SHAKEOUT, CLEANING, GRINDING, AND INSPECTION DEPARTMENT HEALTH HAZARDS IN A FOUNDRY

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SO YOU WORK in a FOUNDRY

Then this book should be of interest and a help to you. It discusses the general health hazards which occur most frequently in foundries. It tells about the hazards in:

- the Shakeout Department
- the Cleaning and Grinding Department
- the Inspection Department

that may harm your health if you don't know what they are, and how to watch out for them.

The first section will tell you about the health hazards you might find in particular areas of any foundry. These hazards are listed in the order of importance. Next, each of these health hazards is described and identified so that you could spot them, if they exist, in your work area. Information is provided about how exposures can be reduced. The third section describes what you can do to help—by using good work practices and keeping track of your health with medical check-ups. Finally, a list of "do's" and "don'ts" is presented to help you review.

Because operations vary, not all hazards that may be present in your particular foundry are discussed. If, after reading this book, you have questions about the hazards you are exposed to, ask your foreman, supervisor, or union representative to explain them to you.

INTRODUCTION

Businessmen, unions, people in government, and workers in industry are working together to become aware of possible health hazards on the job so that the hazards can be eliminated.

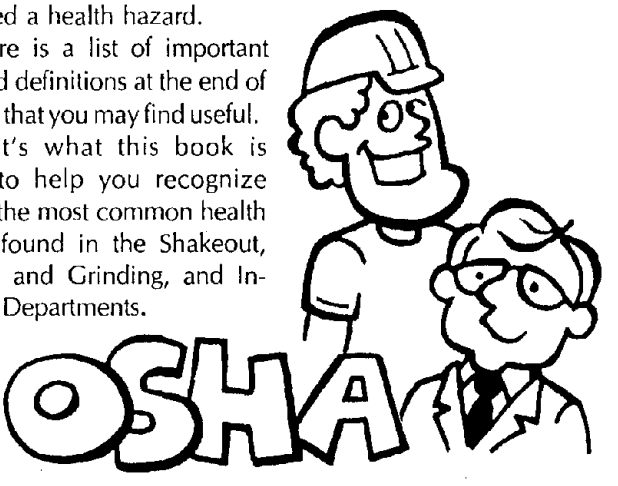
Under the Occupational Safety and Health Act (OSHA), it is management's responsibility to provide healthful working conditions, but you should help management to meet this responsibility. It's *your* responsibility to follow proper procedures and to wear protective equipment where it's required. Because you work in the area where hazards may exist, you are in a better position to spot health hazards and to report them to your supervisor or foreman.

What can you do, as a foundry worker, to identify health problems where you work?

1. Know what health problems may be found in your area.
2. Know how to spot the health hazards.
3. Know the right action to take when you think you have spotted a health hazard.

There is a list of important terms and definitions at the end of this book that you may find useful.

That's what this book is about—to help you recognize some of the most common health hazards found in the Shakeout, Cleaning and Grinding, and Inspection Departments.



WHAT ARE THE HEALTH HAZARDS—
in the Shakeout Department

HAZARD	SOURCE	SEE PAGE
Dust Silica Dust Asbestos Metal Dusts	Shakeout-from foundry sand, core sand Riser sleeves Castings	8
Fumes Metal fumes Iron Copper Lead Chromium Manganese	Castings	11
Noise	Shakeout	13
Gases & Vapors Carbon Monoxide Formaldehyde Phenol Ammonia TDI	Shakeout-from decomposition products of sand binders	16

in the Cleaning and Grinding Departments

HAZARD	SOURCE	SEE PAGE
Dusts Silica dust Metal dusts Nuisance Dusts	Chipping, rough grinding, core knockout tumbling, sand and shot blasting, sprue cutting, swing grinding, and finish grinding	8
Fumes Iron oxide Copper Lead oxide Zinc oxide Manganese	Oxyacetylene, powder arc, carbon torch burning of gases and risers	11
Noise	Chipping, all forms of grinding, core knocking, cut off saws, torch cutting, washing, tumbling, and blast cleaning	13
Gases and Vapors Carbon monoxide Ozone Formaldehyde Phenol Ammonia	Torch cutting, powder arc burning, also from certain gases and vapors drifting over into your area.	16

in the Inspection Department

HAZARD	SOURCE	SEE PAGE
Solvents Mineral Spirits	Penetrant inspection Magnafluxing	17
Ionizing Radiation X-Rays	X-Ray inspection	18
Non-Ionizing Radiation Ultraviolet light	Penetrant inspection	19

HOW TO SPOT POTENTIAL HEALTH HAZARDS IN YOUR AREA

This part of the book is designed to help you identify health hazards that occur most frequently in your work area.

Dust Hazards

Foundry sand usually contains silica. If you breathe too much silica dust, you may develop a lung disease known as silicosis. The silica dust particles that cause this disease are so small that you can't see them. The only way to be sure that there isn't a high concentration of silica in the air is by having an industrial hygienist take air samples, and evaluate your work area. So, if you see a lot of airborne dust in your area, ask if it's been checked.

The symptoms of silicosis are not easily recognized. This kind of disease usually takes from 5 to 20 years of overexposure to develop, although extreme overexposure has produced symptoms after one year.

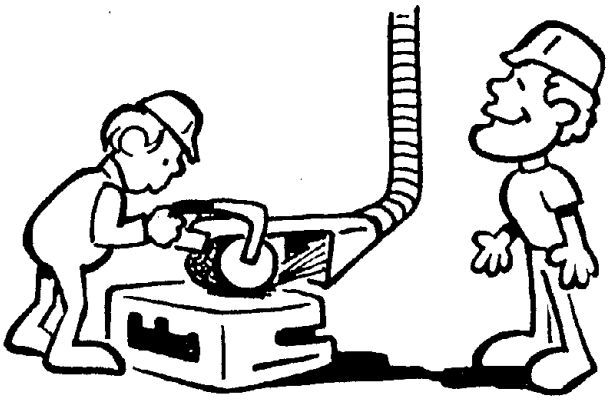
If you work in the Shakeout and Finishing areas of the foundry, or if you think you have been overexposed to silica dust, you should have a thorough examination by a doctor. The examination should include a chest x-ray and breathing tests. If you have silicosis, continued exposure to the dust will make it worse.

Foundry workers who handle castings with adhered sand usually have the largest exposure to dust containing silica. These include the shakeout, core knockout, and chipping operators. Workers at the following operations may also have high silica dust exposures:

ROUGH GRINDING—on castings with adhered sand.

SPRUE CUTTING—(cut-off wheels) if the casting hasn't been through the tumbler or shot blaster to remove adhered sand.

ABRASIVE BLASTING—especially sand blasting operators.



Controls:

1. Use of local exhaust ventilation at shakeout, core knockout, sprue cutting, rough grinding, abrasive blasting, and finish grinding.
2. The use of NIOSH approved mechanical filter respirators for protection against pneumoconiosis producing dusts. These are to be used only for short duration exposures to high concentrations of silica dust.

WATCH OUT—Silica dust can also be generated from accessory equipment such as overhead conveyors, return sand conveyors under the shakeout, leaking exhaust ducts, and storage bins.

The clues that there may be too much silica in the air are:

1. Using grinders, cut-off wheels, sand blasters, and shakeout operations without local exhaust ventilation.
2. Working with castings that have a large amount of adhered burnt sand.
3. Large amounts of black dust caught in your nose.
4. Dust leaking from elevator enclosures.
5. Buildup of settled dust on window sills, rafters, and machinery.
6. Puffs of dust at conveyor drop points.
7. Floor fans blowing dust into your face or away from the ventilation system.
8. Dust escaping the effect of the ventilation system.

Asbestos

Asbestos may be used in the Molding Department as a riser sleeve in the finished mold. You may be exposed to asbestos fibers if you are a shakeout operator.

Prolonged repeated exposure to asbestos can cause serious lung disorders. Generally, you are exposed for a short time and to low levels of asbestos fibers.

Controls

1. Use of local exhaust ventilation at shakeout.
2. Use of NIOSH or MESA approved respirators for protection against asbestos fibers.

Metal Dusts and Fumes

Iron oxide fume generated at burning operations is the main metal fume exposure in ferrous foundries. Breathing this fume for a long time can cause a nondisabling lung condition called siderosis.

Lead dust is a major problem in brass foundries. It can enter your body through breathing or swallowing it, and it can affect the blood and nervous system. Some of the symptoms of lead poisoning are:

Metallic taste in mouth
Loss of appetite
Indigestion
Nausea
Nervousness
Insomnia

Copper dust is generated in brass and bronze foundries, especially at grinding and cut-off operations. You may notice a sweet taste in your mouth as the first symptom of overexposure.

Exposure to copper fumes, zinc oxide, and magnesium oxide fumes can cause metal fume fever. Metal fume fever generally lasts less than a day. Its symptoms are chills, fever, nausea, vomiting, headache, weakness, and tiredness, but there are no permanent effects. It may occur when you return to work after having been away from your job for a few days.

Nuisance dusts such as abrasive dust and iron dust given off from grinding grey iron castings cause eye and nose irritation, and are also a safety problem since large amounts in the air can reduce visibility. Large quantities of abrasive dusts in the lungs can mask serious disorders during your regular chest x-ray examination, but abrasive dusts generally do not cause serious health problems.

Alloys in the castings may be given off as fumes at burning operations, or as dusts at other cleaning operations. There are many different metals used as alloys, and each may have a particular effect on your body. To be sure that you don't have an overexposure to metal dusts or fumes, an industrial hygienist should take air samples in your work area.

The clues that there may be too much metal dust or fume in the air are:

1. visible haze in the air that gets worse as the shift goes on.
2. metal fume fever symptoms.
3. large amounts of dust settled on the grinding and cut-off tables, not collected by the ventilation system.
4. burning or powder washing without local exhaust ventilation.
5. grinding, gate and riser cutting, tumbling, and blasting operations with no local exhaust ventilation.
6. manual grinding of small parts without the use of a downdraft ventilation table.

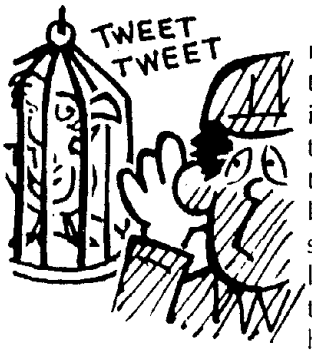
Controls

1. Use of local exhaust ventilation at shakeout, burning, grinding, abrasive blasting, riser cutting, and core knockout.
2. Use of NIOSH or MESA approved respirators for short duration exposures to high concentrations of metal dusts and fumes.

Noise and Vibration Hazards

Noise may become a problem if:

YOU CAN'T HEAR YOUR BUDDY TALKING IN A NORMAL VOICE AT ARM'S LENGTH.



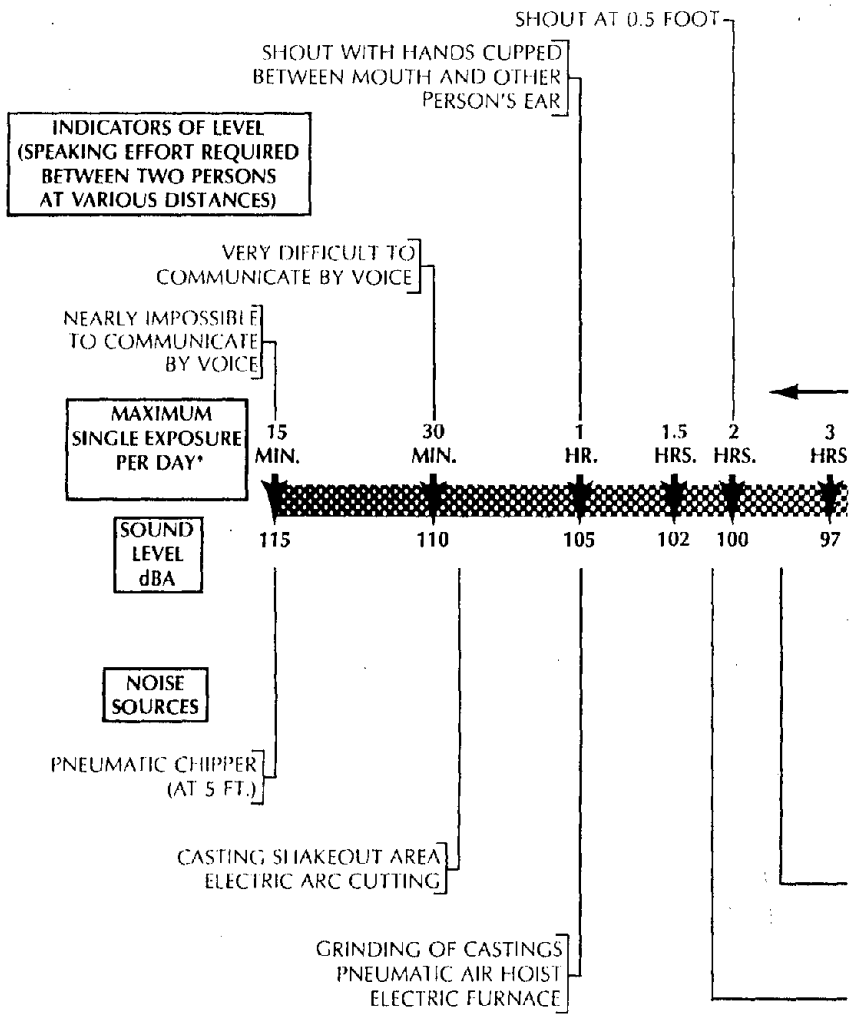
Too much noise (noise is measured in decibels—dß) over too long a time will cause a hearing loss. One sign of exposure to too much noise is you are not able to hear as well for a few hours after leaving your work area. Another sign is that people have to talk louder to you and you aren't able to understand every sound you hear!!

The operations which may generate too much noise are:

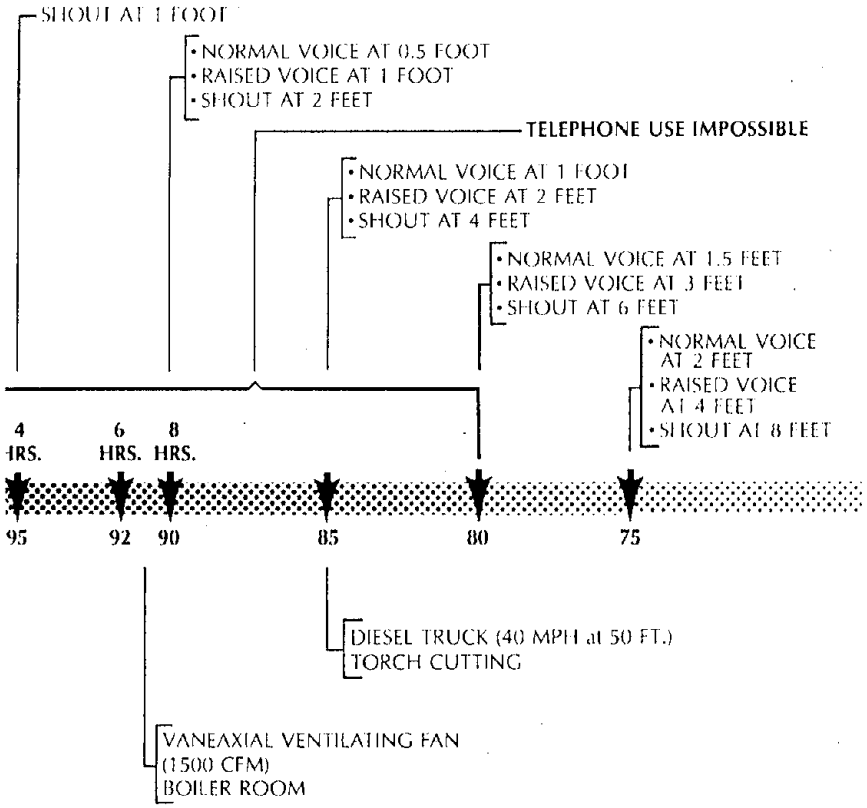
shakeout	cut-off wheels
core knocking	blasting cabinets
stand grinding	tumbling barrels
swing frame grinding	chipping
manual grinding	torch cutting

casting handling (especially on metal chutes, or if tote boxes are equipped with iron wheels).

PERMISSIBLE NOISE EXPOSURES



*EXPOSURE FOR REMAINDER OF DAY MUST BE LESS THAN 90 dBA



—TUMBLER, 6'×3', SMALL CASTINGS

—SQUEEZE JOLT MACHINE

WATCH OUT! Work with vibrating equipment like chipping guns or holding castings against a grinding wheel may cause vibration illness or numbness in the hands and fingers.

Clues that there may be too much noise or vibration are:

Noise:

1. Temporary hearing loss.
2. Ringing in your ears.
3. Clang of castings against metal chutes and boxes and tumbler linings.

Vibration:

1. Vibrating Tools.
2. Poorly balanced tools.
3. Numbness in hands and fingers.

Solvent, Gas, and Vapor Hazards

You may have a significant exposure to gases if you are a burner or are located close to the melting and pouring floor. Books I and II of this series talk more about the gases and vapors. Unlike some other hazards, gases and vapors are quick acting. Some have odors, but don't trust your nose to warn you. Many, like carbon monoxide, have no odor; others dull your sense of smell.

Carbon monoxide, a colorless, odorless gas generated at burning, is the most common gas exposure in the cleaning and grinding departments. At high enough levels it can cause headaches, dizziness, lightheadedness, and blurred vision.

Ozone gas, given off if you are burning with a carbon rod, has a sweet or "electric" odor. Ozone will fatigue your sense of smell. It is irritating to the lining of the nose and throat as well as to the eyes. In high concentrations it will cause lung congestion.

Formaldehyde vapor and ammonia gas are also irritating and will be given off at melting and pouring. TDI, or toluene diisocyanate, is used in certain core sands; you may be exposed to TDI if you are located close to the pouring floor or core room. Overexposure to TDI will cause an asthma-like condition; additional TDI exposure may make the condition worse.

At penetrant inspection or spray painting of finished castings, mineral spirits or naphtha may be used. Direct skin contact causes dermatitis. Breathing too much of the vapors may cause you to become lightheaded and nauseous.

Some castings will be dip-painted,while others will be spray painted prior to shipment. Since the painting is usually done with a flammable solvent mixture containing solvents like xylene, toluene, and methyl ethyl ketone (MEK), local exhaust ventilation should be used to provide health as well as fire protection. Breathing too much of these solvent vapors will cause effects as described previously for mineral spirits and naphtha. Production spray painting must be conducted in an exhaust ventilated spray booth.

Clues which may indicate a gas or vapor hazard are:

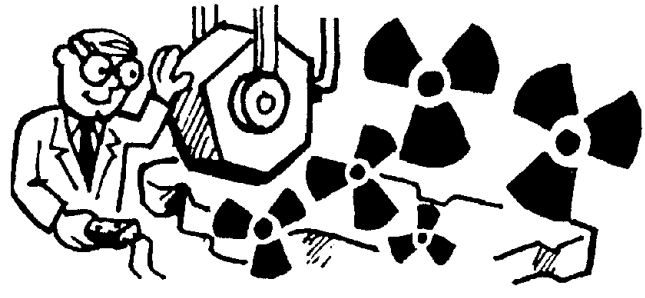
1. headaches and nausea,
2. nose and throat irritation and watery eyes,
3. haze in workroom which gets worse as shift goes on,
4. washing hands with solvent,
5. open containers of solvent in area,
6. smoke at shakeout not captured by ventilation,
7. spray painting outside of spray booth,
8. no local exhaust ventilation at penetrant inspection or spray painting,
9. no ventilation on burning and powder washing operation.

Controls

1. Use of local exhaust ventilation at shakeout and spray painting.
2. Use of local exhaust ventilation at powder arc washing and burning operations.
3. Use of NIOSH or MESA approved respirators for short duration exposure to high concentrations of gases or solvents.

Radiation Hazards

X-rays or isotopes, like cobalt-60, may be used to inspect large castings for flaws. These produce ionizing radiation which may cause genetic damage and other problems.



Only properly trained people may use these inspection devices. The area around the castings must be roped off or barricaded, and signs or warning lights must be in use during radiation inspection.

Shielding the casting with lead, isolating the operation, and other control methods will provide good protection.

Unlike x-rays and isotopes, magnafluxing and penetrant inspection do not produce ionizing radiation. Ultraviolet light may be used at these inspection operations. Infrared radiation and ultraviolet radiation are given off at burning operations. These types of radiation can cause eye injury and a tanning of the exposed skin. Special dark-tinted glasses, long sleeves, and gloves help to prevent exposure.

Is Your Exposure Dangerous?

You can do *your* part in spotting what may be a health hazard by noticing symptoms of what might be overexposure in yourself, and by observing conditions and equipment in your work area. If you think that a health problem exists, tell your supervisor and/or union representative and ask to have it checked. They'll refer the problem to an industrial hygienist.

The industrial hygienist can provide the answer to the question, "Is there an unhealthy condition that the foundry worker is exposed to?" The industrial hygienist may ask you and your co-workers to wear sampling equipment to measure the amount of a contaminant that you have come in contact with. It's the industrial hygienist's job to evaluate the hazards that you've spotted. If possible, observe what the industrial hygienist is doing and ask for an explanation.

The results of the study will not be available until the samples are analyzed. Ask to have the results explained to you.

ACTIONS YOU SHOULD TAKE IF YOU THINK A HEALTH HAZARD EXISTS IN YOUR WORK AREA

This book is written to help you spot health hazards in your work area. This book cannot tell you if your exposures are too high—only a qualified person with special training and equipment can determine that.

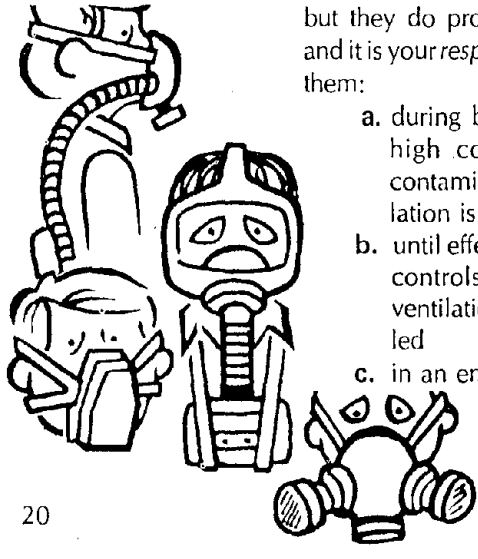
The following are actions you can take to limit your exposure to health hazards:

1. Report your problem. If you think you have a health hazard in your area, it is in *your* best interest to report it to your supervisor and/or union representative.

2. Use engineering controls. Engineering controls include: local exhaust ventilation, noise reduction devices (such as enclosures), vacuum systems, and special production equipment. The selection of these controls can only be made by management as a result of plant engineering studies.

3. Wear protective equipment when required.

Respirators—sometimes respirators aren't comfortable, but they do protect your health, and it is your *responsibility* to wear them:



a. during brief exposures to high concentrations of contaminants when ventilation is not feasible
b. until effective engineering controls—local exhaust ventilation can be installed
c. in an emergency

All approved respirators have a NIOSH/MESA seal on the side of the box or on the respirator itself which explains what the respirator will filter out. Most respirators will only filter out specific chemicals and not all of the chemicals you are exposed to.

IF YOU ARE EXPOSED TO	YOU SHOULD WEAR
Dust	An approved dust respirator with mechanical filter
Solvent Vapors	An approved organic solvent vapor respirator—chemical cartridge
Dust and Solvent Vapors	An approved solvent vapor respirator (chemical cartridge) with a mechanical dust filter (prefilter)
Gases	A chemical cartridge or chemical canister respirator approved for the particular type of gas

WATCH OUT! Surgical type gauze masks do not provide adequate protection.

Remember these points:

— Cartridges must be changed periodically, especially if you begin to taste or smell the vapor or gas, if you have difficulty in breathing through them, or if the specified useful lifetime of the cartridge has expired.

— Respirators must be stored in a clean area.
— They must be disinfected daily, especially when you have a cold.
— Respirators must fit properly. Beards and mustaches may interfere with the face seal.
— You must be trained in the proper use and care of the respirators.

Gloves and Barrier Creams—to protect the skin from chemicals such as solvents and epoxies that can cause dermatitis.

Face Shield and Goggles—must be used during grinding, burning, and shakeout to keep particles from the eyes.

Ear Plugs or Muffs—prevent hearing loss from high noise exposures while engineering controls are being installed.

Note: Some workers say they can't hear warning bells or other workers when they are wearing hearing protection. You can actually hear better with hearing protection since most of the noise around you is masked out. You may find hearing protectors uncomfortable at first, but after a few days, you will get used to them. You may find the noise in the area to be uncomfortable when protectors are not worn.

Remember

— Ear plugs must be properly fitted because one size does not fit everyone.
— Plugs should be washed frequently with warm, soapy water.
— Plain cotton is not effective protection.
— Keep your ears clean.
— The side frames of glasses may prevent ear muffs from giving proper protection. You may have to get glasses with special side frames.

4. Housekeeping

Housekeeping in foundries is important! Dust that settles on the floor, pipes, rafters, and equipment can be blown into the air by passing vehicles, drafts from open windows and doors, sweeping, fans, and other equipment. The better job *YOU* do of keeping your work place cleaned up the better chance you will have of keeping dust out of the air you breathe.

Naturally, it's best to vacuum but if you must sweep, do so carefully; don't blow off equipment with compressed air.

Other housekeeping practices *you* should be aware of include:

— Periodically clean off working surfaces of grinders and cut-off saws.
— Keep aisleways clean to prevent dust being stirred up by industrial truck traffic.

— Remove adhered sand from castings (by placing castings in tumbler) prior to grinding or sprue cutting.
— Attach cloth sleeves to discharge pipes of blasting units to help contain the dust.
— Use safety cans to store and dispense solvents.

5. Personal Hygiene

It's tough to stay clean in a foundry. But good personal hygiene is more than just staying clean. It's a way of protecting yourself against health hazards, against breathing or swallowing harmful materials, from skin problems, and from overexposure to heat.

Remember

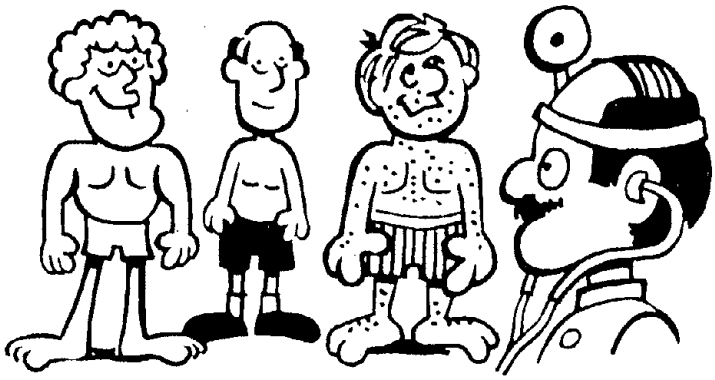
— Wash your hands and face before eating, drinking, or smoking.
— Eat, drink, or smoke only in permitted areas.
— Carry smoking materials in a closed case.
— Store your lunch away from the work area and hazardous materials.
— NEVER heat food on furnaces.
— Don't wear contaminated work clothes home.
— Launder work clothes separate from the family wash.
— NEVER wash with solvents.
— Drink plenty of water to replace liquids you may lose due to exposure to heat. For work in hot areas, increase your salt intake (unless on a low salt diet). Try salting your food a little more than usual.

6. Medical Examinations

In addition to recognition of a hazard through industrial hygiene studies, another way of determining if you are over-

exposed to some contaminants is through periodic medical examination—by your company doctor or family physician.

Tell your doctor everything, such as how you feel on the job and off, any health problems and how long you have had them. Be sure he knows the things you work with. The more he knows, the better he will be able to help you.



A full-size chest x-ray every two to three years can show if silicosis is developing. Also, the doctor will probably ask you to take a breathing test.

Blood and/or urine tests will measure your exposure to certain vapors such as phenol, or to metal dusts and fumes like lead.

If you work in a high noise area, a hearing test called an audiometric test may be given.

These medical records are confidential and can only be released as required by law, or with your permission. These are meant to document your present state of health and can be used in diagnosing the possibility of future illness.

Don't be afraid of these examinations—they're meant to be an early warning for any possible health problems as part of a good preventive medical program.

DO'S AND DON'TS FOR A HEALTHY WORK ENVIRONMENT IN THE SHAKEOUT, CLEANING AND GRINDING, AND INSPECTION DEPARTMENTS.

The Do's!!

1. Make sure the ventilation system is turned *on* and *operating*, things which may be wrong include:
   a. Motor is turning but the belt to the fan is disconnected.
   b. Fan is reversed; the hood is not working effectively.
   c. Floor fans are blowing the contaminant away from the hood.
   d. Hood is too far from source of contamination.
   e. Hoods and ducts are clogged, restricting air flow.
   f. Supply air duct on roof or open window is drawing contaminated air from the exhaust duct.

2. Tell your supervisor of any irritation, discomfort, or rash that you suspect may be caused by a foundry contaminant.
3. Use and store solvents in safety cans.
4. Clean off ledges and machinery above your head. Vacuuming does a better job than sweeping.
5. Wear personal protective devices when needed:
   a. Dust respirators for silica dust and metal dusts.

b. Chemical cartridge respirators for gases and organic solvents.
c. Barrier creams and gloves, face shields and aprons when handling solvents.
d. Ear plugs or muffs for noise exposure.
e. Face shields or goggles at manual grinding, swing grinding, stand grinding, shot and sand blasting, cut off wheels, core knockout.
f. Tinted lenses in goggles or welding helmet when burning gates and risers.
g. Eye protection if there is a possibility of an eye injury from flying particles, chips, or splashes.

6. Eat only in designated lunch room areas.
7. See your doctor or company doctor for periodic physical examination and tests.
8. Discuss industrial hygiene hazards and ways to correct them at your safety meetings.
9. Keep the door to the tumbler and shot blaster closed during operation.
10. Obey all radiation safety rules.
11. Clean up spills of solvents quickly.

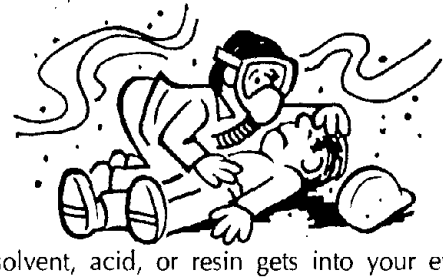
The Don'ts!!

1. Don't allow dust to build up in aisles, on overhead structures, or on machinery.
2. Don't heat food in work area.

3. Don't overlook symptoms you suspect may be caused by health hazards.
4. Don't burn or powder wash without using the exhaust ventilation.
5. Don't store respirators where dust will get into them.
6. Don't eat in areas having airborne contaminants.
7. Don't eat, drink, or smoke in areas of lead exposure.
8. Don't dispense or store solvents in open pails.
9. Don't forget to use ventilation systems where provided.
10. Don't remove radiation warning signs, barriers or alarms.
11. Don't misuse personal protective devices.

First Aid

In foundries, the word is fast — FAST AID.



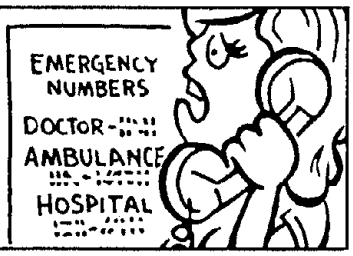
If a solvent, acid, or resin gets into your eyes, immediately flush your eyes with water. Hold the lids open with your fingers to make sure the water washes away all of the material. Send someone for medical help.

Although it is always unexpected, foundry workers may suddenly become unconscious from extreme overexposure to solvent vapor, carbon monoxide gas, or extreme heat.

Remove the victim from the exposure. But—always put on protective equipment first—don't become a "victim" yourself. If you know how to give artificial respiration, you might revive someone who is unconscious and who has stopped breathing. This could prevent death or brain damage.

KNOW WHO THE TRAINED FIRST AIDER IS ON YOUR SHIFT.

Post emergency phone numbers for the:
DOCTOR
AMBULANCE
HOSPITAL
POLICE DEPARTMENT
FIRE DEPARTMENT



You've Finished Reading the Book. . .

Now, what can you do?

Getting rid of health problems in your foundry takes time, and it takes people working together to help solve health problems.

If you've identified what you think is a health problem in your area:

- tell your supervisor or foreman
- tell your union representative
- ask to have an industrial hygiene study done in your work area
- ask about the results of the study
- understand what the results mean
- follow the rules and regulations as they apply to you.

And, if you have any further questions about health hazards:

- contact the nearest office of NIOSH or OSHA.

LIST OF TERMS

Audiometric Test—a hearing test.

Chemical Cartridge Respirator—a breathing device providing gas and vapor protection.

Decibel—a measurement quantity for sound level.

Dermatitis—inflammation of the skin.

Dust—small solid particles created by the breaking of larger particles.

Fumes—smaller solid particles given off at places where metal is in a molten state.

Gas—a substance which occurs as a gas at standard temperature and pressure.

Hood—the shaped inlet of a ventilation system designed to capture contaminated air.

Local Exhaust Ventilation—ventilation designed to remove contaminants at or near the point of origin.

Mechanical Filter Respirator—a breathing device for removing dusts, fumes, and mist.

Metal Fume Fever—an industrial disease of short duration with flu-like symptoms resulting from excessive exposure to some metal fumes.

Mineral Dusts—dusts of substances occurring naturally in the earth, such as silica.

Noise—unwanted sound.

Nuisance or Inert Dust—dusts with minimal health effects.

Siderosis—a non-disabling lung condition due to long time exposure to high concentrations of iron dust and fume.

Silicosis—a lung disease resulting from long time exposure to high concentrations of silica dust.

Solvent—an organic liquid that dissolves another material.

Vapor—the gaseous form of a substance, normally liquid at room temperature.

Vibration—a back and forth motion of matter.

NIOSH AND OSHA REGIONAL OFFICES

The following pages list NIOSH and OSHA regional offices which can provide information on the OCCUPATIONAL SAFETY AND HEALTH ACT including questions on standards interpretations, voluntary compliance information, copies of the *OSHA Standards, OSHA Act, Employee Rights Posting Notice*, and publications.

NIOSH REGIONAL OFFICES

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

DHEW, Region II — Federal Building
26 Federal Plaza
New York, New York 10007
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BIBLIOGRAPHIC DATA SHEET	1. Report No. NIOSH-77-104	2.	PB 274 731

4. Title and Subtitle

SHAKEOUT, CLEANING, GRINDING AND INSPECTION DEPARTMENTS - HEALTH HAZARDS IN A FOUNDRY

5. Report Date: Dec. 1976

6.

7. Author(s)

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

National Institute for Occupational Safety and Health
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10. Project/Task/Work Unit No.

11. Contract/Grant No.

12. Sponsoring Organization Name and Address

13. Type of Report & Period Covered

14.

15. Supplementary Notes

16. Abstracts

The health hazards found in the shakeout, cleaning and grinding, and inspection departments of foundries are listed in order of importance for each area. They include dusts, metal fumes, noise, gases and vapors, solvents and ionizing and non-ionizing radiation. Each hazard is described and identified, and information given on how exposures may be reduced. The worker's responsibility for using good work practices and having medical examinations are explained. A list of do's and don'ts for a healthy work environment and some brief first aid information are given.

17. Key Words and Document Analysis. 17a. Descriptors

Industrial hygiene
Air pollution
Electromagnetic radiation
Dust control
Atmosphere contamination control
Safety engineering
Industrial atmospheres
Industrial medicine
Preventive medicine
Foundry practice
Iron and steel industry
Environmental engineering

17b. Identifiers/Open-Ended Terms

Exposure limits
Safety practices

17c. COSATI Field/Group

18. Availability Statement

Release unlimited

19. Security Class (This Report) UNCLASSIFIED — 2

20. Security Class (This Page) UNCLASSIFIED — 2

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