1.0 PURPOSE
The purpose of this standard is to provide guidelines for the safe handling of corrosive materials. Consult the MSDS for specific information about a particular corrosive.

2.0 DEFINITIONS
Corrosive - A chemical that causes visible destruction of or irreversible alterations in living tissue by chemical action at the site of contact. For example, a chemical is considered to be corrosive if, when tested on the intact skin of albino rabbits by the method described by the U.S. Department of Transportation in appendix A to 49 CFR part 173, it destroys or changes irreversibly the structure of the tissue at the site of contact following an exposure period of four hours.

Examples of corrosive materials are illustrated below:
**Strong Acids:** Nitric, perchloric, hydrochloric, and hydrofluoric acid.
**Strong Bases:** Hydroxides of sodium, potassium, and barium.
**Strong Dehydrating Agents:** Sulfuric acid, phosphorus pentoxide and calcium oxide.
**Strong Oxidizing Agents:** Concentrated hydrogen peroxide, sodium hypochlorite.

3.0 POTENTIAL HAZARDS
Corrosives may:
1. React with each other (acid and base) and evolve heat.
2. React with organic material to generate heat and possible conflagration.
3. Become highly unstable when dry.

4.0 EXPOSURE HAZARDS
4.1 Contact/Absorption
Corrosive liquids have a high potential to cause external injury to the body and are especially dangerous because their effect on the tissue takes place very rapidly.
4.2 **Inhalation**
Corrosive gases are readily absorbed into the body through skin contact and inhalation. They can damage the lining of the lungs leading to pulmonary edema (dangerous build-up of fluid) after a delay of several hours.

Dusts of corrosive solids, if inhaled, can cause serious damage to the respiratory tract since they dissolve rapidly in moisture.

4.3 **Ingestion**
Ingestion may cause: severe gastrointestinal tract irritation with nausea, vomiting, and diarrhea; severe and permanent damage to the gastrointestinal tract; methemoglobinemia; cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood); convulsions; and death.

5.0 **PERSONAL PROTECTIVE EQUIPMENT**
Use chemical splash goggles for eye protection in combination with a full-length face shield for operations that present splash hazards. Thick butyl rubber, neoprene, nitrile, or polyethylene gloves may be appropriate. Check glove manufacturer for recommendations on a suitable glove for the specific chemical.

Wear a lab coat (100% cotton) and closed-toe shoes (non-fabric) with non-slip soles.

If a respirator is needed, then user must follow guidelines of the Respiratory Protection Program.

6.0 **ENGINEERING AND VENTILATION CONTROLS**
All procedures involving corrosive materials must be conducted in a chemical fume hood or inert atmosphere chamber to protect against hazardous exposure.

7.0 **SPECIAL HANDLING PROCEDURES**
1. CONDUCT PROCEDURES IN A FUME HOOD.
2. When diluting acids (especially sulfuric acid), always pour the concentrated acid into water.
3. During the addition of reagents, decant the acid so that it runs down the side of the container and therefore, mixes slowly.
4. Wipe the outside reagent bottles containing corrosives before and after use.
5. Wash hands promptly after using corrosives.
6. Reactions involving acids and bases are often very exothermic; use only heat resistant glassware.

8.0 **LABELING REQUIREMENTS**
Label storage cabinets or areas with appropriate descriptor: CORROSIVE: ACID (BASE).

9.0 **STORAGE REQUIREMENTS**
1. Store acids separately from bases.
2. Store in cool, dry well-ventilated areas, away from sunlight. The storage area should not be subject to rapid temperature change.
3. Store corrosive liquid containers in secondary containment such as a high density polyethylene tub. The secondary containment volume must exceed the combined volume of stored containers by at least 10%.
4. Strong acids will corrode most metal cabinets. Non-metallic or epoxy painted cabinets are available and will provide a better service life.
5. Hydrochloric acid should not be stored in any metal cabinet. Perchloric acid should not be stored in a wooden cabinet.

10.0 FIRST AID
Consult MSDS of specific chemical for first aid treatment.

10.0.1 Eye/Skin Contact
1. Immediately go to the emergency shower/eye wash facility and remove all contaminated clothing.
2. Flush affected body area with water for at least 15 minutes.
3. Do not use neutralizing chemicals, creams, abrasives, or lotions.
4. If the eyes have been contaminated, forcibly hold them open and flush for least 15 minutes.
5. Resume flushing area with water if pain continues.

10.0.2 Inhalation
1. Move exposed person to fresh air if safe to do so.
2. If victim is breathing, loosen victim's clothing and maintain the airway.
   a. Lay victim flat on their back.
   b. Place one hand under the neck and lift.
   c. With the heel of other hand on victim's forehead, rotate or tilt the head backward into maximum extension.
   d. If additional airway opening is required, it can be achieved by thrusting the lower jaw into a jutting-out position.
3. If the victim is not breathing, contact DPS, and perform CPR (if certified) until medical assistance arrives.
   Be careful to avoid exposure to chemical poisoning via mouth-to-mouth resuscitation. If available, use a mouth-to-mask resuscitator.

10.0.3 Ingestion
1. Contact DPS and request medical assistance.
2. If possible, determine what material was ingested by victim.
3. If victim begins to vomit, turn head or entire body to one side to avoid choking.
4. Do not induce the victim to vomit or drink any beverage unless instructed to by qualified medical personnel.
5. If victim stops breathing, see Inhalation, step 3.

10.0.4 Injection
Contact DPS and request medical assistance.

11.0 SPILL AND ACCIDENT PROCEDURES
For all spill emergencies contact the Department of Public Safety (DPS).

In the event of a large chemical spill, follow these guidelines:
1. Notify everyone in the immediate area and the supervisor.
2. Evacuate personnel from the spill area.
3. Deny entry.
4. Alert other building occupants. NOTE: Evacuation of the building and its occupants may be necessary depending on the volume of chemical/biological material spilled and its relative hazard.

5. Notify DPS from a safe location and provide the following information:
   a. Your name, telephone number, and location;
   b. Type of incident, location, and time of occurrence;
   c. Name and quantity of material involved, to the extent known;
   d. If victims are involved, relay the victim(s)’ name(s) and extent of injuries, if any;
   e. If exposed to a hazardous spill, see 7.9.2 Chemical Exposure

11.1 Chemical Spill Clean-Up
Chemical spill clean-up must not be attempted if the employee does not have the proper training and experience, the necessary spill kit supplies, and personal protective equipment. Contact DPS for large chemical spill clean-up.

11.1.1 Corrosive Liquids
1. Neutralize the spill. Apply neutralizer from a spill clean-up kit to the perimeter of the spill. If a spill clean-up kit is not available, sodium bicarbonate can be used on acid spills and 2% hydrochloric acid or citric acid powder can be used to neutralize caustic spills.
2. Mix thoroughly until fizzing and evolution of gas ceases. NOTE: It may be necessary to add water to the mixture to complete the reaction. Neutralizer has a tendency to absorb acid before fully neutralizing it.
3. Check mixture with pH strips or pH paper. Ensure that the final pH is between 6 and 10.
4. Once the chemical is completely neutralized, cover with an absorbent material (e.g. paper towels, pads, etc.)
5. Collect the absorbent and place it in a Ziploc bag.
6. Label the bag, place it in the fume hood and call EH&S immediately.

11.1.2 Other Hazardous Liquids
1. Prevent the spill from spreading by depositing absorbent material such as Super Fine, sand, or vermiculite (paper towels do not control the vapor release as well as sand) at its outer edges.
2. Cover the entire spill with the absorbent by working from the edge toward the center in a circular motion.
3. Mix the absorbent until it has absorbed all of the flammable liquid.
4. Collect the absorbent and place it in a Ziploc bag.
5. Label the bag, place it in the fume hood, and call EH&S immediately.

11.1.3 Solids
1. Solid material of low toxicity may be swept onto a dust pan and deposited into a Ziploc bag. Any powder clinging to the dust pan may be wiped with a lab tissue and the tissue disposed of in the Ziploc bag. Ensure that fine powder or dust from the spilled material does not become airborne.
2. Label the bag, place it in the fume hood and call EH&S immediately.
3. If the spilled material is highly toxic, contact EH&S or Laboratory Safety.

12.0 WASTE DISPOSAL
Chemical waste is segregated into the following groups:
- Flammable/combustible solvents e.g. acetone, xylene, methanol;
- Halogenated solvents e.g. chloroform, methylene chloride;
- Nitrogenous hydrocarbon e.g. trimethylamine, diisopropylamine;
- Sulfurous hydrocarbon e.g. dimethylsulfoxide, dimethylsulfate;
- Corrosives. A separate stream must be started for each of the following:
  - Mineral acids e.g. hydrochloric acid, sulfuric acid
  - Organic acids e.g. trichloroacetic acid, formic acid
  - Bases e.g. calcium oxide, sodium hydroxide
- Aqueous solutions e.g. metal salts, ethidium bromide; and
- Oils e.g. vacuum pump oil, motor oil.

1. Collect the chemical waste in appropriate containers described in the table below. Do not commingle or mix dissimilar waste streams.

<table>
<thead>
<tr>
<th>Waste type</th>
<th>Waste container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammable liquids</td>
<td>glass bottles, steel cans, safety cans, high density plastic containers</td>
</tr>
<tr>
<td>Concentrated acids &amp; bases</td>
<td>2.5 liter “acid” bottle. <em>Note: one gallon glass bottles are unacceptable for acids and bases; the high specific gravity of the substance and the thinness of one gallon glass containers increases the likelihood of container breakage.</em></td>
</tr>
<tr>
<td>Trace contaminated solid waste</td>
<td>contaminated paper, gloves, etc. should be double-bagged using polyethylene bags</td>
</tr>
<tr>
<td>Aqueous solutions</td>
<td>glass bottles, plastic bottles, plastic cans</td>
</tr>
<tr>
<td>Broken mercury thermometers</td>
<td>broken thermometers without free-flowing mercury may be packaged in the same manner as trace contaminated solid waste. Broken thermometers with mercury should be contained in a glass or plastic bottle with a tight cap</td>
</tr>
</tbody>
</table>

2. Containers must be sealed airtight with a screw-on lid. Rubber stoppers, corks, and parafilm are not allowed. They must also be in sound condition, leak-proof, and appropriate for the waste type.

3. Do not fill liquid containers to more than 80% capacity. This is to prevent spillage on top of the container. The top and sides of the container must be free of liquid residue.

4. Solid chemical waste can be collected in plastic bags, fiber boxes or plastic containers.


**13.0 PROGRAM APPROVAL AND REVIEW**

Date prepared: 03/24/2004
By: Alfred M. Bouziane

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By: Alfred M. Bouziane