Chapter 5 - Chemical Safety

Introduction

The objective of this chapter is to provide guidance to all Hayward Electric employees and participating guests who use hazardous materials so that they may perform their work safely. Many of these materials are specifically explosive, corrosive, flammable, or toxic; they may have properties that combine these hazards. Many chemicals are relatively non-hazardous by themselves but become dangerous when they interact with other substances, either in planned experiments or by accidental contact.

To avoid injury and/or property damage, persons who handle chemicals in any area of the Company must understand the hazardous properties of the chemicals with which they will be working. Before using a specific chemical, safe handling methods must always be reviewed. Supervisors are responsible for ensuring that the equipment needed to work safely with chemicals is provided. The cost of this equipment is borne by the Company.

Task Evaluation

Each task that requires the use of chemicals must be evaluated to determine the potential hazards associated with the work. This hazard evaluation must include the chemical or combination of chemicals that will be used in the work, as well as other materials that will be used near the work. If a malfunction during the operation has the potential to cause serious injury or property damage, an Operational Safety Procedure (OSP) must be prepared and followed. Operations must be planned to minimize the generation of hazardous wastes. Additionally, unused chemicals should be recycled as much as feasible.

Supervisor Responsibility

Supervisors are responsible for establishing safe procedures and for ensuring that the protective equipment needed to work with the chemicals is available. Supervisors must instruct their workers about possible hazards, safety precautions that must be observed, possible consequences of an accident, and procedures to follow if an accident does occur. The supervisor is required to enforce the proper use of protective equipment and the established safety practices.
It is the responsibility of employees and all who use Hayward Electric facilities to understand the properties of the chemicals with which they will work and to follow all precautions that apply to each specific task.

When faced with an unexpected threat of malfunction, injury, or damage, employees are expected to choose a course of action that provides the most protection to themselves and to others in the area. Every employee is expected to report to the supervisor any unsafe condition seen in the area that would not permit him/her to work safely.

The Responsible Safety Officer assists employees and supervisors to work safely by providing information on the hazardous properties of materials, recommending methods for controlling the hazards of specific operations, and by monitoring the work environment.

Supervisors must instruct their personnel about the potential hazards involved in the work, proper safety precautions to follow, and emergency procedures to use if an accident should occur. To supplement the supervisor's training, the Responsible Safety Officer will conduct training courses and materials on selected topics. In addition, material safety data sheets and safety information, including hazards, health effects, potential routes of exposure, proper handling precautions, and emergency procedures on specific chemicals, are available through the Responsible Safety Officer's office.

**Effects on Reproduction**

Both men and women may be exposed to hazardous agents that can cause infertility or result in genetic damage that is passed on to offspring. These agents include ionizing radiation, alcohol, cigarette smoke, pharmaceuticals, and some of the thousands of different chemicals that are used in the home or workplace. Although many of these have been tested to determine whether they cause acute (immediate) effects on the body, few have been studied to see if they cause cancer (carcinogens), birth defects (teratogens), or genetic defects (mutagens). Even fewer have been studied to see if they can cause infertility, menstrual disorders, or other disorders relating to reproduction.

The primary path for hazardous substances to reach an unborn child is through the placenta. Scientists now believe that most chemical substances or drugs can cross this barrier with varying degrees of ease and enter the system of the developing fetus.
Thus, many chemicals and drugs that enter a pregnant woman’s body (through breathing, swallowing, absorption through the skin, etc.) will eventually enter the mother’s blood circulation and find their way into the unborn child.

In general, the important questions of exactly how much of the toxic substance that enters the mother’s body will reach the fetus or what concentration the fetus can tolerate without harmful effects are not yet answered.

The fetus may be most vulnerable in the early weeks of pregnancy, but it is also at risk later in pregnancy. In light of the potential harm of workplace exposures to both a pregnant woman and her developing fetus, it is very important and required by Hayward Electric policy for the woman to inform the Responsible Safety Officer of her pregnancy immediately.

**Airborne Contaminants**

Exposures by inhalation of airborne contaminants (gases, vapors, fumes, dusts, and mists) must not exceed the levels listed in the latest edition of Threshold Limit Values of Airborne Contaminants (TLV) published by the American Conference of Governmental Industrial Hygienists. These TLV levels refer to airborne concentrations of substances and represent conditions under which it is believed that workers may be repeatedly exposed without adverse effect.

In all cases of potentially harmful exposure, feasible engineering or administrative controls must first be established. In cases where respiratory protective equipment, alone or with other control measures, is required to protect the employee, the protective equipment must be approved by the Responsible Safety Officer, for each specific use.

**Safety Equipment**

Eyewash fountains are required if the substance in use presents an eye hazard. The eyewash fountain must provide a soft stream or spray of aerated water.

In areas where a corrosive chemical or rapid fire hazard exists, safety showers must be provided for immediate first aid treatment of chemical splashes and for extinguishing clothing fires. The shower must be capable of drenching the victim immediately in the event of an emergency.

Eyewash fountains and safety showers should be located close to each other so that, if necessary, the eyes can be washed while the body is showered. Access to these
facilities must always remain open. In case of accident, flush the affected part for at least 15 minutes. Report the accident to the Responsible Safety Officer immediately.

Safety shields must be used for protection against possible explosions or splash hazards. Company equipment must be shielded on all sides so that there is no line-of-sight exposure of personnel. The sash on a chemical fume hood is a readily available partial shield. However, a portable shield must also be used, particularly with hoods that have vertical-rising sashes rather than horizontal-sliding sashes.

**Labels**

All containers (including glassware, safety cans, and plastic squeeze bottles) must have labels that identify their chemical contents. Labels should also contain information on the hazards associated with the use of the chemical. Precautionary labels are available from Hayward Electric stock room for most of the common chemicals.

**Chemical Storage**

The separation of chemicals (solids or liquids) during storage is necessary to reduce the possibility of unwanted chemical reactions caused by accidental mixing. Use either distance or barriers (e.g., trays) to isolate chemicals into the following groups:

- Flammable liquids (e.g., acetone, benzene, ethers, alcohols). Place in approved fire lockers.
- Other liquids (e.g., chloroform trichloroethane).
- Acids (e.g., nitric, sulfuric, hydrochloric, perchloric).
- Treat acetic acid as a flammable liquid.
- Bases (e.g., sodium hydroxide, ammonium hydroxide).

Lips, strips, or bars should be installed across the width of reagent shelves to restrain the chemicals in case of earthquake.

Chemicals must not be stored in the same refrigerator used for food storage. Refrigerators used for storing chemicals must be appropriately identified by placing a label on the door (labels may be obtained from Responsible Safety Officer).

**Emergencies**

In case of an emergency, consider any of the following actions if appropriate:
• Evacuate people from the area.
• Isolate the area.
• If the material is flammable, turn off ignition and heat sources.
• Call the Fire Department or 911 for assistance.
• Wear appropriate personal protective equipment.
• Pour Sorb-all or appropriate neutralizing agent on spill.
• Clean up; place waste in plastic bag for disposal.

Chemical spill cleanup materials are available from stores as listed below:

• Flammable solvent spill kit
• Flammable solvent absorbent
• Acid spill kit
• Acid spill absorbent
• Caustic (base) spill kit
• Caustic (base) absorbent
• Safety equipment kit (contains scoops, sponge, safety glasses, disposal bags, etc.)
• Cabinet to hold kits

**Disposal of Chemicals**

All Hayward Electric employees, participating guests, and visitors using hazardous chemicals are responsible for disposing of these chemicals safely.

Federal and state regulations mandate strict disposal procedures for chemicals. To comply with these regulations all persons using Company facilities must observe these procedures.

In general the disposal of hazardous chemicals to the sanitary sewer is not permitted. The Responsible Safety Officer will advise on the proper disposal of chemical wastes.
In using chemical waste storage containers, certain procedures must be observed, as listed below:

- Incompatible chemicals must not be mixed in the same container (e.g., acids should not be mixed with bases; organic liquids should not be mixed with strong oxidizing agents).

- Waste oils must be collected in 55-gallon drums. Disposal solids, and explosive materials must be stored in separate containers.

The following requirements must be met as a condition for pickup and disposal of chemicals:

- Chemicals must be separated into compatible groups. Leaking containers of any sort will not be accepted.

- Dry materials (gloves, wipes, pipettes, etc.) must be securely contained in plastic bags and over packed in a cardboard box. Packages that are wet or have sharp protruding objects will not be accepted for pick up.

- Unknown chemicals will require special handling. The responsible department must make every effort to identify the material that is to be disposed of. If all the user's attempts to identify the waste chemicals have failed, the Responsible Safety Officer will accept the waste and analyze the material. For more information call the Responsible Safety Officer.

- Each breakable container must be properly boxed. Place all bottles in plastic bags, then place in a sturdy container and use an absorbent cushioning material that is compatible with the chemicals.

- Each primary container must be labeled with content, amount, physical state, and the percentage breakdown of a mixture.

- Each box must have a complete list of contents or description written on an official Responsible Safety Officer hazardous materials packing list. Blank packing lists are available from the Responsible Safety Officer.

- For safety purposes, boxes must be of a size and weight so that one person can handle them. Boxes that exceed 45 pounds or 18 inches on a side cannot be safely handled by one person and will not be acceptable for pick up.
General Housekeeping Rules:

- Maintain the smallest possible inventory of chemicals to meet your immediate needs.
- Periodically review your stock of chemicals on hand.
- Ensure that storage areas, or equipment containing large quantities of chemicals, are secure from accidental spills.
- Rinse emptied bottles that contain acids or inflammable solvents before disposal.
- Recycle unused chemicals wherever possible.

Do not:

- Place hazardous chemicals in salvage or garbage receptacles.
- Pour chemicals onto the ground.
- Dispose of chemicals through the storm drain system.
- Dispose of highly toxic, malodorous (having a very bad odor), or lachrymatory (causing or producing tears) chemicals down sinks or sewer drains.