

Electronic Waste Recycling: Working Safely

Workers may encounter hazards in electronic waste (e-waste) recycling, including the risk of injury, hearing loss, and exposure to toxic dusts and other chemicals. These hazards can cause permanent and serious health problems that could begin without workers being aware of them. Employers must provide a safe and healthy workplace. This fact sheet describes actions e-waste recycling companies can take to control these hazards and ways workers can protect themselves.

Do you disassemble (take apart) or shred electronics?

- Electronics recycling can pose risks to workers. These include:
 - Illness from toxic metal dusts
 - Injuries from lifting and moving heavy objects
 - Cuts or eye injuries from sharp objects
 - Hearing loss from noise exposure
- A good safety program can help workers avoid these hazards, such as having:
 - Controls that reduce exposure to hazardous dust
 - Tools and lifting devices that minimize stress on the body
 - Protective clothing and safety glasses to avoid cuts and eye injuries
 - Hearing protection to prevent hearing loss



**FACT
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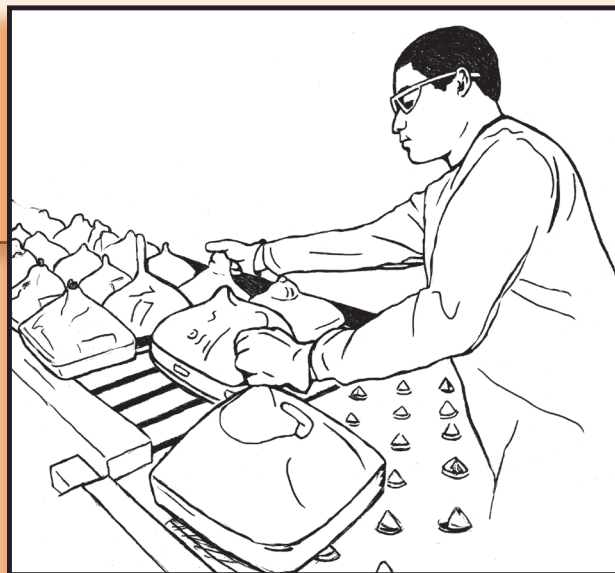
Employers are responsible for providing a safe workplace.

They must:

- Identify and control hazards in the workplace.
- Regularly inspect the workplace and correct unsafe conditions.
- Have a written Injury and Illness Prevention Program that describes how the employer will protect workers from hazards.
- Provide and require use of safe tools and equipment.
- Train workers about job hazards and safe work practices.

Workers also have responsibilities for safety. They should:

- Wear personal protective equipment (PPE) such as eye and ear protection, gloves, and where indicated, respirators, when a potential hazard is present.
- Work with their supervisor or employer to find ways to reduce their exposures.
- Report unsafe conditions to their supervisor or safety committee.
- Share smart work practices with new employees.



Chemical Hazards Found in E-Waste:

E-waste component	Potential hazard	Potential health effects from long-term exposure
Cathode ray tube (CRT) glass, batteries, solder, older printed circuit boards	Lead dust	Anemia, kidney damage, high blood pressure, nerve and brain damage, miscarriage, birth defects
Batteries, switches, thermostats, fluorescent tubes	Mercury vapor	Nerve and brain damage, birth defects
Nickel-cadmium batteries, printed circuit boards, phosphor coating on CRT glass	Cadmium dust	Kidney disease, bone problems, lung cancer
Older printed circuit boards	Beryllium dust	Lung disease, probably lung cancer
Plastic cases and parts	Flame retardant dust	Possible thyroid hormone problems

Dust can cause health problems

E-waste disassembly, shredding, compacting, and glass breakage create fine dust. This dust may contain metals such as lead, cadmium, or beryllium, as well as flame-retardant chemicals. This dust can affect workers' health. They can breathe it in or swallow it if dust gets on their hands or food. Depending on what is in the dust, even small amounts can be bad for them.

Easy changes for employers:

- **Provide a clean eating area.**
- **Provide warm water, soap, and clean towels.**
- **Provide uniforms, smocks, or coveralls and work shoes for workers.**
- **Provide tools for manually disassembling** CRTs and flat screens to enable removal of components before shredding. This will minimize release of toxic materials.

Keep the following items out of shredders (unless safety controls are known to be in place) because they can cause fires or explosions, or release toxic materials:

- Batteries • CRTs • Toner cartridges • Capacitors
- Plasma screen front panel glass • Fluorescent bulbs • Ink cartridges • Mercury-containing switches and thermostats • Mercury-containing lamps from inside LCD screens

If you are not sure whether your shredder can accept these items, ask your safety manager.

Next steps:

- **Provide changing facilities and showers onsite.**
- **Provide separate lockers to keep street clothes and shoes free of toxic materials.**

When dust contains lead or cadmium, employers must:

- **Measure levels of dust in the air.**
- **Provide HEPA-filtered vacuums or wet mops** for cleaning lead or cadmium-containing dust.

Workers, to protect yourself:

- **Keep your work area clean.**
- **Lower the release of toxic materials** by taking apart and sorting components as much as possible before shredding.
- **Do not use brooms to sweep.** Wet mop or use a HEPA-filtered vacuum to keep dust levels down.
- **Don't eat or smoke while handling e-waste.** Wash your hands well with soap and water before eating, drinking, smoking, or using the restroom. Keep drinking water in a closed bottle.
- **Shower at the end of your shift** to remove dust from your hair and body. (It's better to shower at work if you can.)
- **Change into clean clothes and shoes at work** before you go home to avoid getting dust in your car or home.
- **Keep dirty work clothes and shoes separate** from clean street clothes. If you don't have a storage locker, keep your dirty clothes and shoes in a plastic bag.
- If CRT glass breaks, **mist the broken glass with water to keep dust down** and wet mop or HEPA-vacuum the area.



Wet mop or HEPA vac and wear a respirator

Dust (continued)

Upgrading Your Program:

Depending on levels of lead or cadmium found in air, employers must:

- **Provide local exhaust ventilation** to reduce dust at the source.
- **Provide blood lead testing** if levels of lead in the air are at or above the action level of 30 micrograms per cubic meter. More information on blood lead testing can be found in the Alert, “Low Levels of Lead: Dangerous” at: www.cdph.ca.gov/programs/olppp/Pages/Publications.aspx
- **Provide respirators when dust levels are not sufficiently controlled by ventilation.** When respirators are worn, employers must provide medical clearance, fit testing to ensure the respirator provides a good seal to the face of the wearer, and training for workers.
- When exposures to toxic metals equal or exceed the action level, employers must meet additional requirements. See the lead and cadmium regulations listed on page 6.

Workers:

How can you find out if you have been exposed to lead?

- **Ask to see the results of air monitoring** done in your workplace. Ask your supervisor to explain any items that aren’t clear.
- **Ask your employer for a blood lead level (BLL) test.** A BLL test is the best way to know how much lead gets into your body.
- If your employer does not provide a BLL test, **ask your doctor** to order the test.

Respirators can further reduce dust exposure.

You may be exposed to high levels of dust near the shredder and when doing cleanup and maintenance.

- Use a respirator when cleaning up broken CRT glass and for other dusty tasks. A half-mask respirator with filters can reduce the amount of dust you breathe in.
- Do a seal check **every time** you put on the respirator (you will learn how to do this in training).
- Remove your respirator only after leaving the respirator use area.
- Clean your respirator after use and store it properly.

Cuts and lacerations

Many electronic components have sharp edges or fragments that can cause cuts or lacerations, including eye injuries. Flying bits of metal, plastic, or glass are common in e-waste disassembly.

Easy changes for employers:

- **Provide protective equipment** such as cut-resistant gloves and eye protection to prevent injuries.



Face shield worn over safety glasses

Workers, to protect yourself:

- **Wear safety glasses for disassembly, shredding, compacting, and glass handling.** If you (or a neighbor) are using a hammer, mallet or grinder for disassembly, use a face shield and/or screen for extra protection.
- **Use cut-resistant gloves and arm guards** (e.g., Kevlar) for disassembly, sorting of shredded material, and glass handling.

Noise

Workplace noise can rob workers of their hearing. Hearing loss due to loud noise is preventable and may not be noticeable at first. Hearing can be permanently damaged over time by loud noises from hammering, drilling, shredding, or using power tools.

Easy changes for employers:

- **Reduce noise by minimizing vibration of the work table.** Possible solutions include placing a layer of plywood or rubber matting on the table.

Next steps:

- **Measure full-shift exposures for all workers** in order to know who to include in a hearing conservation program.
- **Establish a hearing conservation program** for all workers with average exposure at or above the action level of 85 decibels.

Upgrading your program:

- **Reduce noise using engineering controls** when levels are above the exposure limit.
- If engineering controls are not enough, reduce exposures by providing **ear muffs or ear plugs** or by rotating workers out of noisy areas.

Workers, to protect yourself:

- Your employer may do noise monitoring. **Ask to see the results**, and make sure you understand what they mean for you.
- **If your employer offers to test your hearing, get the test.** Ask for a hearing test if your employer does not offer it.
- **Always wear hearing protection** (ear plugs or muffs) in noisy areas. Hearing protection is required by law in very loud work areas.

Muscle Injuries

Electronic waste can be heavy and difficult to handle, causing muscle strains. Repetitive or forceful motions can lead to injury.

Easy changes for employers:

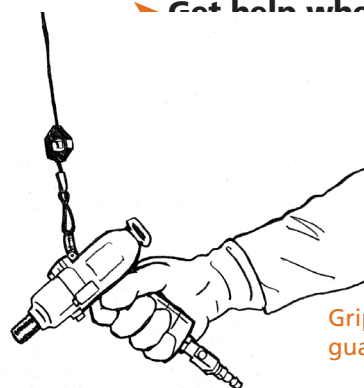
- **Provide material handling aids** such as dollies, hand trucks, lifters, and turntables.
- **Provide grip-enhancing gloves** to minimize the amount of force needed by workers to grip tools and materials.

Next steps:

- **Provide adjustable work tables** and adjust the height for each worker so shoulders remain relaxed.
- **Provide tool suspension equipment** to prevent lifting or repetitive strain injuries

Workers, to protect yourself:

- **Arrange your work station to minimize lifting, twisting, reaching, and carrying.**
- **Get help when lifting heavy or** bend at the knees your body when



Grip-enhancing gloves, arm guard, and suspended tool

RESOURCES

REGULATIONS THAT HELP PROTECT WORKERS

- **Injury and Illness Prevention Program.** This standard (California Code of Regulations (CCR) Title 8, Section 3203), requires employers to write and implement an injury and illness prevention program and provide training. For links to publications on IIPPs, see www.dir.ca.gov/title8/3203.html.
- **Hazard Communication.** This standard (CCR Title 8, Section 5194) requires your employer to tell you if you are working with hazardous substances, train you to work with them safely, and make Material Safety Data Sheets available. See www.dir.ca.gov/title8/5194.html.
- **Lead Standard.** This standard (CCR Title 8, Section 5198) requires employers to take specific action to protect workers from lead. See www.dir.ca.gov/title8/5198.html.
- **Cadmium.** This standard (CCR Title 8, Section 5207) requires employers to take specific action to protect workers from cadmium. See www.dir.ca.gov/title8/5207.html.
- **Airborne Contaminants.** This standard (CCR Title 8, Section 5155) sets permissible exposure limits for toxic substances in workplace air. See Table AC-1 at www.dir.ca.gov/title8/5155table_ac1.html.
- **Access to Medical and Exposure Records.** This standard (CCR Title 8, Section 3204) gives you the right to see and copy your own confidential medical records, and any records of toxic substance exposure monitoring. See www.dir.ca.gov/title8/3204.html.
- **Noise.** These standards (CCR Title 8, Sections 5095 through 5099) require your employer to control noise exposures and to limit average exposure to 90 decibels (dB) or below. When your average exposure to noise equals or exceeds 85 dB, your employer must implement a hearing conservation program. See www.dir.ca.gov/title8/5097.html.

WHERE TO GET HELP

- **HESIS.** Answers questions about chemicals and other workplace hazards for California workers, employers, and health care professionals. Call **(510) 620-5817** or toll free **(866) 282-5516** (toll free in CA). HESIS has many free publications available. To request publications, leave a message at **(510) 620-5717** or toll free **(866) 627-1586**, or visit our website at www.cdph.ca.gov/programs/ohb.
- **California Division of Occupational Safety and Health (Cal/OSHA).** Investigates workers' complaints and answers questions about workplace health and safety issues. Identities of workers making complaints are kept confidential. Find the nearest Cal/OSHA Enforcement District Office by visiting their website at www.dir.ca.gov/dosh/DistrictOffices.htm.
- **Other resources for employees** may include your supervisor, your union, your company health and safety officer, your own doctor, or your company doctor.
- **Cal/OSHA Consultation Service.** Helps employers who want free assistance to improve health and safety conditions and comply with Cal/OSHA regulations. Employers can call **1-800-963-9424**.

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