Health and safety are vital issues, and no one in the University has a right to endanger either themselves or anyone else through uninformed or negligent use of implements, materials, or machinery.

This series of policies have been compiled to provide basic information on safe practices and procedures in the Visual Arts. They are intended to protect you and those around you. Each student and staff member has been made aware of these policies. It is a basic requirement that you read and understand them before beginning to work in the Department of Visual Arts.

Read them now. If you have any questions about the contents, please contact the Department’s safety officer or the Department Chairperson.

In the case of shop equipment, this manual is to be used in conjunction with a hands-on safety demonstration that is mandatory for all Visual Arts Students. If you have not been given a safety demo it is your responsibility to request one from the Shop Technician.

Anyone who uses implements, materials, or machinery in a hazardous or potentially hazardous manner may be immediately barred from further access to the department and may be subject to additional disciplinary action.
Equipment - general

Students requiring equipment to complete class assignments will have first priority to the equipment. Faculty requiring equipment for teaching purposes will also have top priority. Students and staff requiring equipment for any other reason will have access to equipment on a limited basis. In exceptional cases, faculty, researchers and grad students may pre-book equipment. In general, access will be on a first come, first served basis.

All equipment signed out by the original borrower will be the responsibility of that individual. No equipment is to be passed on to another individual unless agreed upon by the equipment technician staff. Over-due fines will be the responsibility of the original person signing for the equipment, no exceptions.

Loan period (for both faculty and students)

During the following periods of the term the time that equipment can be signed out will be as follows. Equipment signed out during weekends and statutory holidays will be required to return equipment on the following school day. Unless under special circumstances no equipment will be signed out for the period of December 22 to January 1.

- September and October: Maximum 2 days
- November and December: 1 day
- January and February: Maximum 2 days
- March and April: 1 day

Longer loan periods, and loan renewals are possible, depending on equipment demand. The time period will be clearly indicated at the time of sign out. Failure to return equipment after the agreed upon period will result in a fine.

Penalties

Failure to return equipment at the agreed upon time will result in a $20.00 per day fine. Any monies collected from fines will be donated to the Graduate Exhibition. Fines not paid within 30 days will be forwarded to UVic Accounting services and will have a Further $20.00 Administration fee added to the cost.

Loss of Privileges

Students having overdue equipment, or consistently returning equipment late may have their borrowing privileges revoked. Failure to pay outstanding penalties will result in loss of privileges until all fines are paid.

Restricted Equipment

Equipment requiring specific skills, or of a highly technical nature, or specifically required for research/teaching will require special permission from a faculty member or the chair of the department. e.g. DVCam cameras, Canon digital camera.

All equipment borrowed by students can be used within the Visual Arts Building. Equipment leaving the campus must have the approval of the technicians. Lost hardware i.e. cables, batteries will be the responsibility of the signing party.
Oil Paint

With the possible exception of lead, arsenic or chromate pigments, there is little danger of acute or immediate poisoning from accidental ingestion of paint. However, many of the pigments - especially lead, chromate and cadmium - can have serious long-term chronic effects from repeated exposures to small amounts. Some pigments can cause skin irritation and allergies. They include chrome yellow, zinc yellow, chromium oxide green and the cobalt pigments.

Note: It is difficult to determine what pigments are in a tube of paint because product labels are often misleading. For example, a tube of Cadmium Red may in fact contain no cadmium. In other words, the traditional name, Cadmium Red, may or may not reflect the chemical content of the paint. Since it is impossible to research the health effects of the substance without knowing the exact identity of the pigments this information should be requested from the product manufacturers.

In addition to the information in this manual, read and follow all manufacturer’s instructions.

Oil Paint Dryers

Cobalt dryers are slightly toxic by skin contact moderately toxic by inhalation, possibly causing allergies.

Solvents

Solvents and paint thinners are moderately toxic by skin contact and inhalation and highly toxic by ingestion. This applies to odorless solvents as well. When using solvents and thinners have good general or local ventilation. The use of turpentine is not permitted in the studios. Lithotine, available from the supply store, is an acceptable substitute.

Acrylic Paint

Acrylic paints usually contain stabilizers that release ammonia and a formaldehyde preservative. These can be inhaled while in use or while paints are drying. Formaldehyde is a throat, eye, and respiratory system irritant that can cause dermatitis, allergies and asthma. It is also a suspected carcinogen. Risks can be minimized through dilution ventilation (such as a window exhaust fan) or simply by using a brand of acrylics that does not contain formaldehyde.

Lucite

Lucite is a liquid plastic which is harmful by inhalation. Avoid prolonged exposure.

Ventilation

To ensure proper ventilation, toxic substances must be placed BETWEEN an individual and an exhaust fan. These are located in the painting, photography and printmaking studios. Where open windows (incoming air) and exhaust fans (outgoing air) coexist, the same positioning applies. In this case, however, the window must be kept behind the individual. This is to ensure that the toxic substance is drawn AWAY, and not PAST them.

Tools

The following tools are available for the use of students registered in the Visual Arts program of the University of Victoria, and are commonly used to build painting supports. Refer to Equipment Tutorials for more detailed instructions.

Compound Mitre Saw

When using the mitre saw, keep your hands away from the blade and wear eye-protection to guard against dust particles.

Staple gun

When using the pneumatic staple gun always assume the tool contains staples; keep the tool pointed away from yourself and others. Disconnect staple gun from air supply before doing maintenance or clearing a jammed staple. The tools need special care and can break down quite easily.

Spray painting

Spray painting or aerosol spraying is to be done outdoors and not in the studios. A respirator and suitable clothing should be worn and drop sheets used.
Studio Clothing
Because oil paint and solvents do contain toxins it is important that they be kept away from the skin and therefore from entering the bloodstream. The best way to minimize risks is to reserve a set of clothing solely for studio use, or to wear coveralls or a smock over street clothes. Also less paint is inhaled if it does not dry and evaporate on clothing.

Storage of Materials
Food items (lunches) should not be stored in lockers that contain paints and/or solvents because of a high risk of contamination.
Drawing

The use of drawing fixatives is prohibited in the studios. Works must be sprayed outdoors – i.e. in the sculpture courtyard, not in building exit areas. Fixative contains toluene and xylene, which are hazardous to health.

Graphite, charcoal and chalk pastel can also be harmful if the dust is inhaled in excessive quantities. Take suitable precautions (i.e. wear a respirator) if doing large-scale work with powdered graphite.
Photography

Most photographic chemicals, diluted in solutions normally used in processing, contain relatively low concentrations of toxic substances and therefore have low toxicity ratings for ingestion. Swallowing these solutions may produce mild transient gastro-intestinal symptoms. However, some toxicologists believe that major potential for hazards lies in continuous inhalation and skin absorption of these chemicals over long periods of time.

Photographers expose themselves to vapors rising from large surfaces of trays, especially when darkroom temperatures exceed 21 C. and ventilation is poor. They expose the skin of their hands to all of these chemicals as they handle prints and move them through the various stages of processing. Low-level exposure to photographic chemicals is believed to have a cumulative effect on the various organs, such as the liver and kidneys, that must metabolize, store or excrete them, and on the central nervous system and respiratory tract. Such exposure has also led to the development of asthma and the worsening of other pre-existing lung conditions for some photographers, students and other persons living in close proximity to unventilated darkrooms.

General Precautions

Everyone who works with photographic chemicals should have a basic understanding of the nature of chemicals and their interaction with each other. Photographers should learn the art and the chemistry of photography at the same time.

1. Always provide exhaust ventilation and a fresh source for the darkroom.
2. Use good housekeeping practices. Wipe up all spills and splashes promptly; dispose of rags and papers contaminated with chemicals.
3. Use aerosol spray products only in a spray booth or with efficient exhaust ventilation.
4. Avoid skin contact with chemicals by using protective gloves or tongs.
5. Change work clothes and launder them frequently. Wash hands well before eating, smoking, or using the toilet.
6. Do not smoke, eat, or drink in the darkroom.

Developing Baths

The most commonly used developers are hydro-quione, monomethyl para-aminophenol sulfate, and phenidone. Other common component of developing baths include an accelerator, often sodium carbonate or borax, sodium sulfite is a preservative and potassium bromide as a restrainer or anti-fogging agent.

Health Hazards

Developers are commonly available in powder form and must be dissolved to make the developing bath. They are skin and eye irritants, and some are strong sensitzes. Monomethyl paraminophenol sulphate creates many skin problems and allergies to it are frequent. Hydro-quinone can cause de-pigmentation and eye injury after 5 or more years of continual exposure. Catechol and pyrogallol can be absorbed through the skin to cause severe poisoning. Phenidone is only slightly toxic by skin contact. Most developers are highly toxic by ingestion (some fatalities have occurred by accidentally drinking developer solution). Inhalation of powders is also hazardous.

Specific Chemicals

1. Para-phenylene diamine and some of its derivatives are highly toxic by skin contact, inhalation, and ingestion. They cause very severe skin allergies and can be absorbed through the skin.
2. Sodium hydroxide, sodium carbonate, and other alkalis used as accelerators are moderately to highly corrosive by skin contact or ingestion. This is a particular problem with the pure alkali or with concentrated stock solutions.
3. Potassium bromide is moderately toxic by inhalation or ingestion and slightly toxic by skin contact. Symptoms of systemic poisoning include somnolence, depression, lack of coordination, mental confusion, hallucinations and skin rashes.
photography, cont’d

4. Sodium sulfite is moderately toxic by ingestion or inhalation causing gastric upset, colic, diarrhea, circulatory problems, and central nervous system depression. It is not appreciably toxic by skin contact. If heated or allowed to stand for a long period in water or acid, it decomposes to produce sulfur dioxide that is highly irritating by inhalation.

**Precautions**
1. Wear rubber gloves and goggles when handling developers in powder form or liquid solution. Wash gloves off before using again. Wear an approved dust respirator when pouring developer dusts.
2. Do not put your bare hands in developer baths. Use tongs instead. If developer solution splashes on your skin or eyes, immediately flush with water.
3. Label all solutions carefully to avoid accidental ingestion.
4. Do not use para-phenylene diamine or its derivatives if at all possible.

**Stop Baths**
Stop baths are usually weak solutions of acetic acid. Acetic acid is commonly available as pure glacial acetic acid or 28% acetic acid. Some stop baths contain potassium chrome alum as a hardener.

**Health Hazards**
1. Acetic acid, in concentrated solutions, is highly toxic by inhalation, skin contact and ingestion. It can cause dermatitis and ulcers, and can strongly irritate the mucous membranes. The final stop bath is only slightly hazardous by skin contact. Continual inhalation may cause chronic bronchitis. However contamination of the stop bath by developer components can increase the hazard.
2. Potassium chrome alum or chrome alum (potassium chromium sulfate) is moderately toxic by skin contact causing dermatitis, allergies, and skin ulcers that might take a long time to heal. It is highly toxic by inhalation.

**Fixing Baths**
Fixing baths contain hypo or sodium thiosulfate as the fixing agent, acetic acid to neutralize developing action, and sodium sulfite as a preservative. Some fixing baths are hardened with alum (potassium aluminum sulfate) and boric acid (as a buffer).

**Health Hazards**
1. In powder form sodium thiosulfate is not significantly toxic by skin contact. By ingestion it has a purging effect on the bowels. Upon heating or long standing in solution, it can decompose to form highly toxic sulfur dioxide, which can cause chronic lung problems.
2. Alum (potassium aluminum sulfate) is only lightly toxic. It may cause skin allergies or irritation in a few people.
3. Boric acid is moderately toxic by ingestion or inhalation and slightly toxic by skin contact (unless the skin is abraded or burned, in which case it can be highly toxic).
4. See previous sections for hazards of sodium sulfite and acetic acid.

**Precautions**
1. Ventilate the fixing bath as described in the
photography, cont’d

2. Follow the named precautions for mixing, handling, and using chemicals as described in previous section.

Intensifiers and Reducers
A common after-treatment of negatives (and occasionally prints) is either intensification or reduction. Intensification involves bleaching of the negative and subsequent redeveloping of the image. In this process, other heavy metals are usually added to the silver. Common intensifiers include mercuric chloride followed by ammonia or sodium sulfite, Monckhoven’s intensifier consisting of a mercuric iodide/sodium sulfite, potassium bromide, and uranium nitrate. Reduction of negatives is usually done with Farmer’s reducer, consisting of potassium ferricyanide and hypo. Reduction can also be done with iodine/potassium cyanide, ammonium persulfate, and potassium permanganate/sulfuric acid.

Health Hazards
1. Potassium or sodium cyanide are highly toxic by inhalation and ingestion. Stomach acids can convert salt into the highly poisonous gas hydrogen cyanide. This can also happen if cyanide salts are treated with acid.
2. Potassium ferricyanide, although only slightly toxic by itself, will release hydrogen cyanide gas if heated, if hot acid is added, or if exposed to strong ultra-violet light (e.g. carbon arcs).
3. Potassium chlorochromate can release highly toxic chlorine gas if heated or if acid is added.

Precautions
1. Dichromate intensifiers are probably the least toxic you can use. However, gloves and goggles should still be worn when preparing and using them.
2. Do not exposed potassium chlorochromate to acid or heat.
3. If possible do not use cyanides. If it is necessary to use them, do so only in a fume hood or other local exhaust hood. Take very careful precautions to ensure that cyanide solutions do not become contaminated with acids. Have an antidote kit available.
4. The safest reducer to use is farmer’s reducer. Do not expose farmer’s reducer to hot acid, ultraviolet light, or heat.

Toner
Toning a print usually involves replacement of silver by another metal, for example gold, selenium, uranium, platinum, or iron. In some cases the toning involves the replacement of silver metal by the brown silver sulfide, for example, in the various types of sulfide toners. A variety of other chemicals are also used in the toning solutions.

Health Hazards
1. Many of the metals used in toning are highly toxic, particularly by ingestion.
2. Sodium and potassium sulfide release the highly toxic gas hydrogen sulfide when treated with acid. Similarly, treatment of selenium salts with acid may release highly toxic hydrogen selenide gas.
3. Thiourea is a suspected carcinogen since it causes cancer in animals.

Precautions
1. Carry out normal precautions for handling toxic chemicals as described in previous sections. In particular wear gloves, goggles, and dust respirator when mixing and handling acids and alkalis.
2. Take precautions to make sure that sulfide or selenium toners are not contaminated with acids. For example, with two bath sulfide toners, make sure you rinse the print well after bleaching in acid solution before dipping it in the sulfide developer.

Other Photographic Chemicals
Many other chemicals are also used in black and white processing, including formaldehyde as a pre-hardener, a variety of strong oxidizing agents as hypo eliminators (e.g. hydrogen peroxide and ammonia, potassium permanganate, bleaches and potassium persulfate), sodium sulfide to test for residual silver, silver nitrate to test for residual hypo, solvents such as methyl chloroform and freons for film and print cleaning, and concentrated acids to
photography, cont’d

clean trays.

Health Hazards

Concentrated sulfuric acid mixed with potassium permanganate or potassium dichromate produces highly corrosive permanganic and chromic acids. Hypochlorite bleaches can release highly toxic chlorine gas when acid is added or it is heated.

Potassium persulfate and other strong oxidizing agents can be explosive when in contact with easily oxidizable materials such as many solvents and organic materials.

Formaldehyde is a throat, eye and respiratory system irritant, which can also cause dermatitis and asthma. It is a suspected carcinogen.

Precautions

1. Cleaning acids should be handled with great care. Wear gloves and goggles and make sure the acid is always added to the water when diluting. An acid-proof apron should be worn to protect your body against splashes. The acid should be disposed of by pouring down the sink very slowly and flushing with water continually for at least 15 min. afterward.

2. Do not add acid to hypochlorite bleaches and do not heat.

3. Keep potassium persulfate and other strong oxidizing agents separate from flammable and easily oxidizable substances.

4. The hazards of formaldehyde can be minimized through dilution ventilation, such as an exhaust fan.
**Sculpture**

Part 6 Sculpture includes general hazards, metal working and wood working - refer also to Section C Equipment Tutorials for individual tools.

**General Hazards**

**Noise**
Tools for both woodworking and metal-working are often noisy, with noise levels ranging as high as 115 db. Wear proper ear protection, as continual exposure can cause permanent hearing loss. It is common sense to show consideration for others by avoiding extended use of a noisy tool in a crowded work-space.

**Toxic Fumes**
Many fumes from the metal being welded or the welding rods are highly toxic by inhalation. Welding of found metals can be hazardous if they give off toxic chemical fumes due to surface paint. Never work in confined spaces without ventilation.

**Safe Zone**
A clear safe zone will be maintained around all power tools. Assignments and materials will be removed if they impede machine use. No material is to be stored in Workshops B109 or B117 (Wood or Metal Shop Areas).

**Dust**
Wear goggles when using machines that create dust, such as the orbital sander. For the lathe which may produce wood chips, use face shield. Any process that can give off small metal filings such as drilling, buffing and grinding should be guarded against with eye wear and/or face shield. For grinding rust off steel a respirator mask should be used.

**Equipment and Facilities**
Equipment and facilities are for the use of registered Visual Arts students and faculty only. They are not to be used for any unrelated outside projects, i.e. car repairs, etc. Facilities and tools are not to be moved or modified to suit individuals unless authorized by Chairperson or the Senior Academic Assistant. Unsafe use, or misuse of equipment in the Department will result in the withdrawal of privileges. Students whose actions are considered detrimental to themselves or fellow students may be asked by any member of the Department to leave the studio or stop using the equipment. Any equipment requiring repairs should be brought to the attention of the department.

**Metalworking**

**General Theory and Practice for Metal Working**

REFER TO SECTION C - EQUIPMENT TUTORIALS FOR SAFETY INSTRUCTIONS ON SEPARATE TOOLS.

**Woodworking**

**General Safety Precautions**
1. Avoid dangerous environments: Do not use power tool in damp or wet locations. Do not expose power tool in rain.
2. Do not force tool: It will do the job better and safer at the rate for which it was designed.
3. Use correct tool: Do not force small tool or attachment to do the job of a heavy-duty tool.
4. Use safety glasses with most tools. Use an A180 face-mask or respirator if cutting operation is dusty. It is important for contact-lens wearer to use safety glasses so that particles do not become trapped behind them and cause eye damage.
5. Do not abuse cord: Never carry tool by cord or yank it to disconnect from receptacle. Keep cord from heat, oil, and sharp edges.
6. Secure work: Use clamps or vise to hold work, especially on drill press.
7. Disconnect tools: When not in use; before servicing; when changing blade, bits, cutters.
8. Proper grounding: The tool should be grounded while in use to protect operator from electric shock. All plugs should have three prongs.

**Wood Types & Hazards**

Cedar
sculpture, cont’d ...

Skin contact may cause skin allergies. Inhalation of sawdust may cause severe asthma, bronchitis, sneezing, nasal irritation, and conjunctivitis. Ingestion may cause gastrointestinal irritation.

Fir

Splinter wounds are hard to heal and may become infected.

Particle Board and Plywood

The glue in particle-board and plywood contains formaldehyde which is hazardous by inhalation. Wear dust mask when ripping on the table saw and store these materials away from heat and moisture.

Finishing Products

Materials such as paint stripper, shellac, varnish, stains, plastic wood, creosote, and enamel paints are all harmful by inhalation, ingestion and skin contact. Particular care should be taken not to use any of these substances in a crowded workspace without adequate ventilation. Many paints and compounds (such as arsenic) are suspected carcinogens and can cause reproductive problems.

REFER TO SECTION C - EQUIPMENT TUTORIALS FOR SAFETY INSTRUCTIONS ON SEPARATE TOOLS. Woodshop tools are broken down into two categories: Wood Shop tools, and Tool Crib tools.
Printmaking

General Hazards
Although the techniques of lithographic, intaglio, and relief printmaking vary considerably, they all involve inking the plates, setting up and operating the printing press, and clean up. The main hazards occur during the inking and cleaning steps. In handling prepared inks, there are no hazards due to inhalation of the pigment unless ink is allowed to dry on surfaces where it can eventually form a powder. The major hazards with inks are due to skin contact and accidental ingestion. This can be a problem particularly with hand-wiping techniques. Using bare hands increases the possibility of getting the ink in cuts and sores and of transferring ink from hands to mouth.

Clean-up
Many solvents are highly toxic by inhalation and moderately toxic by repeated skin contact, causing dermatitis. Do not wash your hands with solvents; appropriate gloves should be worn to avoid skin contact when cleaning up. Dispose of solvent-soaked rags in self-closing waste disposal cans that are emptied each day.

Ventilation
Fume hoods comprise the main ventilation system in the printmaking studio. Essentially a fume hood is an enclosure in which toxic, noxious, or otherwise harmful materials may be handled safely. The hood directs contaminants away from the work area by drawing out the contaminated air and expelling it. But in order to be effective, the fume hood must be used properly. Consult instructor.

The following printmaking methods are facilitated by the University.

Intaglio
Silkscreening
Relief Printing

INTAGLIO PRINTMAKING
Intaglio printmaking processes include etching, engraving, dry-point, and collagraphs.

General Hazards
Although the techniques of lithographic, intaglio, and relief printmaking vary considerably, they all involve inking the plates, setting up and operating the printing press, and clean up. The main hazards occur during the inking and cleaning steps. In handling prepared inks, there are no hazards due to inhalation of the pigment unless ink is allowed to dry on surfaces where it can eventually form a powder. The major hazards with inks are due to skin contact and accidental ingestion. This can be a problem particularly with hand-wiping techniques. Using bare hands increases the possibility of getting the ink in cuts and sores and of transferring ink from hands to mouth.

Clean-up
Many solvents are highly toxic by inhalation and moderately toxic by repeated skin contact, causing dermatitis. Do not wash your hands with solvents; appropriate gloves should be worn to avoid skin contact when cleaning up. Dispose of solvent-soaked rags in self-closing waste disposal cans that are emptied each day.

Ventilation
Fume hoods comprise the main ventilation system in the printmaking studio. Essentially a fume hood is an enclosure in which toxic, noxious, or otherwise harmful materials may be handled safely. The hood directs contaminants away from the work area by drawing out the contaminated air and expelling it. But in order to be effective, the fume hood must be used properly. Consult instructor.

Fume Hood Utilization Guidelines
1. Safety goggles or full-face shields should be worn when using a fume hood. The yellow apron should be also worn when in the acid area.
2. Operations that may generate air-born contaminates to be carried out of the fume hood are not suitable for the fume hood. (Fume hoods must be specifically certified for the use of CARCINOGENS, and PERCHLORIC ACID.)
3. Keep your head away from the acid trays as
printmaking, cont'd ...

much as possible. Attempt to keep the acrylic cover over the acid tray.
4. Prevent disruption of fume hood air flow patterns.
5. Do not place electrical apparatus or other ignition source inside the fume hood when flammable liquids or gases are present.
6. A fume hood should not be used for storing chemicals unless the fume hood had been designated for storage.
7. Keep the fume hood tray area uncluttered.
8. Avoid blocking the lower rear ventilation slot. Material stored at the back of the fume hood should be on the elevated shelf to allow air to flow freely.
9. Avoid cross drafts in front of the fume hood by minimizing foot traffic past the hood.

Drypoint
The main hazard of drypoint and engraving is the chance of cutting yourself through improper use of the tools. Hold the tools properly and always cut in a direction away from you with both hands behind the blade. Always keep the tools sharp.

Etching Grounds
Some of the ingredients which make up both hard ground and soft ground are flammable and can cause skin and eye irritation; avoid prolonged contact. Xylene is often used in making up hard ground, but as it is non essential to the mix and highly toxic, it should be deleted if you are making your own hard ground.

Stop outs - alcohol: slightly toxic.
Rosin - slightly toxic by inhalation.
Asphaltum - toxic by skin contact, possibly causing skin cancer and skin irritation. Wash carefully after use.
Aquatint Rosin - can cause respiratory problems during this process because of the fine dust produced when it is shaken onto the plate. Wear respirator.
Acid - Zinc and copper plates are etched with nitric acid of varying strengths. Copper plates can also be etched with Dutch mordant or iron perchloride.

Hazards
1. Concentrated acids are highly corrosive to the skin and eyes. Nitric acid etching can release highly toxic nitrogen oxides, especially if a large plate is being etched or the acid solution is too strong.
2. During the preparation of Dutch mordant, highly toxic chlorine gas is released. Dutch mordant is not to be used in the stainless steel fume hood. See instructor. Chlorine gas is highly irritating to the eyes and mucous membranes of the respiratory system. Potassium chlorate can be explosive in contact with organic materials such as rosin.
3. Nitric acid etching on zinc releases small bubbles of hydrogen gas. If the surface being bitten is large and/or a strong nitric acid solution is being used, the solution might get hot enough to cause the ground or hydrogen gas to catch fire.
4. Nitric acid etching of both zinc and copper plates can release highly toxic nitrogen oxides. This is especially true when large plate areas are being etched or the acid solution is too strong. This can be very hazardous since nitrogen oxide gases are highly irritating to the lungs. Single heavy exposures (especially if you see a brownish-orange gas) can cause pulmonary edema and possibly death. Long-term effects of exposure to nitrogen oxides include emphysema and chronic bronchitis. Note that nitrogen oxides do not have good odor-warning properties, and effects might not show up for several hours.
5. Iron perchloride (ferric chloride) is moderately irritating to the skin. It is also moderately toxic by ingestion and inhalation.

Precautions
1. Gloves and a suitable respirator are to be used when handling concentrated acids. These precautions should be used when student has a plate in the acid baths.
2. The acid baths and preparation of acid solutions
printmaking, cont'd ...

should be done in A102g in the fume hood tray. Ordinary respirators are not sufficient protection against nitric acid, or Dutch Mordant. In case of excessive emission of acid fumes during etching, add sodium bicarbonate to neutralize the acid.

3. If the acid bath gets too hot, carefully remove the plate from the bath and cool it with cold water. Wear gloves.

4. Acid mixture - always add acid to the water. Usual mixtures are: Normal bite (8 parts H20 to 1 part acid; Strong bite - 4 parts H20 to 1 part acid. Avoid spiking baths (adding acid to tray), as this makes for an inconsistent bath.

5. The use of any solvents around the etching fume hood is to be avoided totally.

RELIEF PRINTMAKING

General Hazards
Although the techniques of lithographic, intaglio, and relief printmaking vary considerably, they all involve inking the plates, setting up and operating the printing press, and clean up. The main hazards occur during the inking and cleaning steps. In handling prepared inks, there are no hazards due to inhalation of the pigment unless ink is allowed to dry on surfaces where it can eventually form a powder. The major hazards with inks are due to skin contact and accidental ingestion. This can be a problem particularly with hand-wiping techniques. Using bare hands increases the possibility of getting the ink in cuts and sores and of transferring ink from hands to mouth.

Clean-up
Many solvents are highly toxic by inhalation and moderately toxic by repeated skin contact, causing dermatitis. Do not wash your hands with solvents; appropriate gloves should be worn to avoid skin contact when cleaning up. Dispose of solvent-soaked rags in self-closing waste disposal cans that are emptied each day.

SILKSCREENING

General Hazards
Although the techniques of lithographic, intaglio, and relief printmaking vary considerably, they all involve inking the plates, setting up and operating the printing press, and clean up. The main hazards occur during the inking and cleaning steps. In handling prepared inks, there are no hazards due to inhalation of the pigment unless ink is allowed to dry on surfaces where it can eventually form a powder. The major hazards with inks are due to skin contact and accidental ingestion. This can be a problem particularly with hand-wiping techniques. Using bare hands increases the possibility of getting the ink in cuts and sores and of transferring ink from hands to mouth.

Relief Printmaking
Wood and linocuts are made by gouging out areas of a smooth surface with cutting tools. Standard inks (both oil- and water-based) can be used to print the plates. Soft woods such as pine make ideal woodcut blocks. Battleship linoleum is available in the store. Heating the linoleum with the electric pad in the print shop makes cutting easier. Cleanup of the plates may be done in the sawdust box beside the sink. Woodcut tools can be either purchased at the store or signed out from the tool crib in sculpture.

Precautions
1. Always cut in a direction away from you, with your free hand on the side or behind the hand with the tool.
2. Solvents which are used during cleanup are skin irritants. Wear gloves.
Clean-up
Many solvents are highly toxic by inhalation and moderately toxic by repeated skin contact, causing dermatitis. Do not wash your hands with solvents; appropriate gloves should be worn to avoid skin contact when cleaning up. Dispose of solvent-soaked rags in self-closing waste disposal cans that are emptied each day.

Ventilation
Fume hoods comprise the main ventilation system in the printmaking studio. Essentially a fume hood is an enclosure in which toxic, noxious, or otherwise harmful materials may be handled safely. The hood directs contaminants away from the work area by drawing out the contaminated air and expelling it. But in order to be effective, the fume hood must be used properly. Consult instructor.

Silkscreening
Screen printing is essentially a stencil technique. Water-based inks that are thinned by water or have a retardant added are used in the print shop.

In water soluble screen printing the main hazards lie in the use of the inks, emulsion removers, and general screen solvents. The water-soluble inks contain some solvents and resins and may contain traces of lead chromate. Basic good housekeeping methods as well as some personal protection are necessary when mixing the inks, printing and cleaning up. Through all these procedures, gloves or barrier creams should be used, since skin contact is considerable. Do not eat, drink, or smoke in the studio.

Silkscreen Inks
When mixing inks avoid leaving cans open or large amounts of ink on the palette for long periods of time. All through the mixing, printing and drying stages, solvent is constantly evaporating from the inks into the atmosphere at concentrations that are much higher than those found in intaglio or lithography. When the mixing is complete clean up the area entirely, i.e. don’t leave unused ink or solvent-soaked rags laying around. The rags should be immediately placed in a safety disposal container. A slot hood or respirator should be used when dealing with toxic inks.

Paint Thinner
Paint thinner is moderately toxic by inhalation, and highly toxic by ingestion. It is also combustible. Paint thinner is most harmful during the printing and drying processes where it is used in large volumes. During printing, avoid letting the screen dry out to the point where an excessive amount of clean-up solvent will have to be used. If equipment is cleaned immediately after printing, less solvent is used. All clean-up should be done in screen-washing area.

Lacquer Thinner
Lacquer thinner is a mixture of solvents that contains high amounts of toluene and other toxins. Skin contact and inhalation should be avoided. Ensure ventilation and wear gloves. Goggles are recommended to protect against splashes. Since it is highly flammable, contaminated rags and newspapers should be disposed of in red metal containers.

Printing
Most silkscreening now uses water soluble inks. Use gloves for clean-up.

Photo Stencils
There are two types of photo stencil techniques in silk screening: direct emulsions, in which the screen is coated with the emulsion, exposed, and then developed; and transfer film, in which the film is exposed and developed and then physically adhered to the screen. In both cases the emulsion can be pre-sensitized or unsensitized. Unsensitized emulsions usually use ammonium dichromate for sensitization. Direct emulsions use water as developer, and indirect emulsions use hydrogen peroxide. Some emulsions may use silver nitrate as sensitizer and caustic soda as developer. Exposure of the emulsions is done with an intense light source such as a No. 2 photoflood reflector bulb, sun lamp, and in some cases, carbon arc. The screens are reclaimed with bleach, hot water, and sometimes enzymes.
printmaking, cont'd ...

Hazards
1. Ammonium dichromate is moderately toxic by skin contact, causing ulcers and allergies. Inhalation of the powder can cause severe respiratory irritation, ulceration of the nasal septum, and respiratory allergies. It is a suspect carcinogen. Ammonium dichromate is also flammable.
2. Silver nitrate is moderately corrosive to the skin and highly corrosive to eyes. Caustic soda, used as developer with this sensitizer, is highly corrosive to skin and eyes.
3. Hydrogen peroxide is a slight skin irritant in diluted form. In concentrated form it is hazardous.
4. Diazo sensitizing solutions are eye irritants by direct contact.
5. Carbon arcs are highly hazardous, giving off metal fumes, nitrogen oxides, and ozone, all of which are severe lung irritants. In addition, the ultraviolet light produced is harmful to the eyes.
6. Enzymes can cause skin allergies in some people. Inhalation of the powder can cause asthma. Bleach is a moderately toxic skin irritant and is highly toxic by inhalation if sprayed.

Precautions
1. Wear gloves and goggles when mixing and using photo stencil solutions and when cleaning the screen.
2. Do not use carbon arcs. Instead use a photoflood or sun lamp.
3. Pre-sensitized emulsions are a good choice for making photo stencils since it is not necessary to handle the hazardous ammonium dichromate.