EMPLOYEE HEALTH AND SAFETY IN THE LITHOGRAPHIC PRINTING INDUSTRY

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Guide identifying the hazards commonly encountered by workers employed in the lithographic industry. It also tells how workers can be protected by the right combination of engineering controls, personal protective equipment, and work practices. Some of the requirements for protecting the employees against hazards are the responsibility of the employer, such as ventilation, machine guarding, and measuring the concentration of chemicals in the air. Described in detail are mechanical, fire, chemical, noise and light hazards encountered in the litho industry. Plant maintenance and custodial operations, and measures and identifying and remedying health and safety hazards are outlined.

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CONTENTS

INTRODUCTION

This guide describes the hazards to workers which are common in lithography. Besides identifying the hazards, it tells how workers can be protected by the right combination of **engineering** controls (such as machine guards), personal protective equipment (such as gloves), and work practices (such as locking out machinery before working on it).

Although **administrative** controls can also be used to help meet federal standards, they are not discussed here. These are rules an employer can set up to limit the amount of **time** a worker is exposed to some hazard, such as noise or chemical vapors.

The U.S. litho industry includes 8,400 commercial plants, thousands of job shops, and many tens of thousands of in-plant printing departments. Some facilities have 2 workers, others 200 or 2,000.

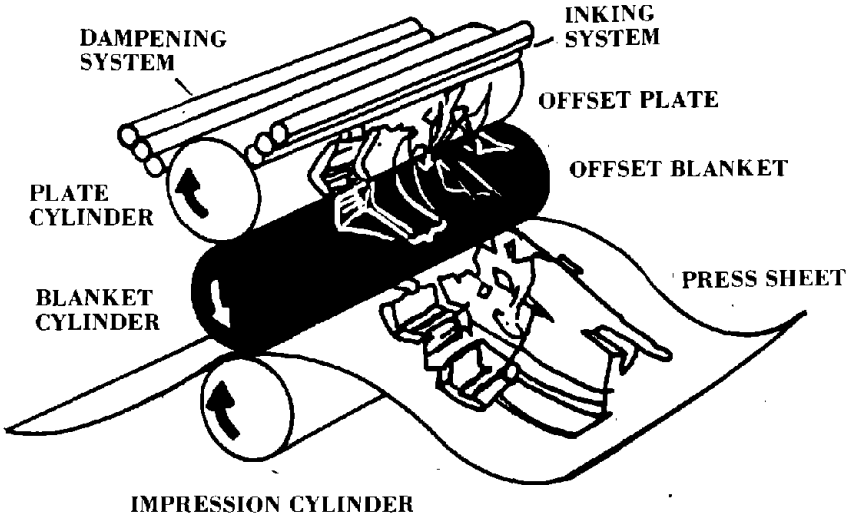
Because of the great variety of operations within the litho industry, no single publication could cover every workplace without requiring some modification for each particular work situation. Your experience is the best guide to deciding which parts apply to your particular workplace. This does not mean you can decide to overlook parts of the guide for no good reason. What it means is that if, for example, you don't do any work on sheet-fed machines, you don't need to be concerned about getting your hands caught in delivery bars.

Since folding, binding, stitching, trimming, and other finishing operations are basically similar for the five major printing processes (lithography, gravure, screen, letterpress, and flexography) these operations will be treated in a single guide.

Note that this guide mentions some requirements for protecting employees against hazards that are the responsibility of the **employer,** such as ventilation, machine guarding, and measuring the concentration of chemicals in the air. If these requirements aren't met, the steps you can take on your own, such as hand or eye protection, will not be adequate to protect you.

If you have questions that this guide doesn't answer, you can call or write one of the offices **listed in the back.** Or your employer may be able to answer them.

THE LITHOGRAPHIC PROCESS



MECHANICAL HAZARDS

Mechanical hazards are responsible for most serious physical injuries in the litho industry. These hazards are controlled by four basic measures . . .

A. machine guarding

B. personal protection

C. lock out devices

D. materials handling practices

A. MACHINE GUARDING

Machine guarding is needed wherever hazardous machine parts are within the reach of workers from any work position . . .

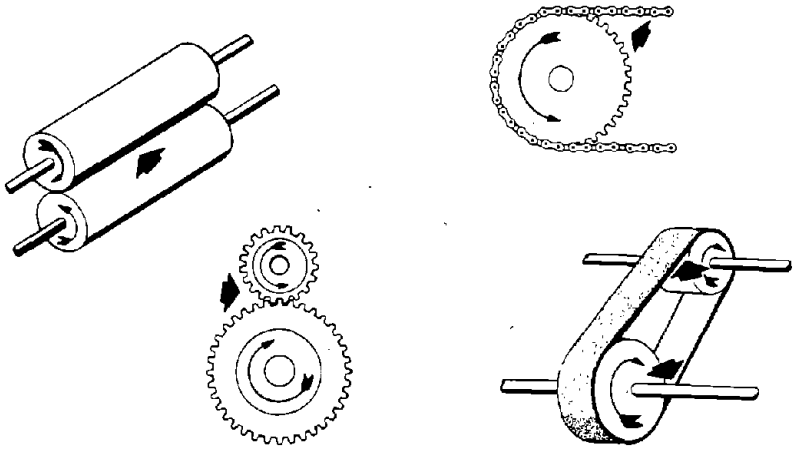
- belts
- chains
- flywheels
- cutters
- pulleys
- sprockets
- ratchets
- shafting
- fasteners
- punches
- conveyors
- clamps
- cams
- gears
- rollers
- cylinders
- shears
- presses
- reciprocating parts
- other points of operation

Machine guarding protects you against cutting, squashing, flying fragments, and other physical injuries by . . .

- enclosures
- remote controls
- moving barriers
- fixed barriers
- proximity sensors
- light beam sensors
- electrical & mechanical interlocks
- sensitive safety bars
- two-hand tripping devices
- pull-away and push-away devices

Most machines used in litho work need guarding . . .

- binders
- presses
- slitters
- joggers
- tiers
- whirlers
- folders
- trimmers
- smashers
- guillotines
- gatherers
- stitchers
- embossers
- step and repeat
- photo composers
- die cutters
- plate processers
- film processers



EXAMPLES OF IN-RUNNING PINCH POINTS (NIP POINTS)

Specialized guards for machine guarding in lithography include:

1. pressure-sensitive guards at the plate-to-blanket nip point

2. two-hand trip switches, guard on the foot pedal or treadle, dual clamp pressure, and light beam safety devices on guillotine cutters

3. an interlocked barrier over the delivery bars

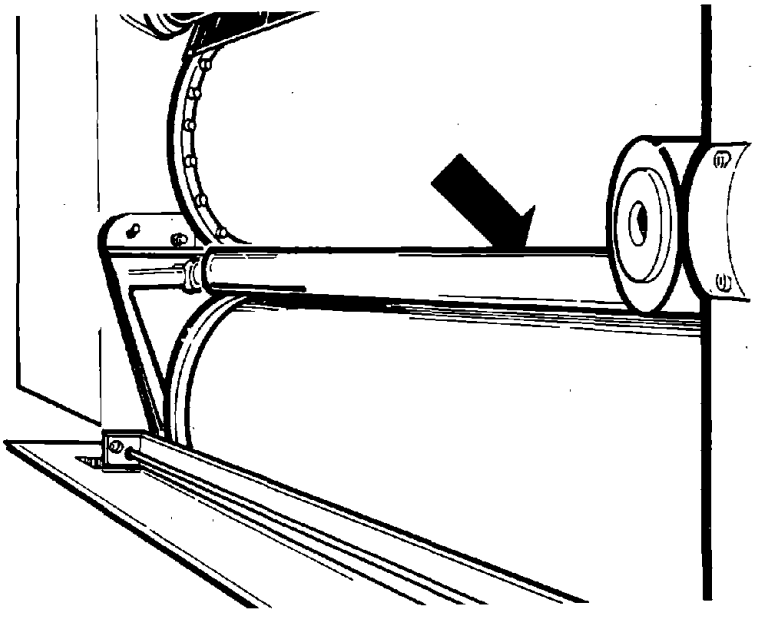
1. plate-to-blanket nip

Operations commonly performed near this nip include:

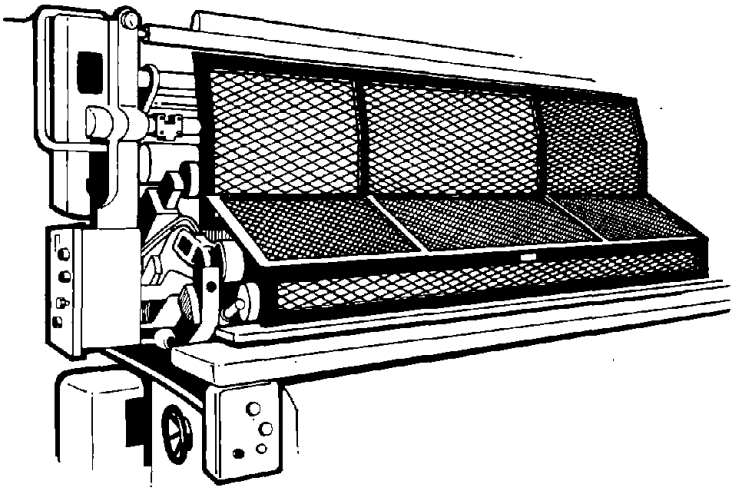
- removing hickies (ink or paper fragments)...but not on the fly—the machine can't stop fast enough, even with electromagnetic braking, to protect persons picking hickies at operating speeds*
- blanket washing
- blanket and plate changes

The in-running nip between the plate and blanket cylinders is usually guarded by a pressure-sensitive safety (trip) bar positioned just outside the nip. An object can't enter the nip without moving the bar—moving the bar cuts off power and brakes the machine to a quick stop. This nip point can also be protected (although not for washing or for plate or blanket changes, when the machine is inched) by a barrier type guard that cuts power when the barrier is lifted or removed.

* If you must pick hickies **on the fly** (NIOSH does not recommend it), use a light object, such as a thin piece of stiff plastic film—never a fingernail. Be sure you do the picking on the side of the cylinders that has in-running nip-point guards. Be careful to avoid long hair (if no hair cap) that might get drawn into the nip.



PRESSURE-SENSITIVE GUARD. A pressure-sensitive guard is frequently used at the plate-to-blanket nip to automatically stop the press when an object wedges between it and the cylinder.



BARRIER GUARD. Guards the inking and dampening rollers at the press infeed—if the guard can be lifted up or off, it should be interlocked to cut off power.

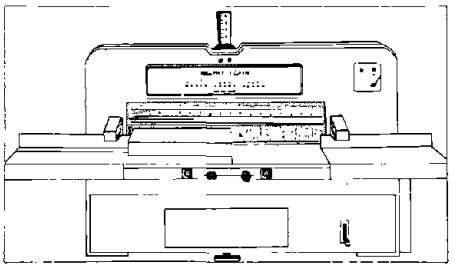
. . . more specialized machine guarding applications . . .

2. guillotine cutters

Material can't be cut until:

- pressure clamp is set (foot pedal or treadle must have a guard)
- light beam on the optical safety device (where provided) is unblocked by hands or by objects
- hands of the operator(s) are on the two-hand (or four-hand) safety controls
- hands have been taken off safety controls after prior cut (non-repeat feature).

Note that special precautions are necessary to prevent serious injury when knives are removed to be sharpened. Although the best source of information on proper knife handling is the guillotine manufacturer's maintenance instructions, most procedures involve special knife handles or knobs for safe removal, mounting boards for safe transport, and use of a helper when changing knives on larger machines. IT .IS IMPORTANT THAT KNIFE HONING NEVER BE DONE WITH THE KNIFE MOUNTED ON THE MACHINE.

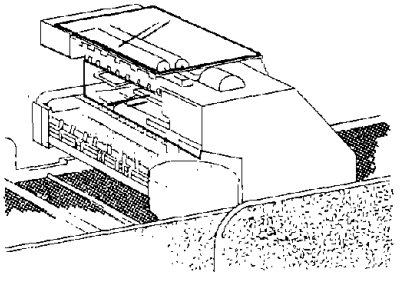


3. delivery bars

To prevent a person from reaching in to grab jammed sheets while a sheet-fed press is running, an interlocked transparent barrier is often placed over the delivery bars and over the feed mechanism. Opening the hinged barrier cuts power, and brakes the machine to a stop. But this doesn't mean it's safe to rely on the interlock while clearing a paper jam. Always use the safe button or power lockout when clearing jams.

non-working machine guards

Your employer is required by law to provide machine guarding. If repeated adjustments to a guarded part are necessary, hinged (or otherwise removable) barriers with interlocks should be provided. Note that no guarding device exists which cannot be defeated—but none of the injuries that can occur when guards are missing, broken, defeated, or out of adjustment are worth the risk to yourself and your co-workers.



PLASTIC BARRIER GUARDS. Just because a press or other machine looks small doesn't mean the power it produces won't injure. Plastic barrier guards over the inking and dampening rollers on a smaller press are shown here. Without these guards, the operator's clothing could easily get caught and pull a hand into the nip.

B. PERSONAL PROTECTIVE MEASURES

Besides making sure that guards are provided and are working, there are definite steps workers can take to protect against machine injuries . . .

- don't wear aprons, long sleeves (except if snug fitting), bulky sweaters, pants with cuffs, jewelry, medallions, necklaces, ties, watches, rings, bracelets, scarves, or other loose items while working around operating machinery

- keep long hair tucked up under a hair cap to prevent it from getting caught in machinery (note: turbans, hair nets, or bandannas are not acceptable substitutes)

- clear jams or waste and wipe down machinery only when it is shut off and locked out

- where wiping is essential during machine operation, use the jog or inch modes only, not the run mode . . . the cloth or rag used for wiping should never be wrapped around the hand—otherwise, if the rag gets caught the hand will be drawn in

If a rag ever <u>does</u> get caught, LET GO. If a finger, hand, or arm is ever drawn into a nip point between cylinders or rollers, release roller or cylinder pressure until all pressure is off the trapped limb. If pressure can't be relieved, dismantle the unit and pry the rollers or cylinders apart until the limb can be released from the machine. NEVER REVERSE THE MACHINE WHILE THE LIMB IS STILL TRAPPED UNDER PRESSURE BETWEEN THE ROLLERS OR CYLINDERS.

. . . more personal protective measures . . .

- lock out power to machines while maintenance is being performed on them or jams are being cleared . . . (this rule doesn't apply to cleaning operations that require power)

- if you can't be sure from the operator position that others are clear of the press, walk around the machine to make sure all hands are clear before powering up—besides a walkaround, an additional margin of protection can be gained by use of high-visibility flashers, loud horns, or bells

- never run or clean a large press alone (especially multi-color or other units with several print stations)—if you get caught by a moving part, there should always be someone around to stop the press

- keep hands out of areas where you can't see them

- use hand rails and hand holds on larger presses rather than jumping or leaping from one position to another

- make sure visitors and out-of-area persons are protected from unfamiliar mechanical hazards

C. LOCKOUT DEVICES

Many injuries have occured as a result of premature powering up. These injuries could have been avoided by routine use of effective power cutoff equipment on electric, hydraulic, and compressed air supplies.

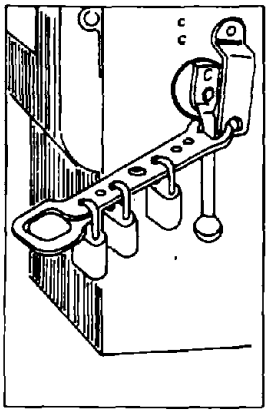
- during maintenance or other operations where guards are removed, or where work is required near normally inaccessible moving parts, it is crucial that measures be taken to prevent the machine from being started

- many machines used in litho work are now equipped with lockable stop buttons ("safe" buttons)

- many installations allow for the handle on a power supply box to be locked in the off position

- the employee doing the maintenance work should always keep the key until the job is completed

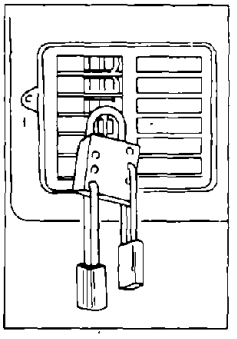
- no worker finding a locked or tagged stop button, power box handle, or circuit breaker should ever attempt to restore power without first checking with the person who tagged the power supply



LOCKED OUT POWER SWITCH. Each person doing repair or maintenance work (plus the maintenance or shift foreperson) has a personal lock. Until all locks are removed, the switch can't be turned on.

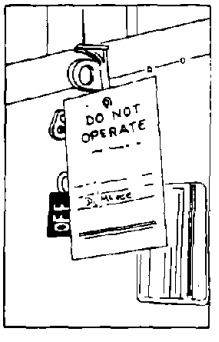
In addition to power lockout features, some litho presses are equipped with flip covers.

- flip covers prevent either the run, reverse, or inch buttons from being accidentally pressed
- covers on the run and reverse buttons should be flipped shut during gumming, plate lockup, blanket lockup, and other operations where the press is inched
- covers on the run and inch buttons should be shut while the press is operated in reverse, such as to remove plates or blankets



Some circuit breakers are lockable.

TAGGING OUT. If it isn't possible to lock out a power switch, shut off the power at the fuse or breaker box, shut off and tag the machine power switches (including your name), and notify your supervisor.



D. MATERIALS HANDLING PRACTICES

Many physical injuries occur while heavy, bulky, or hazardous materials are being moved . . .

- back injuries from trying to lift a heavy load without a mechanical aid, or by improper lifting practice
- foot and head injuries from falling materials
- hand injuries from paper cuts, metal plates or the sheet metal used in metal decorating, and from leaking chemical containers
- foot and leg injuries from improper storage of skids

Preventing back, foot, head, hand, and eye injuries in materials handling work . . .

back injuries

- to prevent back injuries, make sure the floor or platform isn't slippery—then lift from a knees-bent position with your legs, keeping the back straight . . . do not lean over other items to get to the load . . . if the load is too heavy or bulky for one person, get extra hands or a lifting/moving device

foot injury

- foot injuries can be reduced by routinely wearing safety shoes . . . ordinary safety shoes provide toe protection only . . . such shoes can be equipped with instep guards (metatarsal guards) to protect the instep from being crushed
- since one person's load may fall on another's feet, all employees in the pressroom, bindery, shipping, and storage areas should wear safety shoes (not just those handling heavy materials)

hand injury

- wearing tough leather, canvas, or metal-reinforced gloves will protect against many common injuries that occur during materials handling operations (such as cuts from handling sharp metal)

- only gloves that do not allow chemicals to reach the skin should be used if open or leaking chemical containers must be handled

- neoprene gloves are impervious to most litho chemicals (thin plastic gloves that let chemicals through can be worse than none at all, since the chemical will be held against the skin after passing through the glove)

- if the skin is cut, get it cleaned and covered before resuming work (otherwise you risk infection)—report cuts and all other injuries to your supervisor

skin & eye injury

- if chemicals splash or spill on skin, eyes, or clothes during materials handling, thoroughly wash the skin or eyes immediately (remove the clothes if more than a few drops has gotten on them) . . . fifteen (15) minutes continuous washing, such as at an eyewash fountain or emergency shower, is recommended

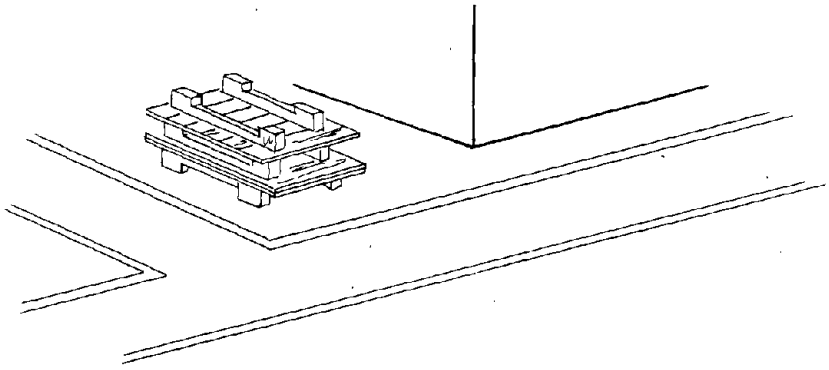
  Note that any amount of chemical splashed in the eyes is dangerous. Depending on the chemical and how quickly the skin or eyes are flushed, you may need to see a doctor.

  The person who performs first aid should have material safety data sheets for all chemicals used in the plant. These sheets should include descriptions of proper procedures to follow if the chemical comes into contact with skin or eyes (they also discuss breathing and swallowing hazards, if any).

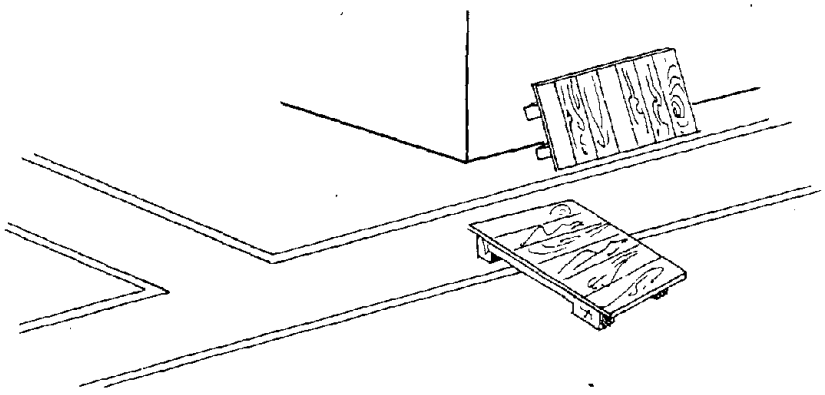
More hazards of materials handling work . . .

- even **with** adequate personal protective equipment, injuries can occur if a person . . .
  - stands under a raised load
  - carries an unstable load, or exceeds the load limit on a lift jack or truck, or moves a load with forks in a raised position, or fails to center a load
  - has poor visibility in the direction of travel (if necessary, travel with the load trailing)
  - slips on spills of oil, ink, or paper
  - trips over skids, or on paper, metal, cardboard, or wiping cloth litter
  - rides as a passenger on trucks or dollies
  - startles other employees by dropping heavy materials

- cutting steel straps—when straps under tension are cut, they often snap like a whip; hands and face must be protected. Since strap scraps left lying on the floor can cause deep cuts, be sure to place them in a scrap container before they pile up.



PROPER PALLET STORAGE.



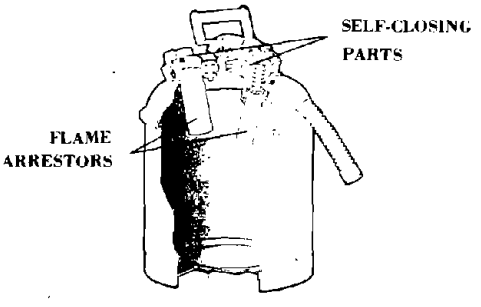
IMPROPER PALLET STORAGE.

FIRE

Fire can be caused in litho plants by:

- clouds of paper dust or starch (anti-setoff powder) exploding
- solvent vapors from leaks, spills, or poorly ventilated areas
- oily, greasy, and ink-soaked or solvent-soaked rags (wipe rags soaked with ink, especially those used on sheet-fed presses, are particularly likely to ignite, since these inks create heat as they dry)
- smoking:while using solvents, while in solvent storage area, where solvent spills have occurred, or where alcohol is used in the fountain solution
- static electricity in solvent transfer operations

SAFETY REFUSE CAN. The lid keeps vapors inside. The can needs to be emptied at least daily (sooner if it gets full). Note that a drum is NOT a safe substitute.



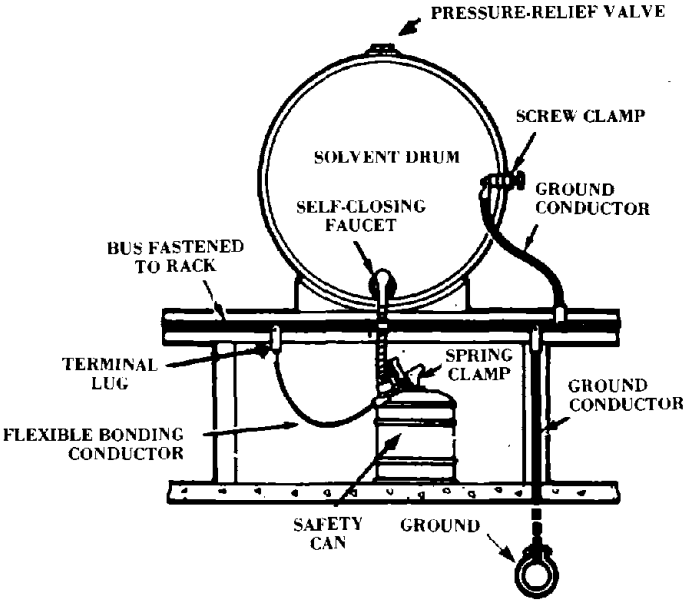
SAFETY CAN. For transferring small quantities of a flammable liquid, use a safety can. Be sure to add a label with the name of the solvent.

Litho plant fires can be prevented by . . .

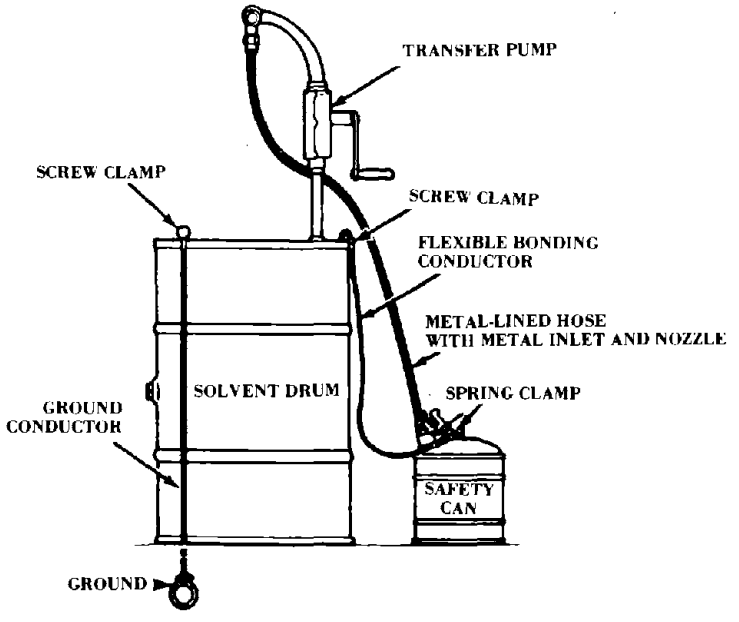
- never using solvent-plus-compressed-air for clean-up—the air vaporizes the solvent, which can ignite easily (this practice also creates a serious breathing hazard)
- vacuuming paper and other dusts rather than blowing down with compressed air
- reporting and removing from further use (or fixing) leaking solvent containers, spigots, pumps, and safety cans
- wiping up solvent spills with rags or paper towels (never use saw-dust)
- putting oily, greasy, and ink-soaked or solvent-soaked rags or other materials in closed metal safety containers—the safety container must be emptied daily (a drum may **not** be substituted)
- transferring "flammable" or "combustible" solvents only to safety cans which have been looked over to see that flame arrestors are intact (see drawing on page 18)
- making sure that "flammable solvent" drums are grounded ("flammable" solvents are greater fire hazards than those called "combustible") . . . and that the safety can is connected to the drum with a bond wire while it is being filled
- not dumping solvents into normal drains or sewers (they can explode)

CAUTION:

Highly poisonous gases are produced by some solvents (especially chlorinated solvents) when they burn. Only persons wearing self-contained supplied-air respirators (these look like scuba tanks) can safely fight such fires. All other workers should leave by the nearest exit.



EXAMPLES OF BONDING AND GROUNDING



Vacuuming Dusts. Paper and anti-setoff dusts can form explosive clouds if they are thrown into the air by cleaning with compressed air. Using compressed air also causes eye injuries from flying fragments, and serious rectal injury if pointed at the seat of the pants. When compressed air must be used, wear eye protection and limit air pressure to 30 psig.

Three situations where compressed air should NEVER be used are:

- ✗ cleaning clothes
- ✗ general cleanup of dust, scraps, etc.
- ✗ solvent cleaning of machinery or other items (the compressed air will throw large amounts of solvent into the breathing zone—breathing these vapors can be a long-term as well as an immediate health hazard for everyone in the area—besides creating a serious fire hazard if the solvent supports combustion)

CHEMICAL HAZARDS

Litho chemicals can be harmful if they come into contact with the skin or eyes, or if they are taken into the body by breathing, swallowing, or through healthy as well as injured skin.

Four categories of chemical hazards are:

A. organic solvents

B. platemaking chemicals

C. ink & oil mists

D. gases and fumes

CAUTION:

Knowing precisely (or as precisely as possible) what chemicals you work with and what their known hazards are is your first line of defense against toxic chemicals. This information can be valuable in helping assure that your exposure to harmful chemicals is within safe limits, and can also be very useful to your doctor, since many physicians don't know the components of trade name industrial products. In addition, this information helps in determining which chemicals are more hazardous than available substitutes.

While most chemicals come with labels that give some information about safe handling and immediate health hazards (such as eye burns, dangers of swallowing or of prolonged inhalation), additional information is often readily available from the supplier or manufacturer. Your employer or doctor can ask for the "Material Safety Data Sheet" for any chemical or preparation you work with. Such sheets typically show:

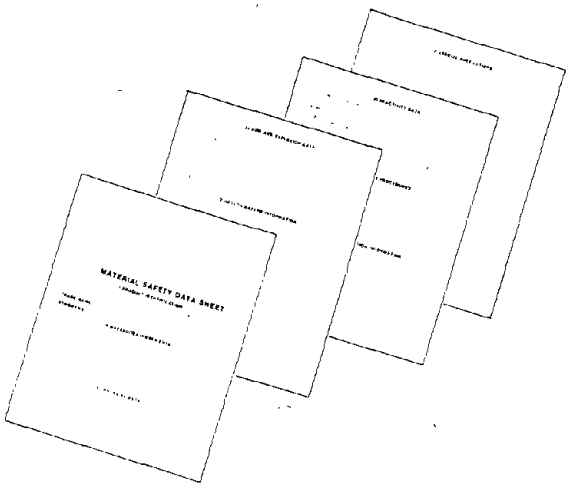
1. the technical names of the chemicals in a brand-name product

2. physical characteristics of the product, such as flammability and ease of vaporizing

3. health effects (if known) of overexposure—both long-term (such as liver or kidney disorders) and short-term (such as chemical eye burns, loss of consciousness, and other immediate effects)

4. the manufacturer's recommendations for ventilation, protective equipment and for safe handling practices

Note that some manufacturers consider certain information about their chemical products to be "proprietary" and resist disclosing it. Usually what is considered "proprietary" is the amount of each chemical in a mixture, or details of how it is manufactured, or data on how much is made—not the identity of the chemical components. The four items of information listed above (appearing on material safety data sheets) do not relate to matters of interest only to the manufacturer, and should not be withheld from employers, employees, employee representatives, or plant or private physicians.



A. ORGANIC SOLVENTS

Organic solvents are found in many litho chemicals . . .

- inks
- roller washes
- blanket washes
- fountain solutions
- lacquers, shellacs, varnishes, and their thinners
- splicing glues and their solvents
- plate cleaners
- platemaking chemicals
- glaze removers
- degreasers
- film cleaners

Many organic solvents give off invisible vapors which are dangerous if breathed too long or in too high an amount. Typical effects are . . .

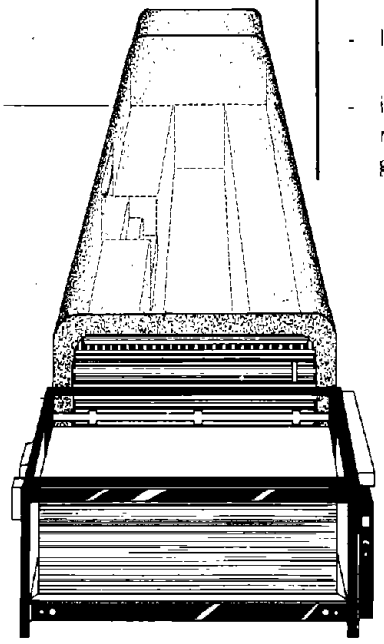
- headache
- dizziness
- giddiness
- mental confusion
- blurred vision
- incoordination
- weakness and fatigue
- numbness of limbs
- loss of consciousness
- nausea

CAUTION:

The effects of overexposure to organic solvents can be more pronounced for workers who take tranquilizers and certain other medications, or who have liver or kidney ailments. Let your doctor know if you work with organic solvents.

What to do if you feel one or more of the effects listed on page 24 . . .

- get away from the vapors immediately
- don't continue to work while dizzy or uncoordinated (you may injure yourself or others)—leave the area and get fresh air
- let your employer know about the situation
- if fresh air doesn't make you feel better in a few minutes, or if the effects of exposure are severe, get medical attention



PRESS PIT. Pit shown in this x-ray view (internal mechanism not shown) can collect solvent vapors when solvents are used to clean press parts, blankets, etc. A supplied-air respirator is needed by persons entering the pit if solvent levels inside are high enough to present a threat of illness or suffocation.

How much solvent vapor is too much to breathe?

- since your sense of smell tires quickly, or may not detect solvent levels too low to be smelled, your nose **isn't** a good judge of how much vapor is too much—especially since some solvents actually smell good as they are harming you

- solvent vapors in the air must be **measured** in order to know whether the amount is safe

- a level that is safe from a **fire** standpoint may still be hazardous from a **health** point of view (so measuring only the fire danger with a combustion meter isn't enough)

- the only accurate way to measure solvents in the air is for a qualified industrial hygienist to take an air sample and analyze it

- if your employer doesn't have an industrial hygienist take air samples, you can request a health hazard evaluation by NIOSH or an inspection by OSHA (see pages **64–69**)

- breathing too much of some solvent vapors for a period of months or years can result in permanent damage to the liver, kidneys, blood-forming organs, nerves, eyes, and brain

A few organic solvents have such serious health effects they shouldn't be used at all—not alone, not in mixtures . . .

Solvents which should NEVER be used in litho work include:

- benzene
- carbon tetrachloride
- gasoline (contains benzene)
- chloroform
- carbon disulfide

CAUTION:

Benzene, which was widely used as a solvent until the last few years, is now known to be a cause of leukemia. (Note: benzene, NOT benzine.) Some of the other solvents on the list above are also widely used, and are now known to cause permanent injuries to the liver, kidneys, or other organs in persons exposed to them for long periods of time (usually several years). While all litho workers can benefit from an annual medical exam, those who have been working routinely with organic solvents (in litho plants or elsewhere) for 5 or more years are especially encouraged to get one.

Note: Although many litho shops have stopped using benzene and benzene mixtures, it can still be found **as an impurity** in some commercial grades of the solvents toluene, xylene, and mineral spirits. OSHA issued an emergency temporary standard for benzene on May 21, 1977, and is expected to issue a permanent regulation by early 1978. The temporary standard decreases the permissible concentration of benzene in breathing air, exempts technical grade substances (and mixtures) with 1% or less benzene by volume, and requires quarterly medical exams at employer expense for workers exposed to benzene.

The FIRST line of defense against breathing too much solvent vapor is keeping it out of the air you breathe.

- lids on cans, drums, and cleaning tanks are needed to keep solvent vapors inside

- where large quantities of solvents are used in one area, they should be piped directly to avoid repeated small transfers

- spills cleaned up without delay prevent the liquid solvent from evaporating to form vapors

- vapors from soiled rags and other materials don't enter the air you breathe if the rags are put in a safety container with a snug lid

- tunnel dryers and chill rolls on web presses must have local exhaust ventilation in good working order to collect and exhaust the solvent vapors that the ink gives off as it is dried (heat-set litho inks are 30-40% solvent; many coatings applied during web printing have even more solvent)

- floors should not be cleaned with organic solvents, or else solvent vapors will get into the air you breathe

. . . more measures you can take to avoid breathing solvent vapors . . .

- clothing with more than a few drops of solvent spilled on it should be removed—otherwise you wind up breathing the vapors until the spill has dried

- hands should be washed before smoking or eating (but NEVER wash up with solvents)—if you don't wash, you may breathe the toxic combustion products of a solvent that contaminates a cigarette or swallow a solvent that gets on food, candy, or gum

- print stations where lacquers, varnishes, or shellacs are applied need local exhaust ventilation, since these coatings have large amounts of organic solvents in them

- solvent storage areas require mechanical exhaust ventilation to remove solvent vapors due to leaking containers, pumps, or spigots—otherwise the vapors will move with air currents into other work areas as well

- don't sniff a solvent to determine its identity

The SECOND line of defense against breathing too much solvent vapor is using a respirator.

- respirators are used where air contaminants make them necessary, especially while engineering controls are being made, installed, or repaired

- respirators are also used in those situations where ventilation or other engineering controls in use aren't adequate to reduce the amount of solvent in air to safe level

- a respirator with a charcoal filter cartridge or canister (not just a dust filter) may be necessary when handling quantities of solvent-soaked rags, paper, etc., and when cleaning machinery or other items

- selecting the proper respirator for the job is important (example: a dust mask won't protect against solvent vapors)—the person making the selection must know the amount of vapor in the air and its identity

- employers who require the use of respirators must provide their employees with a physical exam to determine whether they can safely wear a particular respirator, and must give training in how to use, test, and clean them

- for respirators with charcoal filter cartridges or canisters, the cartridge or canister must be replaced as soon as you smell vapor coming through, or if your face or eyes become irritated, or if the service time shown by the manufacturer on the label has expired, or the throw-away date has passed, or the breakthrough indicator (if provided) signals a need for replacement, **whichever occurs first**

. . . more points on proper respirator use . . .

- using a respirator with a used-up or stale cartridge or canister may be no better than using none at all—and it could be worse (the charcoal filter may release trapped chemicals into the face mask)

- a respirator that supplies fresh air must be worn whenever a tank or other confined space is entered that has contained either an organic solvent or any material which contained an organic solvent

- watch out for solvent trapped in scale or sludge when you enter a tank

- while a worker is in such a tank there must be a second worker standing guard at the entrance who has a fresh air type respirator plus a lifeline rope attached at the other end to a waist harness on the worker inside—this second worker must be able to enter to take out the first if the first loses consciousness

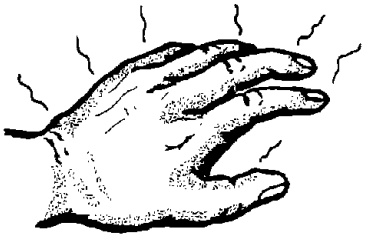
failure to take these precautions when entering confined areas can lead to unconsciousness and can even be fatal

CAUTION:

A press pit or other recessed area can collect solvent vapors. For this reason it should have local exhaust ventilation. Before entering a pit, make sure the air is safe to breathe or that you have a **supplied-air** respirator on and in operation. A recent tragedy occured when a worker without a respirator entered a pit to rescue an unconscious worker. The rescuer died.

Organic solvents also harm the skin and eyes.

- most remove the protective fatty oils from skin
- as a result of repeated skin exposure to solvents, the skin dries, flakes, and cracks—easily leading to dermatitis
- germs can enter this unhealthy skin and cause infections that are hard to cure
- some solvents cause burns
- a few solvents (like turpentine) can cause you to become allergic to the solvent—this is called sensitization
- some solvents can actually pass **through** perfectly healthy skin and enter the bloodstream—they pass through unhealthy skin (skin that is cut, punctured, scraped, or peeling) even faster



The obvious solution is to take steps to keep solvents from reaching the skin and eyes.

- wear a long-sleeved shirt where work allows—(never around presses or bindery equipment, unless it is snug-fitting)
- wear **impervious** gauntlet gloves when solvents are handled—neoprene gloves are impervious to most litho chemicals, including solvents

  (impervious means the solvent can't get through the rubber or other material to reach the skin)

. . . **more** . . .

- get clean gloves if the insides of the ones you're wearing become contaminated with solvent

- do not touch your face or eyes with gloves on

- hands and other skin should **never** be washed with organic solvents

- to avoid abrading the skin, wash up with a waterless hand cleaner rather than a gritty one

- apply a hand lotion after washing up

- where solvent splashes are likely, wear a face shield or splash goggles

- if solvent is splashed in the eyes:

    * spray the eyes in an eyewash fountain for 15 minutes, while holding the lids open with your fingers (roll your eyes by looking high, low and side to side so water can flush them well)

    * don't use home remedies, such as boric acid

    * after flushing your eyes with water, get first aid from a trained person

    * get someone to take you to a hospital emergency room or doctor's office if you can't get first aid or you feel you need further treatment (but flush the eyes **first**)

Swallowing organic solvents can kill.

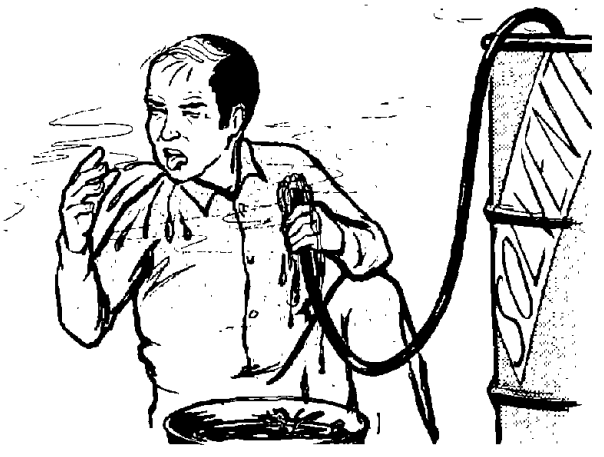
- siphons on a solvent container should never be started by sucking on the hose (one swallow of solvent may be deadly—a splash in the face can be serious)

- food or beverage containers should never be used to store or dispense solvents (even when labeled the solvent could be mistakenly swallowed)

- never taste a chemical to decide what it is

- if a person swallows some solvent, get medical help immediately

  don't try to get a victim to vomit (vomited solvent can wind up getting breathed into the lungs and ruin them)



CAUTION:

So-called "exempt solvents" and "safety solvents" can have both health and fire hazards. All that **exempt** means is that the solvent vapors do not form smog readily when exposed to sunlight. **Safety** solvents are ones that don't damage a particular material, or which pose less of a fire hazard. Safety solvents are usually mixtures containing chlorinated as well as non-chlorinated organic solvents.

Chlorinated organic solvents belong to the category of solvents that includes such known hazardous chemicals as carbon tetrachloride and trichloroethylene. While chlorinated organic solvents are usually not fire hazards, their vapors can produce several toxic gases, including phosgene, if welding is done in their presence. This is due to the presence of invisible ultraviolet light caused by the welding arc. This light is also produced by arc lamps, anti-setoff bulbs, and UV-ink curing units.

Unlike those organic solvents that aren't chlorinated, the chlorinated solvents tend to build up in the body over a period of time—and can do damage in the process.

B. PLATEMAKING CHEMICALS

Chemicals used to make litho plates include some that can burn or irritate the skin.

- impervious gauntlet gloves should be worn when platemaking chemicals are handled to protect against burns, skin irritation, and allergies—neoprene is usually the prefered glove material for most litho work

- gloves also protect against chemicals that can enter the body through the skin

- to help prevent skin problems caused by keeping hands in warm, sweat-dampened gloves for extended periods, remove gloves when they are no longer needed

- wearing an apron keeps chemicals off your clothes—otherwise they may contact the skin

- gloves and apron should be washed after use (such as before lunch and at quitting time)

- inspect gloves for pinholes whenever you wash them—if water poured in them leaks out at all, or you can see light coming through holes, throw the gloves out and get a new pair from your supervisor

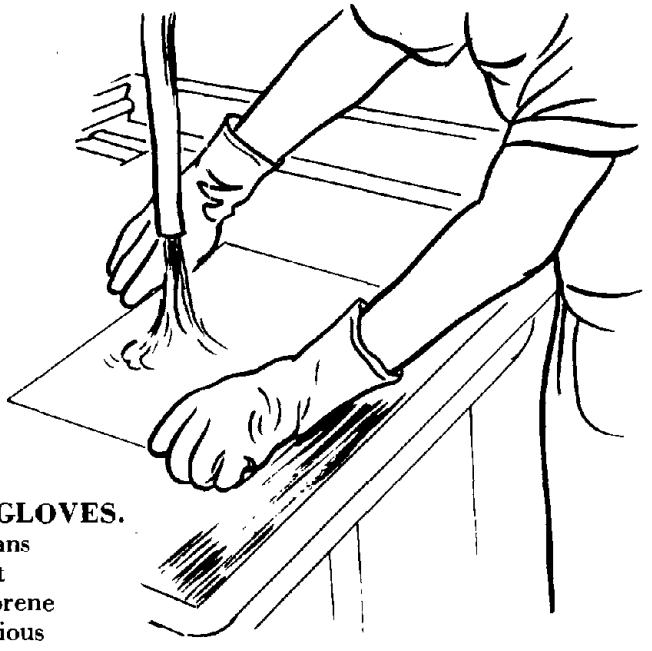
- do not touch the face or eyes with gloves on

- remove clothing that has been wet with more than a slight amount of chemicals and put on clean clothes (your employer should have spares on hand)

- if you are heavily splashed or drenched, go immediately to an emergency shower, remove clothing while under the shower with the water running, and wash thoroughly

CAUTION:

If deep-etch, bimetal, or trimetal plate sensitizing solutions are spilled on clothing, the garments should be washed separately from household laundry items. These solutions contain ammonium bichromate (also called ammonium **di**chromate), a potent skin sensitizer that can cause an allergic reaction. Washing such clothing with others may contaminate them, and other family members could develop the allergy.

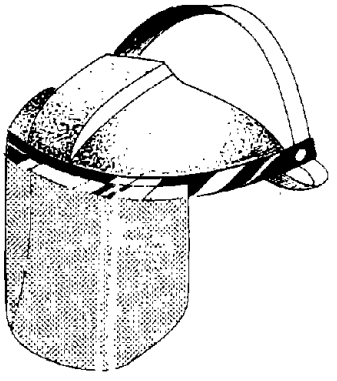


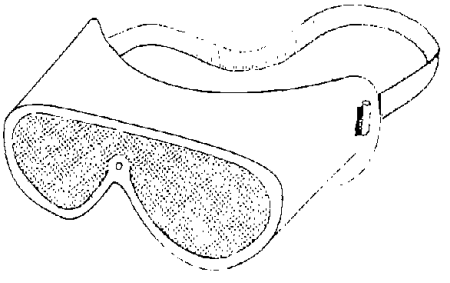
IMPERVIOUS GLOVES. "Impervious" means the chemical can't get through. Neoprene gloves are impervious to nearly all plate-making chemicals.

Several platemaking chemicals can harm the eyes.

- eye protection is important in preventing injuries caused by strong acids, caustics, and by any product used in platemaking whose safety you don't know
- contact lenses should not be worn when handling litho chemicals—splashed chemicals tend to seep under the lens and get trapped
- regular glasses or safety glasses do not fully protect the eyes against chemical splashes
- chemical splash goggles or a face shield are the best forms of eye protection

FACE SHIELD: Needed where chemicals (like strong acids) could harm both skin and eyes.





CHEMICAL SPLASH GOGGLES. Safety glasses do not adequately protect the eyes against chemical splashes. Contact lenses offer no protection at all. In fact, a chemical splashed in the eyes will tend to seep under a contact doing serious damage to the eye.

. . . more on eye protection from platemaking chemicals . . .

- if a chemical does get in your eyes: (1) stop work, and (2) immediately flush the eyes for 15 minutes at an eyewash fountain or other source of clean running water; (3) then get first-aid if it is available at your workplace—if you think your eyes are not entirely OK, or if the first-aid person or your supervisor suggests it, see a doctor immediately; (4) if a person trained in first-aid is not available, get someone to take you to a hospital emergency room of doctor's office (only **after** eyes have been flushed)

- when making up dilute acids from concentrated stock solutions, always add acid to water (adding water to acid can cause acid to generate intense heat, resulting in vigorous splattering, regardless of how slowly you pour)—so never add water to concentrated acid

  This acid-to-water rule doesn't apply to water added to storage batteries to bring up the electrolyte level, since the battery acid isn't strong enough to cause heat-based **splattering** (but it can still **splash** out of the cells if you don't pour slowly).

EMERGENCY EYEWASH FOUNTAIN.

Chemicals splashed in the eyes may cause permanent injury if not removed FAST.

Don't wait to finish the job when an eye splash occurs. Use an eye wash fountain or other source of clean running water IMMEDIATELY, and keep using it for 15 minutes.

Swallowing platemaking chemicals is easy to avoid . . .

- store (and use) food, beverages, cigarettes, tobacco, and candy outside the areas where platemaking and other press chemicals are used or stored (and wash up before eating or smoking)

- never use food or beverage containers for storing chemicals—someone else may wind up poisoned

Handling carboys requires special care . . .

- when moving carboys (large bottles) of corrosive chemicals, use a carboy truck

- where possible, use a suction pump to remove solution from a carboy rather than tilting the carboy to pour from it

- if pouring from a carboy is necessary, be sure to use a tilting cradle

- never start a siphon by sucking on a hose

Keeping chemical vapors out of the air you breathe is important.

- some chemicals are more likely to present vapor hazards than others

- since the exact identity of the chemicals used in some platemaking solutions does not appear on the label, and specific health hazards often aren't mentioned (and may not even be known), all platemaking solutions should be treated as possible hazards

- this means not working in confined areas without mechanical exhaust ventilation and a supply of clean makeup air

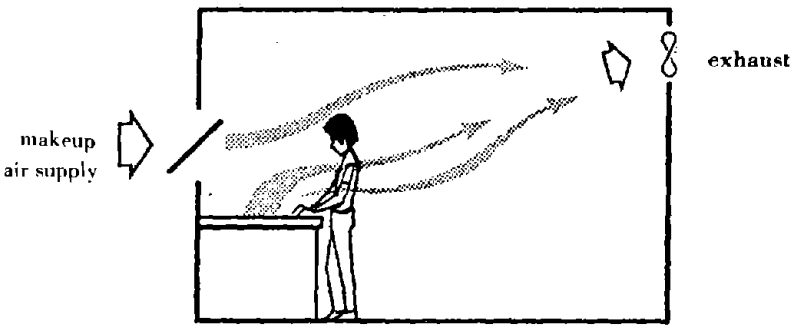
- it also means keeping the chemical solution between you and the exhaust hood or slots—this way the fan won't pull vapors through your breathing zone

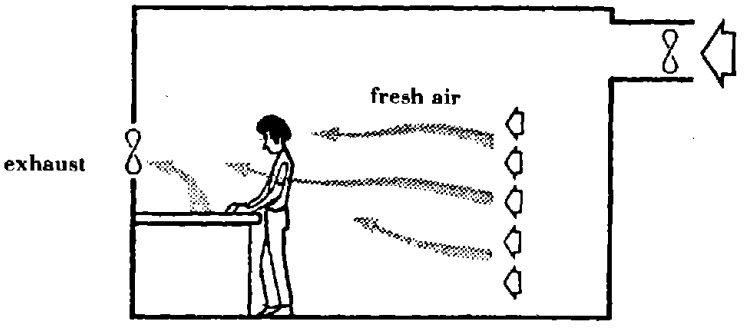
- to further avoid breathing the vapors of platemaking chemicals, avoid using floor stand or table fans near exhaust hoods or slots—these fans will interfere with the capturing of vapors by the exhaust

- also: never sniff a chemical container to decide what it contains

POOR POSITIONING OF THE WORK.

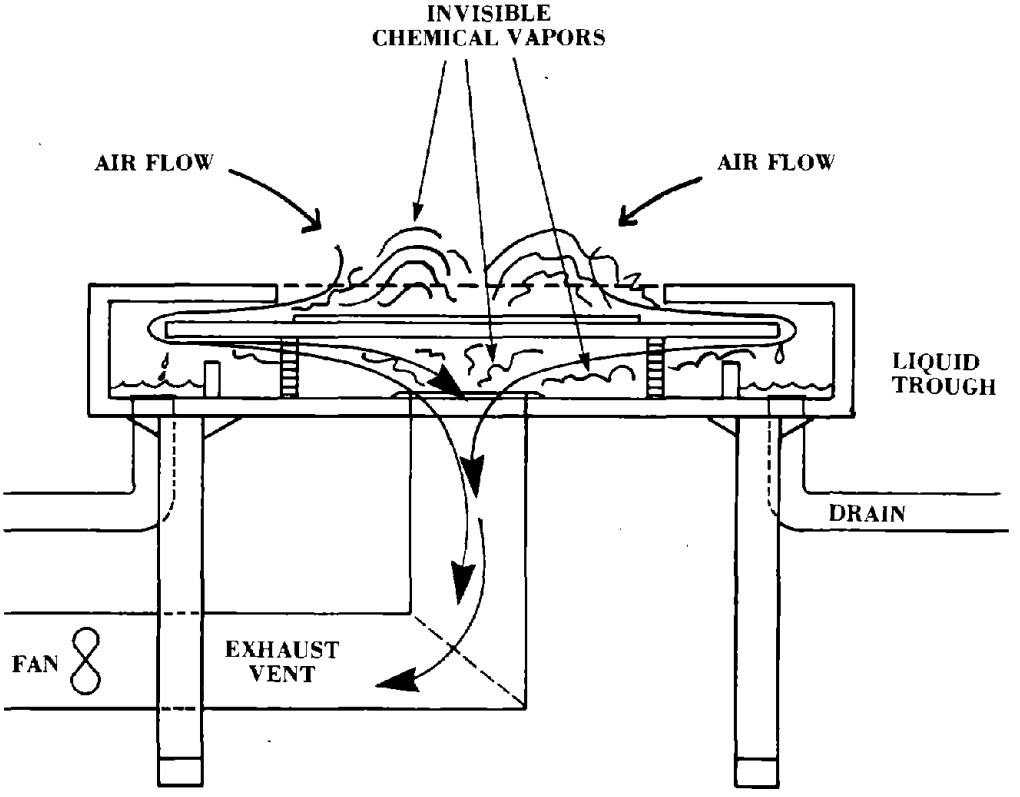
When you work in **between** the vapor source and the exhaust intake, the vapors are drawn through your breathing zone.





GOOD POSITIONING OF THE WORK.

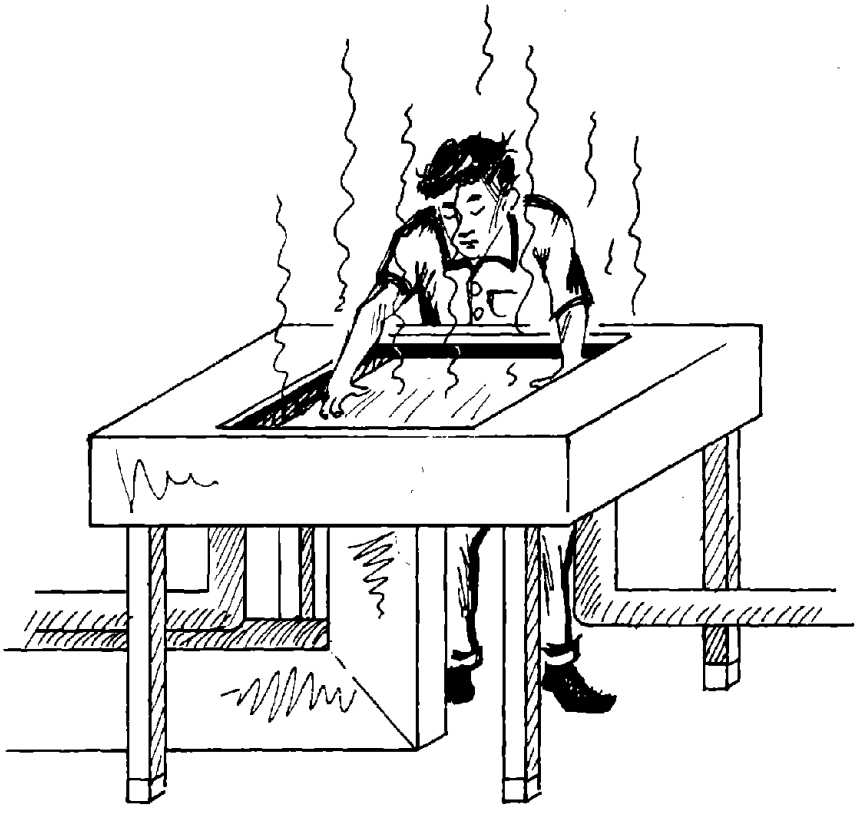
Working **"upwind"** of the vapor source means that vapors won't enter your breathing zone.



DOWNDRAFT TABLE.

A downdraft table can be used in plate preparation to scavenge vapors in order to keep them out of your breathing zone.

Downdraft tables for liquids often have a liquid trough to catch runoff (illustrated). When dry pigments are handled (such as toner pigments for proofing), or fast-evaporating solvents are used, downdraft tables with only air exhaust (no liquid trough) are usually adequate.



MALFUNCTIONING DOWNDRAFT TABLE.

If your work table air exhaust isn't working, or only draws weakly, you may wind up breathing dangerous vapors from platemaking chemicals.

C. INK AND OIL MISTS

Some ink and oil mist drops are small enough to be breathed into the lungs. Larger ones are trapped in the breathing passageways.

- tiny drops of ink are thrown into the air (forming a mist) wherever contact between an inked cylinder or roller and another object is broken—such as between ink rollers, oscillators, blankets, plates, and printed materials

- ink mist contains whatever the ink does—pigments, plasticizers, oxidation accelerators, polymers, resins, solvents, etc.

- note that all litho printing operations produce some ink mist

- ink mist health effects are not fully understood, but good preventive medicine requires that breathing of these mists be minimized

- control of ink mists can be achieved by enclosing the ink rollers as much as practical, by using specially formulated inks, and by local exhaust ventilation

- ink mist eliminators are electrostatic devices that charge the ink mist so that it gets attracted back to oppositely charged ink rollers—this control is used primarily where relatively large amounts of ink mist are produced, such as in newspaper printing

- note: lubricating oils can also form mists, typically at gear train mesh points. These mists are thought to be effectively contained when the gear train is enclosed. When the gear trains are exposed (while running), oil mist may be breathed. Health effects, if any, of breathing lubricating oil mist over a period of years are not known. This note is included to make it clear that the particular hazards presented by oil mists in other industries (examples: **cutting oil** mists in machine shops, **mineral oil** mists in newspaper pressrooms) are **not** now associated with exposure to **lubricating oil** mist in litho operations.

CAUTION:

The ink pigments LEAD CHROMATE (chrome yellow) and MOLYBDATE ORANGE may present a lung cancer hazard. Exposure to these pigments can occur by breathing the dry form of the pigment or by breathing ink mists containing them.

Note, however, that most pigments are wet when formulated and are mixed in a closed device—making exposure in these processes unlikely.

Studies performed on the death certificates of workers involved in **manufacturing** lead chromate suggest that it is a cause of higher lung cancer rates. However, these workers were likely exposed to considerably more of the chemical (as dry material) than pressroom workers would be (as ink mist). How much exposure is "just enough" is not known for **any** cancer-causing chemical found in the workplace.

The preferred solution, until the health effects of these pigments (and any other pigments that appear to cause disease) are determined, is for your employer to prevent exposure by substituting known nonhazardous pigments.

In an attempt to determine whether long-term (chronic) disease hazards (including cancer) exist for pigments or other substances used in the printing industry, NIOSH began an intensive study of the problem in 1976. Findings are expected in 1978. If this study or others determines that particular substances present long-term health hazards to litho workers, NIOSH will issue appropriate warnings, notify OSHA, and revise this guide accordingly.

The Occupational Safety and Health Act of 1970 directs that the Secretary of Health, Education, and Welfare ". . . shall determine, following a written request by any employer or authorized representative of employees, . . . whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found . . . ." In the case of suspected carcinogenic substances, a Health Hazard Evaluation request will provide the mechanism whereby NIOSH will assist in determining the safety of a substance in a specific workplace environment.

D. GASES AND FUMES

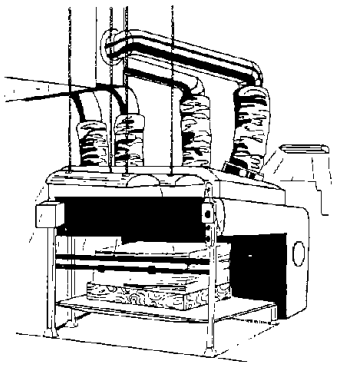
Gases and fumes can be harmful if breathed.

- gases, which are usually invisible, pass from the lungs into the blood

- **ozone** is a gas with a strong bleach-like odor produced by carbon-arc lamps (they are still occasionally found in tilt-top vacuum frames, step-and-repeat composers, or other equipment)—it is also produced by "ozone lights" on anti-setoff spray devices, by some anti-static devices, and by UV-ink curing units (especially at startup)

- ozone in low concentrations can cause these problems: mouth dryness, chest pain, throat irritation, coughing, headaches, altered smelling and thinking, and drowsiness

- ozone is especially hazardous to people with heart or lung ailments—it can make these problems worse



COLLECTING OZONE AND ANTI-SETOFF DUST.
Ozone and anti-setoff dust overspray can be collected at the delivery end of the press by local exhaust ventilation.

. . . more gas and fume hazards . . .

- **carbon monoxide,** a colorless-odorless-tasteless gas, can give you a headache and nausea, make you dizzy and uncoordinated, even (in high concentrations) kill by interfering with the ability of the blood to carry oxygen

- carbon monoxide is produced in litho plants primarily by tunnel driers on webs and by fuel-burning industrial trucks (while they are operating)—note that even idling trucks produce plenty of carbon monoxide

- tunnel driers can also produce ink breakdown products—gases which are formed when certain ink components, such as solvents, are heated; these gases can be dangerous if inhaled

- besides producing some carbon monoxide and oxides of nitrogen, carbon-arc lamps also produce a copper fume as the carbon-clad electrodes burn down—breathing copper fume can result in metal fume fever (fever and muscle aches) and can lead to possible kidney damage

The quantity of gases and fumes produced in most litho plants is NOT great enough to require use of a respirator as long as proper ventilation is provided.

However, persons handling solvents or solvent-soaked rags, or working with solvent-base coatings, may need a respirator to protect against exposure to solvent vapors (see pages 30–1).

- tunnel driers must have local exhaust ventilation that prevents smoke and gases from escaping into the room—and the ventilation system must be kept in good working order

- devices using carbon-arc lamps must have local exhaust ventilation to remove gases, copper fume, and carbon dust

- measurements of gases and fumes around carbon-arc devices, tunnel driers, anti-setoff sprayers, and anti-static devices should be made by your employer on a regular basis (and when problems develop or changes in the equipment are made)

- ventilation should never pull the gases or fumes through the breathing area of any worker

- industrial lift trucks powered by gasoline, diesel oil, or LP gas should not be allowed to idle on a closed loading dock or in a similar confined area

NOISE

Excessive noise:

can lead to permanent damage to hearing ability...

may have other health effects not yet well understood...

is an obvious safety hazard.

- the best method for protecting against too much noise is to control it at the source

- source controls include baffles, sound-absorbing materials, and equipment designed to run quiet

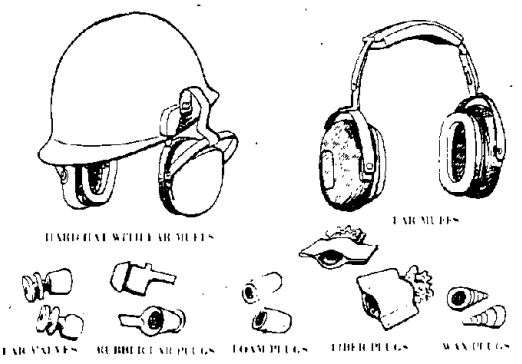
- equipment controls and monitors can be placed in a less noisy area, such as an enclosed cab (example: enclosing the console on a modern web press)

- when source controls don't reduce the noise enough, or where they aren't possible, your employer must still protect your hearing

  this may be done by limiting how long you spend in the noisy area, by providing you with a personal hearing protection device, or both

AUDIOMETRIC TEST. The subject, in a sound-proof booth, signals the technician when he hears tones at the frequencies tested.

HEARING PROTECTION DEVICES.



Personal hearing protective devices may have to be used to reduce noise to a level that doesn't harm your hearing.

- hearing protection devices include ear cups or muffs, many sizes and shapes of rigid ear plugs, and moldable inserts that can be shaped to fit the ear (cups or muffs reduce noise best)

- fit is important to getting a good seal—without a good seal you are not protected

- cotton wads and most other improvised hearing protectors offer little or no protection

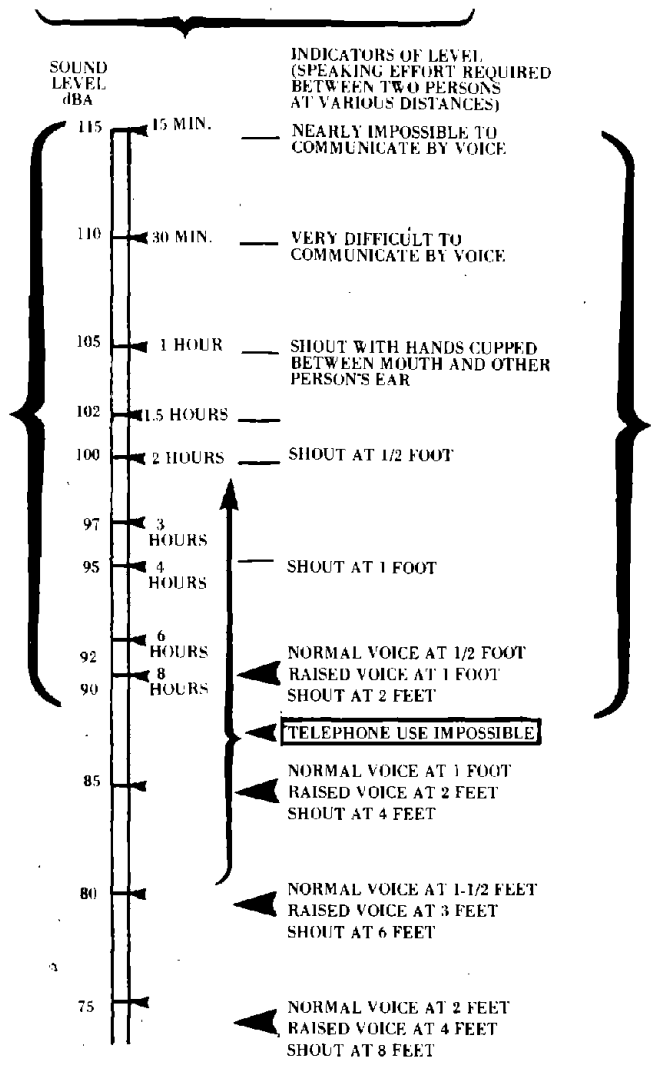
- note that the only way of telling whether the noise level is too high, and of determining which hearing protectors are adequate (if personal hearing protection is necessary), is to measure the noise

- if you are required to use a hearing protection device because of excessive noise, your employer must provide an annual hearing test

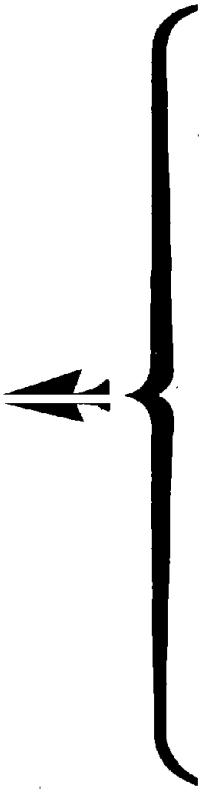
- if you suspect that noise is excessive, or that the employer's hearing conservation program is inadequate, you have the right to request an OSHA inspection (see pages **65-69**)

NOISE REGULATIONS.

Sound levels are measured in units called decibels (dbA). Under the existing regulations, the allowable length of exposure (in hours) halves with every increase of 5 decibels. For example, working in a noise level of 100 dbA is allowed for half as long as at a 95 dbA level, one fourth as long as at a 90 dbA level.



*Note that a mix of noise exposures, such as 1/2 hour at 105 dbA plus 1 hour at 100 dbA would also satisfy the OSHA noise regulations.



If the average noise level of your work area falls in this range, your employer must provide engineering controls to reduce the noise, or administrative controls to limit the time spent in noisy areas, or a combination of both. If these measures don't reduce the noise to 90 dbA or less, the employer must provide personal hearing tests. After the time per workday allowed at 90 dbA or greater has expired, the noise level during the rest of your workday must average less than 90 dbA. If it averages higher than 90 dbA, your employer must provide you with a properly fitted personal hearing protection device.

LIGHT HAZARDS

Some invisible forms of light that are produced in litho work can harm the eyes and skin.

- ultraviolet (UV) light is produced by:
  - * carbon-arc lamps, pulsed xenon lamps, and by mercury vapor lamps—found in platemaking, process camera, and color proofing operations
  - * UV-ink curing units
  - * "ozone lights" used on anti-setoff devices
- some UV sources look purple, but the harmful part, which is mixed in with the visible, can't be seen
- UV light burns the eyes and skin—the eyes are especially sensitive
- note that both direct and reflected UV light can do damage—you don't necessarily have to look directly at the source to be exposed
- infrared (IR) light can also cause eye & skin burns
- IR light is produced by IR-ink drying (curing) devices

Enclosing the light source or protecting the eyes is necessary.	- special goggles are available which protect the eyes against IR and UV light - IR & UV sources should be operated in enclosed or partly enclosed devices to cut down stray light - areas where IR & UV sources are used may require special screens or curtains to protect workers passing the area or working nearby from eye damage (also to protect workers in the area if they don't wear UV/IR eye protection) - these areas should have a poster at each entrance warning of the eye hazards of UV and IR light, and explaining the necessary precautions

PLANT MAINTENANCE AND CUSTODIAL OPERATIONS

Plant maintenance and custodial workers, at one time or another, may face any of the hazards discussed in this guide.

- before doing plant maintenance or special cleanup work, find out whether any personal protective equipment is required

- even if such equipment isn't **normally** required, you may still need it if normal hazard controls aren't working or can't be used

- to prevent skin irritation, and breathing the vapors of chemicals spilled or splashed on clothes, you may need to change clothes more than once a day—your employer should have spares

- thoroughly read every section of this guide that applies to areas you work with or operations you perform

IDENTIFYING & REMEDYING HEALTH AND SAFETY HAZARDS

The Occupational Safety and Health Act of 1970 requires all employers to provide a safe and healthful workplace. Government regulations under this law are specific as to what machine guarding is required, what amounts of chemicals are allowed in workplace air, what noise levels are acceptable, where emergency showers and eye washes are required, etc.

The law also gives workers or employers the right to request a Health Hazard Evaluation of their workplace from the National Institute for Occupational Safety and Health (NIOSH), an agency of the federal government. These evaluations are free. Many requests result in an in-plant survey of health hazards by NIOSH personnel. Both the employees and employer are given the results of the survey.

Another right under the Act is to request an inspection for one or more suspected hazards by the Occupational Safety and Health Administration (OSHA), or the state equivalent where the state has one. OSHA inspectors can require the employer to take steps to comply with federal standards if these aren't being met. An OSHA inspection can be requested either by workers or employers. Results are given to the employer and must be posted in the workplace.

Although the law doesn't require that workers discuss health or safety hazards with their employers first, most employers would prefer being told of a problem or suspected problem by an employee rather than by an OSHA inspector. However, Congress realized that workplace hazards are not always obvious to the worker or the employer, and that in some situations employees might prefer anonymity. For these reasons, federal law:

1. allows direct complaint from the worker or employee representative to OSHA

2. allows persons contacting OSHA to remain anonymous if they so desire

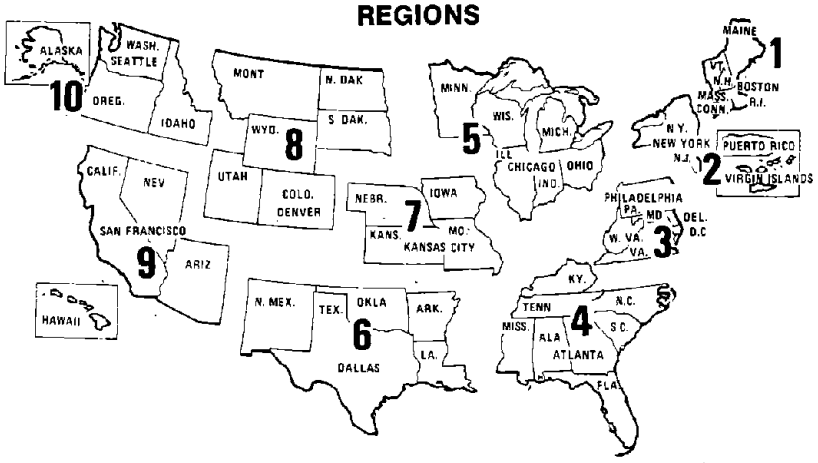
3. prohibits retaliation by the employer

As a result, it is left up to the worker to decide who to approach when a safety or health problem is discovered or suspected.

Note that it can be valuable to discuss close calls that **didn't** turn into accidents with your supervisor.

NIOSH REGIONAL OFFICES

REGIONS



NIOSH REGIONAL OFFICES

DHEW, Region I
Government Center
(JFK Fed. Bldg.)
Boston, Massachusetts 02203
Tel.: 617/223-6668/9

DHEW, Region II
26 Federal Plaza
New York, New York 10007
Tel.: 212/264-2485/8

DHEW, Region III
3525 Market Street,
P.O. Box 13716
Philadelphia, Pennsylvania 19101
Tel.: 215/596-6716

DHEW, Region IV
50 Seventh Street, N.E.
Atlanta, Georgia 30323
Tel.: 404/881-4474

DHEW, Region V
300 South Wacker Drive
Chicago, Illinois 60607
Tel.: 312/886-3881

DHEW, Region VI
1200 Main Tower Building
Room 1700-A
Dallas, Texas 75245
Tel.: 214/655-3081

DHEW, Region VII
601 East 12th Street
Kansas City, Missouri 64106
Tel.: 816/374-5332

DHEW, Region VIII
19th & Stout Streets
9017 Federal Building
Denver, Colorado 80202
Tel.: 303/837-3979

DHEW, Region IX
50 Fulton Street (223 FOB)
San Francisco, California 94102
Tel.: 415/556-3781

DHEW, Region X
1321 Second Avenue
(Arcade Bldg.)
Seattle, Washington 98101
Tel.: 206/442-0530

OSHA REGIONAL AND AREA OFFICES

REGION I (see map on page 64)

U.S. Department of Labor
Occupational Safety and Health Administration
JFK Building, Room 1804
Boston, Massachusetts 02203..... 617/223-6712

Area Offices

Boston, MA	617/894-2400	Hartford, CT	203/244-2294
Springfield, MA	413/781-2420	Providence, RI	401/528-4466
Concord, NH	603/224-1995		

REGION II (see map on page 64)

U.S. Department of Labor
Occupational Safety and Health Administration
1515 Broadway (1 Astor Plaza), Room 3445
New York, New York 10036..... 212/399-5941

Area Offices

Manhattan, NY	212/264-9840	Buffalo, NY	716/842-3333
Brooklyn, NY	212/330-7667	Newark, NJ	201/645-5930
White Plains, NY	914/761-4250	Belle Mead, NJ	201/359-2777
Long Island, NY	516/294-0400	Camden, NJ	609/757-5181
Queens, NY	212/445-5005	Dover, NJ	201/361-4050
Albany, NY	518/472-6085	Hasbrouck Hts., NJ	201/288-1700
Rochester, NY	716/263-6755	San Juan, PR	809/753-4457
Syracuse, NY	315/473-2700		

REGION III (see map on page 64)

U.S. Department of Labor
Occupational Safety and Health Administration
15220 Gateway Center, 3535 Market Street
Philadelphia, Pennsylvania 19104 . . . 215/596-1202

Area Offices

Philadelphia, PA	215/597-4955	Wheeling, WV	304/232-8044
Pittsburgh, PA	412/644-2905	Elkins, WV	304/636-6224
Johnstown, PA	814/535-3504	Charleston, WV	304/343-6181
Meadville, PA	814/724-8031	Richmond, VA	804/782-2864
Allentown, PA	215/434-0181	Falls Church, VA	703/557-1330
Harrisburg, PA	717/657-0100	Roanoke, VA	703/982-6342
Lancaster, PA	717/394-0681	Norfolk, VA	804/441-8381
State College, PA	814/234-6695	Washington, DC	202/523-5224
Wilkes-Barre, PA	717/825-6811	Baltimore, MD	301/962-2840
Wilmington, DE	302/571-6115		

REGION IV (see map on page 64)

U.S. Department of Labor
Occupational Safety and Health Administration
1375 Peachtree Street, N.E., Suite 587
Atlanta, Georgia 30309. . . . . 404/881-3575

Area Offices

Atlanta, GA	404/939-8987	Jackson, MS	601/969-4606
Macon, GA	912/746-5143	Pensacola, FL	904/438-2543
Savannah, GA	912/354-0733	Tampa, FL	813/228-2821
Louisville, KY	502/582-6111	Ft. Lauderdale, FL	305/566-6547
Anniston, AL	205/237-4212	Jacksonville, FL	904/791-2895
Mobile, AL	205/690-2131	Tallahassee, FL	904/877-3215
Montgomery, AL	205/832-7159	Raleigh, NC	919/755-4770
Huntsville, AL	205/895-5268	Columbia, SC	803/765-5904
Birmingham, AL	205/822-7100	Charleston, SC	803/577-2423
Sheffield/		Nashville, TN	615/749-5313
Florence, AL	205/383-0010	Memphis, TN	901/534-4179

REGION V (see map on page 64)

U.S. Department of Labor
Occupational Safety and Health Administration
230 S. Dearborn, 32nd Floor
Chicago, Illinois 60604 ..... 312/353-4716

Area Office

Calumet City, IL	312/891-3800	Wausau, WI	715/842-8004
Niles, IL	312/631-8535	Milwaukee, WI	414/224-3315
Aurora, IL	312/896-8700	Madison, WI	608/252-5388
Peoria, IL	306/673-9515	Appleton, WI	414/231-1406
Belleville, IL	618/277-5300	Eau Claire, WI	715/832-9019
Cincinnati, OH	513/684-2354	Detroit, MI	313/226-6720
Cleveland, OH	216/522-3818	Indianapolis, IN	317/269-7290
Columbus, OH	614/469-5582	Minneapolis, MN	612/725-2571
Toledo, OH	419/259-7542		

REGION VI (see map on page 64)

U.S. Department of Labor
Occupational Safety and Health Administration
555 Griffin Square Building, Room 602
Dallas, Texas 75202 ..... 214/749-2477

Area Offices

Dallas/Ft. Worth, TX	214/749-7555	El Paso, TX	914/543-7828
Tyler, TX	214/595-1404	Albuquerque, NM	505/766-3411
Austin, TX	512/397-5783	Little Rock, AR	501/378-6291
San Antonio, TX	512/225-4569	Oklahoma City, OK	405/231-5351
Beaumont, TX	713/838-0271	Tulsa, OK	918/589-2451
Lubbock, TX	806/762-7681	Baton Rouge, LA	504/387-0181
Harlingen, TX	512/425-6811	Shreveport, LA	318/226-5360
Corpus Christi, TX	512/888-3257	New Orleans, LA	504/589-2451
Houston, TX	713/226-5431		

REGION VII (see map on page 64)

U.S. Department of Labor
Occupational Safety and Health Administration
Federal Building, Room 3000, 911 Walnut Street
Kansas City, Missouri 64106..... 816/374-5861

Area Offices

Kansas City, MO	816/374-2756
St. Louis, MO	314/425-5461
Des Moines, IA	515/284-4794
North Platte, NE	308/534-9450
Omaha, NE	402/221-9341
Wichita, KA	316/267-6311

REGION VIII (see map on page 64)

U.S. Department of Labor
Occupational Safety and Health Administration
Federal Building, Room 15010, 1961 Stout Street
Denver, Colorado 80202..... 303/837-3883

Area Offices

Lakewood, CO	303/234-4471
Salt Lake City, UT	801/524-5080
Billings, MT	406/245-6711
Bismarck, ND	701/255-4011
Sioux Falls, SD	605/336-2980

REGION IX (see map on page 64)

U.S. Department of Labor
Occupational Safety and Health Administration
9470 Federal Building, 450 Golden Gate Avenue
Post Office Box 36017
San Francisco, California 94102..... 415/556-0586

Area Offices

San Francisco, CA	415/556-7260
Fresno, CA	209/487-5454
Sacramento, CA	916/484-4363
Long Beach, CA	213/432-3434
Carson City, NV	702/883-1226
Las Vegas, NV	702/385-6570
Honolulu, HI	808/546-3157
Phoenix, AZ	602/261-4858
Tucson, AZ	602/792-6286

REGION X (see map on page 64)

U.S. Department of Labor
Occupational Safety and Health Administration
6048 Federal Office Building, 909 First Avenue
Seattle, Washington 98174..... 206/442-5930

Area Offices

Bellevue, WA	206/442-7520
Spokane, WA	509/624-5235
Portland, OR	503/221-2251
Boise, ID	208/342-2711
Pocatello, ID	208/233-6374
Anchorage, AL	907/265-5341

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