking the ignition, engaging the parking brake and removing the key.

- Vehicles must comply with Florida Statute 316.228, which requires a 12-inch square red flag or light on all loads extending four (4) feet beyond the rear of a vehicle.

- Operators of City-owned vehicles are responsible for checking all safety devices before leaving the vehicle. Any defects found shall be reported to the immediate supervisor and the vehicle shall not be operated until the defect is corrected.
• No City vehicles and equipment will be used for transport of employees unless they are designed and equipped to safely carry personnel.

• All employees shall ride in the driver's compartment or cab with sufficient seating and seatbelts.

• Tailgates shall be closed when the vehicle is in operation.

• Bodies of dump trucks shall be secured in the down position or the hoist lever security in the lock position when the vehicle is in motion.

• Employees shall not ride on the top of side rails, top of cabs or running boards of any vehicles. Each operator and passenger must have all necessary safety equipment.

• Drivers of emergency vehicles are not exempt from the duty to drive with due regard for the safety of all persons using the roadway.

When a vehicle is towing a trailer or semi-trailer by means of a trailer hitch, safety chains from the trailer or semi-trailer to the vehicle shall also be attached. Safety chains shall be connected to the towing vehicle by crossing the chains under the tongue of the trailer. These safety chains shall be of sufficient strength to maintain connection of the trailer or semi-trailer to the pulling vehicle under all conditions while the trailer or semi-trailer is being towed by the vehicle. The provisions of this section shall not apply to trailers or semi-trailers using a hitch known as a fifth wheel.

Driving Records Under Review

This will be conducted annually on all employees authorized to drive City vehicles. All employees having the need to drive for business will:

• Have a valid Florida State Driver’s License;
• Be authorized by Risk Management and Human Resources after review of their driver license record;
• Be trained and authorized to operate a truck or special purpose vehicle until that employee has satisfactorily demonstrated complete familiarity with its functions. It is mandatory the employee thoroughly understand the manufacturer’s operating instructions, verify limitations, emergency procedures, and be able to successfully pass operator’s check-out test to the satisfaction of the supervisor;
• Be knowledgeable and understand City vehicle operating rules and safety regulations before driving a City vehicle;
Inspect assigned vehicles for safety discrepancies, malfunctions, signs of abuse, unreported damage and cleanliness. Have all reports related to the safety and reliability of vehicles made as soon as possible; and,

- Not drive a vehicle if it is found to be unsafe. The employee will report all unsafe vehicle conditions to his/her immediate supervisor.

Use of Seatbelts

Wear a seatbelt at all times while driving or riding in a City vehicle and while driving their personal vehicle on City business.