

Free Safety & Health Consultation for the Prevention of Workplace Injuries and Illness at Museums and Cultural Heritage Sites

Museum and conservation associations like the American Institute for Conservation (AIC) and the American Alliance of Museum (AAM) are working with Work**WISE** NH to help their members understand and better manage the health and safety risks associated with this type of work.

The activities of acquiring, preparing, and caring for collections for display and study can span a large and complex variety of operations, often mirroring those seen in industrial facilities and warehouses. Like their industrial counterparts, these activities may expose your employees to the same potential safety and health risks.

For example, those who work directly with collections, such as conservators, curators, collection managers, registrars, preparators, and exhibit installers, are regularly exposed to hazardous materials such as:

- **Formaldehyde fixatives for fluid specimens**
- **Radioactive dyes**
- **Pigments containing toxic metals**
- **Silica dust while removing fossils from rock matrices**
- **Mold on specimens or archival collections**
- **Paints, epoxies, and solvents for display fabrication**
- **Legacy residual pesticides (arsenicals) and cases with accumulated pesticide vapors (naphthalene, mercuric salts)**
- **Field collection involving excavation and diving operations**

Conservation treatment can involve a wide variety of chemicals that present their own hazard communication requirements and proper ventilation and storage. These include:

- **Fine powders**
- **Solvents, acids, and bases**

Tasks in collection storage and public exhibit areas pose a variety of direct physical hazards such as:

- **Working at heights**
- **Material handling activities, both manual and mechanical,**
- **Work on uneven and wet surfaces.**

Outside of the collections, but inside museums, there are often other small industrial operations, including wood shops, paint booths, printing presses, and vehicle maintenance facilities. OSHA has developed guidelines to address the hazards associated with all of these operations. For more information about potential hazards and resources to address them, see the additional pages within this PDF.



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Potential Hazards in the Museum & Cultural Heritage Industry

Management & Communication

Communicating Hazards

Individuals working in Culture Heritage Institutions may be exposed to toxic chemicals during the handling and care of collections and the maintenance of the facilities which house them. Safety Data Sheets (SDS), labels, and written procedures are used to communicate such hazards so individuals can take the appropriate actions to protect themselves.

- <https://www.osha.gov/dsg/hazcom/index.html>
- https://www.conservation-wiki.com/wiki/Chemical_Safety#Safety_Data_Sheets

Management of Collections-Based Hazards

Museums, art galleries, cultural site employers are responsible to both their staff and the visiting public for providing a safe, healthy, and enjoyable work and educational experience. Management must understand that keeping your staff safe depends on handling safe collection objects and specimens.

- Smithsonian Safety Manual Ch 24:
https://www.sifacilities.si.edu/safety_health/docs/safety_manual/pdf%20PRISMout/ch_24_collections_based_hazards.pdf

American Institute for Conservation (AIC) Health and Safety Network

Individuals should consider their health and safety and those around them to be equally as important as the health and safety of the collections in their care. The Health & Safety Network provides educational and technical information to increase knowledge of safety hazards and general health issues related to the conservation profession. This list of resources gives a general overview of health and safety issues specific to conservators

- https://www.conservation-wiki.com/w/images/1/1d/H%26S_BeginnerGuide.pdf

Field Work and Collection Based Hazards

Digging, trenching, and excavation

Archaeological excavations can pose numerous hazards to those who conduct activities at such sites. These include engulfment hazards from cave-ins; dermal and inhalation hazards from contact with toxic or biological materials; lethal atmospheres from the gases created and/or contained within the soil; hazards posed by insects and animals or even other humans.

- <https://www.osha.gov/trenching-excavation>
- https://www.nps.gov/archeology/cg/fd_vol8_num2/hurt.htm
- <http://www.archaeologyfieldwork.com/AFW/health.htm>
- <https://pdfs.semanticscholar.org/6197/ed3439b08323771dcd3dc5ddf1671feb6bee.pdf>

Arsenic

Arsenic salts and soaps were widely used in the last 100 years as a pesticide and preservative, coating the inside of specimen skin mounts or applying prophylactically to collection surfaces and storage drawers. No longer legal to apply, the residual legacy toxin is a serious hazard to collection handlers, exhibit installers, and loan recipients.

- <https://www.osha.gov/arsenic>

Mercury/Mercuric chloride

Mercuric chloride is still used as a pesticide/repellent for botanical specimens. Over time, disassociated elemental mercury, a toxin, accumulates inside closed cases, posing inhalation risks when accessing the case. Mercury-tin amalgam historic mirrors leak mercury droplets.

- <https://www.osha.gov/mercury>
- Tin Mercury Amalgam Mirrors, AIC News
- https://www.culturalheritage.org/docs/default-source/periodicals/2013_jan_aicnews.pdf?sfvrsn=1
- <https://www.cdc.gov/niosh/topics/mercury/default.html>
- <https://hazardsincollections.org.uk/mercury-and-its-compounds/sources-and-references>

Silica

Silica is a common, naturally occurring mineral found in soil, clay, brick, stone, concrete, and other similar materials. It has recently been declared a human lung carcinogen and a known cause for many diseases that affect the lungs (such as silicosis) to other illnesses such as kidney failure. Silica poses a risk when broken down into small enough particles that can be respired into the body and travel systematically after entering the lungs. Any activity where silica-containing material is impacted (such as grinding, chipping, hammering, or cutting) can create respirable silica particles. Dust control and suppression measures should be used where possible when working with silica.

- <https://www.osha.gov/dsg/topics/silicacrystalline/>
- <https://www.osha.gov/Publications/OSHA3902.pdf>
- <https://synergist.aiha.org/201605-health-and-safety-in-museums>
- http://washingtonconservationguild.org/wp-content/uploads/2020/01/GOLDSMITH_Silica-Dust-Concerns-2019.pdf

Formaldehyde as a Fixative in Preservation

Museums can preserve whole specimens, like aquatic invertebrates, reptiles, amphibians, fish, and some plants and minerals, by submerging and storing them in fluid chemicals. The specimen is first prepared by “fixing” it. This is achieved by injecting it with chemicals that stop the deterioration and decay process. The most common fixative is formaldehyde, or a formaldehyde and water solution known as formalin. The fixed specimen is then moved to a fluid preserve, usually alcohol, either or isopropyl, and finally

placed in a container, usually glass jars or tanks. With the fixative and fluid conservation process, specimens can be preserved for hundreds of years.

Exposure to formaldehyde and/or formalin can occur when initially immersing the specimen, handling the containers, topping off the fluid in the containers, or transferring the specimen to another solvent. Contact with lower concentrations may cause eye and skin irritations, while higher concentrations can cause more serious symptoms like pneumonia and pulmonary edema.

- <https://www.osha.gov/sites/default/files/publications/formaldehyde-factsheet.pdf>
- <https://www.cdc.gov/niosh/npg/npgd0293.html>
- <https://www.amnh.org/research/natural-science-collections-conservation/general-conservation/health-safety/fluid-preserved-specimens>

Radioactive Materials/Dyes

Radioactive materials can be found in many of the naturally occurring specimens found and displayed in museums as well as within certain well-known antique items built with the use of radioactive dyes.

- <https://www.geocurator.org/images/resources/advice/radioactive.pdf>
- <http://preparation.paleo.amnh.org/66/radiation>
- <https://www.amnh.org/research/natural-science-collections-conservation/general-conservation/health-safety/geological-collections>
- <https://www.epa.gov/radtown/radioactivity-antiques>

Mold

A common issue found in museum collection storage is the presence of mold. Mold can be found on collections themselves or on the layers that are to protect collections. All organic materials (and even some inorganic materials) will support mold, with natural fibers being the most susceptible.

- <https://www.osha.gov/molds>
- <http://insidetheconservatorsstudio.blogspot.com/2014/09/mold-in-collections-is-environmental.html#:~:text=Mold%20can%20unfortunately%20be%20found,their%20collections%20with%20archival%20materials.>
- <https://www.nps.gov/museum/publications/conservation/03-04.pdf>
- <https://www.archives.gov/preservation/conservation/mold-prevention.html>
- https://www.culturalheritage.org/docs/default-source/resources/emergency-resources/tips-sheets/mold.pdf?sfvrsn=75aa0c20_4

Exhibit Production and Facility Operations and Maintenance

Working at Heights

Construction and the maintenance of exhibit displays, including lighting fixtures, often require workers to work at elevated heights. Guardrails, guarding systems, fall protection devices, and the safe use of ladders are all measures that can be used to protect workers while working from such heights.

- <https://www.osha.gov/fall-protection>
- <https://www.culturalheritage.org/docs/default-source/resource-guides/fall-protection-working-safely-at-heights.pdf?sfvrsn=1>

Wood shops

The construction of collection displays or wooden crates used to store &/or ship collection items often requires the use of power tools and other woodworking equipment. Such tools can pose safety and amputation hazards, as well as health and fire hazards created by the dust.

- <https://www.osha.gov/SLTC/etools/woodworking/index.html>

Printing and printing presses

Various printing processes, including 3D, involve the use of toxic, flammable, and hazardous chemical agents that might include: lead, lead alloys, antimony, aluminum, zinc, chromium, mineral acids and salts for etching, carbon black and pigments for inks, organic and petroleum solvents, polymers, gelatin and cellulosic esters for photographic films and materials, glues, varnishes, resins, and paints. In addition, press operations may present noise levels that cause hearing loss and machines with amputation hazards.

- <https://www.osha.gov/printing-industry/industry-segments#litho>
- <https://www.osha.gov/pls/publications/publication.athruz?pType=Industry&pID=165>
- <https://www.cdc.gov/niosh/docs/2020-114/pdfs/2020-114.pdf?id=10.26616/NIOSH PUB2020114>
- <https://www.cdc.gov/niosh/docs/2020-115/pdfs/2020115.pdf?id=10.26616/NIOSH PUB2020115>

Paints, epoxies, solvents

Paints, epoxies, and solvents are commonly used chemicals that can off-gas hazardous, toxic, and even carcinogenic compounds (such as VOCs, including toluene, xylene, and benzene). Prolonged exposure to these chemicals can damage the nervous system, liver, and kidneys, as well as increase the risk of developing cancer. Additionally, many of these substances are also highly flammable, and caution should be exercised anytime while working around them or placing them in storage.

- <https://www.osha.gov/Publications/OSHA3646.pdf>
- <https://www.osha.gov/spray-operations>
- https://www.osha.gov/dts/maritime/sltc/ships/surfaceprep/app_toxiccoatings.html
- https://oshwiki.eu/wiki/Occupational_exposure_to_epoxy_resins

Museum and Cultural Heritage Industry Online Resources

Collections Care Health & Safety links

AIC Wiki: Health & Safety

- http://www.conservation-wiki.com/wiki/Category:Health_%26_Safety

ACTS FACTS Archives

- <http://resources.culturalheritage.org/acts-facts/>

Ventilation and Air Quality in Conservation Laboratories

- [https://www.culturalheritage.org/docs/default-source/publications/periodicals/aic-news-vol-41-no-5-\(september-2016\).pdf?sfvrsn=14](https://www.culturalheritage.org/docs/default-source/publications/periodicals/aic-news-vol-41-no-5-(september-2016).pdf?sfvrsn=14)

US Environmental Protection Agency (EPA)

- <https://www.epa.gov/lead/learn-about-lead>

Essential Safety and Health links

The National Institute for Occupational Safety and Health (NIOSH): *Workplace Safety and Health Topics Index*

- <https://www.cdc.gov/niosh/topics/default.html>

NIOSH Pocket Guide to Chemical Hazards - in print, pdf, and mobile app

- <https://www.cdc.gov/niosh/npg/>

Hazard Communication Standard

- <https://www.osha.gov/dsg/hazcom/index.html>

Hazard Communication: *Small Entity Compliance Guide for Employers That Use Hazardous Chemicals*

- <https://www.osha.gov/Publications/OSHA3695.pdf>

OSHA Brief: Hazard Communication Standard: *Labels and Pictograms*

- <https://www.osha.gov/Publications/OSHA3636.pdf>

Occupational Safety and Health Administration: *Chemical Hazards and Toxic Substances*

- <https://www.osha.gov/SLTC/hazardoustoxicsubstances/index.html>

OSHA Publication 3885: *Recommended Practices for Safety and Health Programs*

- https://www.osha.gov/shpguidelines/docs/OSHA_SHP_Recommended_Practices.pdf

OSHA Laboratory Standard (including information about ventilation):

- <https://www.osha.gov/Publications/laboratory/OSHA3404laboratory-safety-guidance.pdf>
- <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1450>

Small Business Resources

The National Institute for Occupational Safety and Health (NIOSH):

Small Business

- <https://www.cdc.gov/niosh/topics/smbus/default.html>

Small Business Resource Guide

- <https://www.cdc.gov/niosh/topics/smbus/guide/default.html> See also on this page the links to national business organizations that can assist your small business.

National Small Business Environmental Assistance Program

- <https://nationalsbeap.org/>

OSHA Publication 2209-02R 2005: *Small Business Handbook*

- <https://www.osha.gov/sites/default/files/publications/small-business.pdf>

US Department of Labor (DOL), Wage and Hour Division (WHD)

New and Small Businesses Resource Page

- <https://www.dol.gov/whd/smallbusiness.htm>
 - This webpage provides general information about the laws administered by WHD and DOL, and other helpful federal resources that are often applicable to new and small businesses.