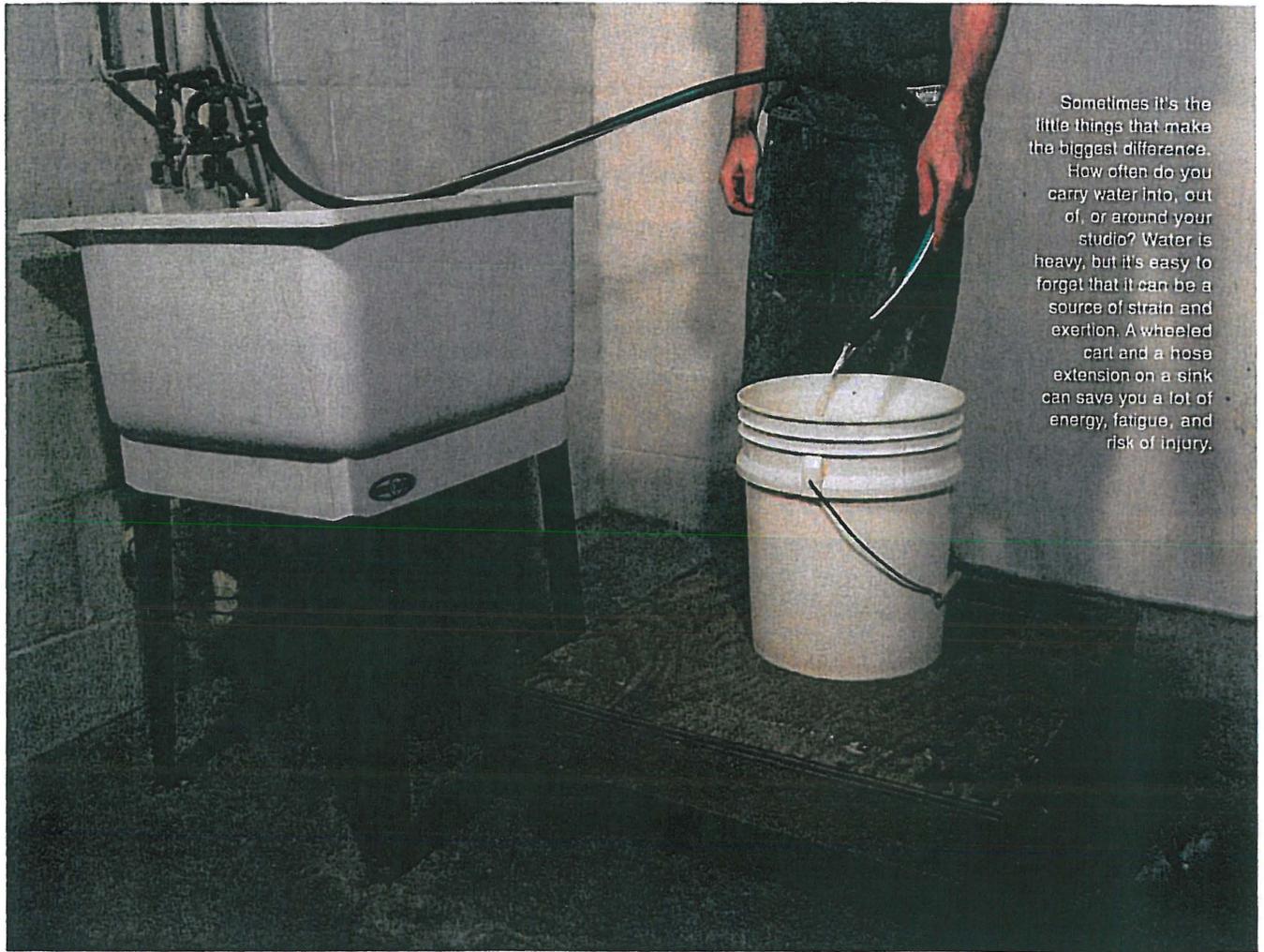


Best Practices for a **SAFE AND HEALTHY STUDIO**

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Sometimes it's the little things that make the biggest difference. How often do you carry water into, out of, or around your studio? Water is heavy, but it's easy to forget that it can be a source of strain and exertion. A wheeled cart and a hose extension on a sink can save you a lot of energy, fatigue, and risk of injury.

As a ceramic artist, you could face many potential hazards, since your work area (e.g., your home, a small studio) may not have been designed to reduce or eliminate health hazards encountered during the art-making process.

In 2007, the owner of an independently-owned pottery shop was concerned about employees' long-term exposure to substances used in the shop (although no health symptoms had been reported) and asked our team of investigators at the National Institute for Occupational Safety and Health (NIOSH) to perform a health hazard evaluation (HHE). The pottery shop offers classes and sells pottery supplies, including pottery-making tools and raw materials such as clays and glazes.

Employees, employers, or union representatives can ask our comprehensive team of experts to investigate their health and safety concerns by requesting an HHE. Our team contacts the requestor and discusses the problems and how to solve them. This may result in sending the requestor information, referring them to a more appropriate agency, or making a site visit (which may include environmental sampling and medical testing). If we make a site visit, the end result is a report of our investigations that includes recommendations that are specific to the problems found, as well as general guidance for following good occupational health practices. These HHE reports are available online (see "Resources and Links" on page 75). This evaluation made us realize that small

studios could benefit from the information we gathered concerning potential hazards that ceramic artists may not be aware of.

Health Effects and Occupational Exposure Limits

In evaluating the hazards posed by workplace exposures, we use both mandatory (legally enforceable) and recommended occupational exposure limits (OELs) for chemical, physical, and biological agents as a guide for making recommendations. OELs have been developed by federal agencies and safety and health organizations. They suggest levels of exposure to which most workers may be

exposed up to 10 hours per day, 40 hours per week for a working lifetime without experiencing adverse health effects. However, a small percentage of people may still experience adverse health effects at levels below the OELs because of personal susceptibility, pre-existing medical conditions, or hypersensitivity (allergy).

In addition, some hazardous substances may act in combination with other workplace exposures, the general environment, or with medications or personal habits of the worker to produce health effects even if the occupational exposures are below the exposure limit.

Studio Safety Reference

To eliminate or minimize identified hazards, we encourage (in order of preference) the use of the traditional hierarchy of controls: (1) substitution or elimination of the hazardous agent, (2) engineering controls (e.g., local exhaust ventilation, process enclosure, dilution ventilation), (3) administrative controls (e.g., limiting time of exposure, employee training, work practice changes, medical surveillance), and (4) personal protective equipment (e.g., respiratory protection, gloves, eye protection).

Even if you work in a small studio or your home, you can consider this hierarchy when looking for ways to minimize or eliminate your exposure to hazardous substances.

- Don't eat, drink, or store food in work areas, and wash your hands thoroughly before eating to prevent ingestion of metals and other contaminants.
- Wet-wipe surfaces rather than sweeping or vacuuming (and if you must use a vacuum, make sure it has a HEPA filter). Avoid carpet use.

Air Quality

- Install local exhaust ventilation around dust-generating activities (e.g., in mixing/pugging areas), with a hood to capture airborne dust as close as possible to the point of generation.
- Allow adequate intake of outdoor air and an adequate number of air changes per hour for the work area. Since work area characteristics can differ greatly, a ventilation engineer should be consulted to determine the appropriate ventilation parameters on a case-by-case basis.
- Minimize the number of bends in the electric kiln and other exhaust ducts to improve the efficiency of the system.

Respirator Usage

- If you use a respirator or other personal protective equipment, consult the federal standards for proper use,

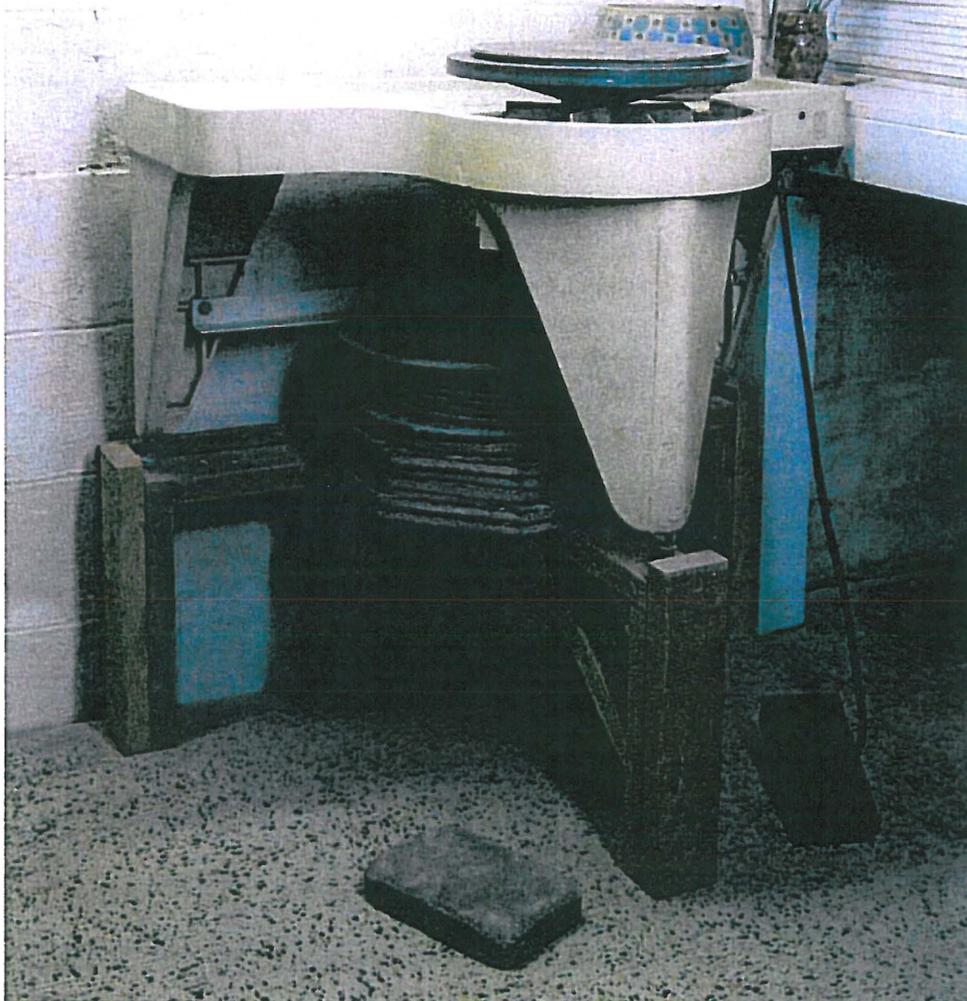
maintenance, and storage. Refer to the OSHA respiratory protection standard (29 CFR 1910.134) (www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=12716&p_table=standards) or Appendix D of the standard if your use of a respirator is voluntary.

- Employers, schools, and group studios should consider establishing a written respiratory protection program, medical evaluations, fit testing, and training on proper respirator use and maintenance (such as shaving facial hair before use and proper placement of straps), if necessary depending on the level of exposure.

Ergonomics

- Incorporate a minimum height range of 27.6 inches and a maximum height of 56.2 inches for workstations/worktables, palletized pieces, shelving units, and items on carts to eliminate overhead reaching and bending.
- Store frequently used materials at waist height rather than at floor level. Use extra pallets to raise the height of cart surfaces to the recommended ranges.
- Use scissor lift tables to reduce bending and overhead reaching, and pallet carousels and collapsible carousel stands to allow access to loads from various angles.
- Eliminate lifting and carrying items weighing more than 50 pounds, and always use carts to transport heavy materials long distances.
- Provide a faucet hose extension to eliminate lifting buckets into and out of the sink.
- Provide a range of heights for pottery wheels and stools, and personalize the two heights for each user to eliminate back pain and discomfort. Use stools with lumbar support and tilt adjustment. Provide adjustable leg stools for level or tilted seats.
- Do not perform repetitive activities (wedging, throwing, and trimming) in long sessions.

Setting a potter's wheel up on leg extensions provided by the manufacturer, or some other stable support or frame, can reduce back strain from throwing in a seated position. It may still be important to have a brace (table or wall) to lean against for leverage when making larger items.



You also may face ergonomic risks that can cause pain or discomfort if you perform repetitive activities in long sessions, if your workstation is not properly designed or adjusted, or if you often lift heavy bags or boxes of materials.

The toxic metal compounds in both glaze powders and wet mixed glazes can have varying health effects ranging from respiratory symptoms (e.g., caused by exposure to cobalt, cadmium, or vanadium) to skin sensitization (nickel); some metals are confirmed as human carcinogens (cadmium, hexavalent chromium, and nickel compounds) or possible human carcinogens (cobalt compounds, vanadium pentoxide) by the International Agency for Research on Cancer.

Since many dry materials used in mixing clays, glazes, and colorants contain crystalline silica and metals, it is important to control the dust you generate to prevent inhaling these substances. Inhaling these substances over a period of time could lead to development of silicosis (a disabling lung disease) or lung cancer.

Silica

Silica exists in several forms, but only exposure to crystalline silica (the type present in ceramic materials) can produce the pulmonary condition called silicosis. Although this disabling, progressive, and sometimes fatal disease

The US Department of Labor Occupational Safety and Health Administration (OSHA) mandates legally enforceable permissible exposure limits (PELs) for workplaces covered by the Occupational Safety and Health Act. However, not all hazardous chemicals have specific OSHA PELs, and the legally enforceable and recommended limits for some substances may not reflect current health-based information.

Primary Concerns for Small Studios

If you work in your home or a small studio, you could potentially be exposed to crystalline silica and toxic metals from working with dry materials in clays and glazes, and gases released during kiln firing.

usually occurs after 15 or more years of exposure, NIOSH has found that it has also developed after only a few years of exposure to high concentrations of crystalline silica. Initially, silicosis may not produce symptoms. However, as the disease progresses, it is characterized by shortness of breath and a reduction in pulmonary function. Individuals with this disease are also at increased risk of developing tuberculosis. The smallest particles of quartz and other major forms of crystalline silica (cristobalite and tridymite) are more hazardous because they can be inhaled into the deepest part of the lung. The NIOSH recommended exposure limit (REL) for respirable silica (all forms) is intended to prevent silicosis, however, evidence indicates that crystalline silica is also a potential occupational cause of cancer.

Our case study revealed that the task of moving bags of raw materials to and from storage resulted in the highest concentrations of both respirable particulates and silica. The employee who had moved bags of raw materials had levels of silica exposure that were at the NIOSH REL.

Employees were required to wear NIOSH-certified elastomeric half-mask respirators with P100 particulate filter cartridges when weighing and mixing dry ingredients for glaze mixing or clay mixing and pugging, but no formal respiratory protection program was in place. We observed employees improperly using respirators (twisted straps, worn over facial hair) during these activities.

Metals

Inhalation of high concentrations of metals can cause respiratory irritation and may result in severe respiratory tract damage, including bronchitis, chemical pneumonitis (lung inflammation), and pulmonary edema (fluid build-up in the lungs). Inhalation is usually the exposure pathway of concern in the workplace.

Dust

Ceramic artists can be exposed to dusts, or mixtures of dusts, that are not associated with a specific toxic chemical. Occupational health specialists refer to these as respirable particulates not otherwise regulated. Although larger dust particles are trapped by the body's natural defense mechanism (e.g., the mucous lining the upper respiratory tract), respirable dust particles are small enough to penetrate to the deepest parts of the lungs and cause more harmful health effects.

With respect to elements on surfaces, there are no standards defining "acceptable" levels of workplace surface contamination for most substances. These elements can get into the body by ingestion, if your hands or eating surfaces are contaminated. It is best to wet-wipe, rather than sweep, a work area to reduce the presence of airborne dust.

Kiln Exhaust

The intense heat used in the firing process and the variety of compounds used in clays and glazes raise health concerns related to fume exposures. Opening doors and windows can change the flow of air movement throughout a building or home and can increase the movement of emissions from the kiln to other areas.

Exposure to carbon monoxide (a colorless,

odorless, tasteless gas produced by incomplete burning of carbon-containing materials such as gasoline or propane fuel) can cause initial symptoms of headache, dizziness, drowsiness, and nausea. Further symptoms of carbon monoxide poisoning include vomiting, loss of consciousness, and collapse with prolonged or high exposures. If the exposure level is high, loss of consciousness may occur without other symptoms. Coma or death may occur if high exposures continue. The display of symptoms varies, and may occur sooner in susceptible individuals such as young or aged people, people with preexisting lung or heart disease, or those living at high altitudes. NIOSH, OSHA and the American Conference of Governmental Industrial Hygienists (ACGIH®) have published maximum limits for carbon monoxide exposure, which should not be exceeded (see "Resources and Links" below).

Ergonomics

Overexertion injuries and musculoskeletal disorders, such as low back pain, tendonitis, and carpal tunnel syndrome are often associated with the following tasks: repetitive movement about the joints; forceful movements of one's hands; lifting; awkward work postures and/or work postures that don't change; direct pressure on nerves and soft tissues; work in cold environments; or exposure to vibration in the whole body, or parts of the body. The harder and longer you work without rest increases your risk of injury. Exposure to potentially hazardous task factors can be reduced or eliminated through designing jobs, workstations, tools, and other equipment to match your personal physical and mental characteristics and capabilities.

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Resources and Links

- NIOSH HHE reports: www.cdc.gov/niosh/hhe/
- Read the complete HHE for the case study mentioned in this article (PDF format): www.cdc.gov/niosh/hhe/reports/pdfs/2007-0127-3068.pdf
- NIOSH Pocket Guide to Chemical Hazards. Includes recommended exposure limits (RELs), permissible exposure limits (PELs) and other information on chemical effects: www.cdc.gov/niosh/npg/default.html
- American Conference of Governmental Industrial Hygienists (ACGIH) 2009 threshold limit values (TLVs®) and biological exposure index (BEIs®) for chemical substances and physical agents: www.acgih.org
- OSHA Permissible Exposure Limits (PELs): www.osha.gov/SLTC/pel/
- OSHA Small Entity Compliance Guide for the Revised Respiratory Protection Standard [OSHA 1998]: www.osha.gov/Publications/secgrev-current.pdf
- (Mandatory) Information for Employees Using Respirators when not Required Under Standard- 1910.134 Appendix D: www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=12716&p_table=standards
- Canadian Centre for Occupational Health and Safety [1998]. Materials flow. In manual materials handling. www.ccohs.ca/oshanswers/ergonomics/mmh/materials_flow.html