Arsenic and Old Lace: Controlling Hazardous Collection Materials

Connecting to Collections Care Webinar Series

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HEALTH & SAFETY COMMITTEE

RISK MANAGEMENT PLAN
SAMPLE CHECKLIST FOR PESTICIDE RESIDUES

The following checklist can serve as a foundation for a risk management plan for collections with residual pesticides. While it is specific to pesticide contaminated objects, it can be used as a general outline for other hazardous collection materials.

For more information on Risk Management Plans and hazardous collections materials, visit the Health & Safety Committee Website: **www.conservation-us.org/healthandsafety**.

PART 1: ROLES & RESPONSIBILITIES

Name, contact information and responsibilities for:

- ✓ Individuals trained to identify hazards (i.e., registrar, curator, conservator, art handler)
- ✓ Person to notify when a hazard is identified
- ✓ Person in charge of safety protocols and training, including
  - Implementation
  - Enforcement
  - Review and updating
- ✓ Safety specialist and/or Industrial Hygienist
- ✓ Individuals allowed to have contact with contaminated objects

PART 2: EXPOSURE IDENTIFICATION

- ✓ Types of collections that may have been treated (ethnographic, botanic, taxidermied)
- ✓ Institutional history of using specific treatments
- ✓ Types of testing available for identification
- ✓ Testing protocols
  - When and how objects should be tested (before treatment, before loan, random survey)
- ✓ Identify individuals allowed to conduct testing
- ✓ Information on obtaining test materials and suppliers

PART 3: EXPOSURE ASSESSMENT

- ✓ Types of risk associated with specific hazard (inhalation, absorption, ingestion)
- ✓ Results of surveys
- ✓ Survey protocols (who, what, where, when and why)

PART 4: RISK CONTROLS

- ✓ Protocols for treatment
- ✓ Protocols for exhibition and loan
- ✓ Protocols for collection policy
- ✓ Types of materials to use for isolation (exhibition, storage, during treatment)
- ✓ Equipment and materials for decontamination/remediation
- ✓ How and where to dispose of waste
- ✓ Personal hygiene protocols and PPE types and sources

PART 5: HAZARD COMMUNICATION

Outline procedures for:

- ✓ Labeling objects and storage areas
  - Types of labels
  - Label information (type of pesticide, date of test, person testing, date of treatment)
- ✓ Restricting access
- ✓ Repatriation
- ✓ Loans, shipping and receiving
- ✓ Accessions
- ✓ Who receives training and how often

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Using Filtering Facepiece Respirators (2016)

(commonly known as "disposable dust masks")

Air purifying respirators (APR) can be an effective method of protection against specific hazards when properly selected and worn. It is critical to assess all potential hazards in order to understand the limitations of the APR and to be clear on the reason for wearing it—Is it protection against hazardous materials or for comfort?

Filtering Facepiece Respirators (FFP), or disposable dust masks, are designed to filter *only* particulates (liquid or solid airborne contaminants, including dusts, fumes, mists, fibers, fog, pollen, smoke, spores and bioaerosols). **FFP respirators will NOT protect against gases or chemical vapors.** Some manufacturers have incorporated carbon or charcoal layers in the FFP masks; this is only for comfort against nuisance odor. These added layers are not adequate for toxic levels of gases or chemical vapors and they must not be used for those purposes.

FFP respirators are sometimes purchased without realizing that these simple devices are still part of an overall Respirator Program. Their use needs to be reviewed by your supervisor and personal (or company) physician to be sure that they are appropriate for the hazard, and for your personal medical history.

FFP respirators that are purchased for a comfort reason are often mistakenly worn in a different, more hazardous operation, mainly because staff has not been informed of the limitations of this type of respirator. Your employer is still responsible for the proper selection and use of any type of personal protective equipment, even disposable FFPs.

If your work requires vapor- and/or gas-removing APR in addition to particulates, your mask must have replaceable cartridges or canisters to remove specific vapor/gas contaminants attached singularly or in combination to an elastomeric facepiece AND a HEPA filter incorporated into the cartridge or a dust/mist pre-filter.

If your employer and medical practitioners approve of the use of FFPs for your task, you should know that:

- ✓ **If the FFP is *required* by occupational exposure limits** to protect you from hazardous exposures, you need to be medically evaluated, properly fitted, and trained. See Health & Safety web link for Respirator Medical Evaluation Questionnaires.
- ✓ **If the FFP respirator is worn only for *comfort*** (i.e. when your exposures are well below the maximum allowable occupational exposure limits established by the U.S. Occupational Safety and Health Administration (OSHA), or in Canada, by the applicable jurisdiction) you still need to wear it safely and keep it clean.
- ✓ FFP respirators do not provide oxygen and must not to be used in environments that are Immediately Dangerous to Life or Health (IDLH.)
- ✓ No filter will protect you if it doesn't provide a tight face seal or is worn over a beard.
- ✓ Read all instructions provided by the manufacturer on use, maintenance, and warnings as to the FFP limitations. The packaging for the FFP will tell you for what the respirator is to be used.
- ✓ **DO NOT BUY OR USE AN FFP UNLESS THE "NIOSH" LABEL IS ON THE BOX, PACKAGE OR FFP ITSELF (e.g., NIOSH TC number on the strap).**The packaging and respirator must state that the FFP is certified by the National Institute for Occupational Safety and Health (NIOSH) of the U.S. Department of Health and Human Services.
- ✓ Dispose when it becomes damaged, dirty or is difficult to breathe through. If it doesn't require disposal after your shift, store it in a zip lock bag.
- ✓ Particulate filters are rated for both how well they holdup in oil-mist atmospheres and how well they capture particles, resulting in 9 types of filters:

Three categories of resistance to filter efficiency degradation by oil:	Three levels of filter efficiency:
N (Not resistant to oil)	95% (called "95")
R (Resistant to oil)	99% (called "99")
P (Oil proof)	99.97% (called "100")

- ✓ The most commonly used types are either "N95" (95% efficiency) or "P100" (almost 100% particle capture). N95 might be appropriate for common cleaning tasks, possibly mold or insect frass unless you are highly allergic. N or P100 might be worn for protection against allergens or heavy dusting.

IF YOU HAVE ANY QUESTIONS ABOUT THE USE OF FILTERING FACEPIECE ("DUST MASK") RESPIRATORS, OR IF YOUR JOB TASKS CHANGE, CONTACT YOUR SUPERVISOR SO THEY CAN BE SURE THE RESPIRATOR IS PROVIDING YOU WITH THE COMFORT AND PROTECTION THAT IS RIGHT FOR YOU AND THE JOB.

For more information visit: www.conservation-us.org/HealthandSafety

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PPE Chemical Protective Material Selection Guide[1] (2014)

Chemical	Butyl	Rubber	Neoprene	Nitrile	PE	PVAL	PVC	Silver Shield®
Acetic acid	VG	P	F	P	P	P	P	VG
Acetone	VG	P	P	P	P	P	P	VG
Ammonium carbonate	-	VG	VG	VG	-	-	-	-
Ammonium hydroxide (30-70%)	VG	P	G	G	P	P	F	-
Aniline	VG	P	P	P	P	VG	P	VG
Benzene	P	P	P	P	P	VG	P	VG
Benzyl alcohol	VG	P	F	G	-	P	P	VG
Calcium hydroxide	-	-	VG	VG	VG	-	-	-
Citric acid (30-70%)	VG	VG	VG	VG	VG	P	VG	-
Ethyl acetate	F	P	P	P	P	G	P	VG
Ethanol	VG	P	G	F	F	P	P	VG
Ethylene glycol	VG	VG	VG	VG	VG	F	VG	VG
Ferric chloride	-	-	VG	VG	-	P	G	-
Formic acid (>70%)	VG	P	VG	F	P	P	G	F
Glycerin/Glycerol	VG	VG	VG	VG	-	-	VG	VG
Hydrochloric acid (<30%)	VG	VG	VG	VG	F	P	G	G
Hydrofluoric acid (30-70%)	VG	F	VG	P	F	P	F	G
Hydrogen peroxide (30-70%)	VG	VG	VG	VG	VG	P	G	G
Iodine, solid	VG	-	VG	VG	G	-	-	-
Isooctane	P	P	F	VG	-	G	P	-
Isopropanol	VG	P	VG	VG	P	P	F	VG
Methanol	VG	P	F	P	P	P	P	F
Methylcellosolve (methyl glycol)	VG	P	P	P	-	P	P	G
Methylene chloride	P	P	P	P	P	VG	P	G
Methyl ethyl ketone	G	P	P	P	P	P	P	VG
Methyl methacrylate	F	P	P	P	P	VG	P	VG
Naphthalene	P	P	P	P	-	-	P	-
Naphtha, 15-20% aromatics, (Mineral spirits)	P	P	F	VG	P	G	F	VG
Naphtha, <30% aromatics, (Petroleum benzine/VM&P)	P	P	P	G	-	G	P	-
Nitric acid (30-70%)	VG	P	VG	P	G	P	F	G
Oxalic acid (<30%)	VG	VG	VG	VG	-	P	VG	VG
Petroleum ether, <1% aromatics	P	P	P	VG	P	-	P	VG
Phenol (>70%)	VG	P	F	P	P	F	P	G
Phosphoric acid (>70%)	VG	VG	VG	VG	VG	P	VG	VG
Potassium hydroxide	VG	VG	VG	VG	-	P	VG	G
Propanol	VG	P	G	G	-	P	F	G
Sodium hydroxide	-	-	-	-	VG	-	-	-
Sodium thiosulfate	VG	VG	VG	VG	-	-	VG	-
Stoddard solvent	P	P	F	VG	-	G	P	-
Sulfuric acid (30-70%)	VG	VG	VG	F	VG	P	VG	VG
Tetrahydrofuran	P	P	P	P	P	F	P	VG
Toluene	P	P	P	P	P	VG	P	VG
o-Toluidine	VG	-	F	-	P	-	P	VG
Trichloroethylene	P	P	P	P	P	VG	P	VG
Triethanolamine	VG	F	G	F	-	-	F	G
Turpentine	P	P	P	F	-	G	P	VG
Xylene	P	P	P	P	P	VG	P	VG

[1] Recommendations from Forsberg, K and Mansdorf, SZ. 2007. *Quick Selection Guide to Chemical Protective Clothing, 5th Edition.* New Jersey: Wiley & Sons Inc.
Recommendations are not valid for very thin Natural Rubber, Neoprene, Nitrile and PVC gloves (0.3mm or less).

Recommendations are based on resistance to chemical breakthrough under conditions of continuous contact:
VG = Recommended (> 8 hours of resistance)
G = Recommended (4- 8 hours of resistance)
F = Use with caution (1-4 hours of resistance); only suitable for short periods and with chemicals having minimal dermal hazards
P = Not Recommended (< 1 hour of resistance)
- = Not Tested

Rubber = Natural Rubber/Latex
PE = polyethylene
PVAL = polyvinyl alcohol
PVC = polyvinylchloride
Silver Shield = North Silver Shield® laminate of polyamide/ethylene vinyl acetate/polyethylene plastic films

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Choosing Gloves: A Quick Selection Guide

As part of a conservator's personal protective equipment (PPE) toolbox, appropriate gloves should be available for use with a given chemical. There are a variety of glove materials from which to choose such as nitrile, latex, neoprene, and butyl, in addition to trade name gloves made from multiple materials that provide greater chemical protection.

The Health & Safety Committee has created the **PPE Chemical Protective Material Selection Guide** to help conservators select the appropriate material for chemical use based on data from the *Quick Selection Guide to Chemical Protective Clothing* (Forsberg and Mansdorf 2007). No single type of glove is perfect for all chemicals. Please note that this guide represents the safest materials for both immersion and incidental contact based on results from continuous chemical contact. Therefore, while the chart may indicate that a certain material is rated fair or poor, this rating may not be indicative of splash resistance, or reflect the effectiveness of a particular brand or trade name product. The manufacturer's recommendations also should be consulted when selecting the suitable material, particularly when the gloved hands will be immersed in the chemical.

In addition to chemical protection, the working properties of the gloves, for example flexibility and tear resistance that can vary by material, must also be taken into consideration when choosing the appropriate glove for a task. Non-disposable gloves usually provide excellent chemical barriers and perform better under mechanical stresses, but tend to be thicker and must be cleaned after each use. Most of these gloves are available in flexible models to address dexterity issues or with slip resistance at the palm and/or fingertips to help with grip. Disposable gloves are typically thinner and allow for greater movement, but they generally only provide splash protection, may have shorter breakthrough and permeation times, and should be replaced after any chemical contact or after removing them for any reason. Doubling up gloves of the same material or using gloves that are a combination of materials (e.g., Silver Shield®) may lengthen breakthrough time and provide more physical and chemical protection.

Technical assistance is always available from glove manufacturers and vendors to help determine the correct product for use. Finally, while Safety Data Sheets (SDSs) may be vague about the specific glove materials required for use with a particular chemical, they should be reviewed to assess the overall risk for chemical exposure. Prudent health and safety practices should always be observed to provide a safe working environment.

Important Considerations for the Selection and Use of Chemical Protective Clothing

(Adapted from Forsberg, K and Mansdorf, SZ. 2007. *Quick Selection Guide to Chemical Protective Clothing, 5th Edition.* New Jersey: Wiley & Sons Inc.)

1. All chemicals eventually pass or permeate through any protective barrier. Replace periodically and at any change in appearance.
2. Even the best protective clothing products will not perform properly if they are torn, cut or damaged. Always check for leaks and holes.
3. A barrier may protect against one chemical very well, but perform poorly against another or a mixture of chemicals.
4. Recommendations are generally based on tests that have been performed at room temperature; higher temperature usually decreases the breakthrough time of chemicals.
5. Generally, thicker is better. The use of multiple layers of the same material (i.e., double gloving) can increase protection.
6. Chemically resistant gloves and other chemical protective clothing may all look alike. Be sure that the material you are using is the right one for the job you are doing.
7. Once the barrier material has absorbed a chemical, it will continue to permeate (pass through) the material.
8. Many recommendations for glove use give the common generic name of the glove material. Most of the polymer formations in each material type vary by manufacturer and can vary by product lot.
9. Some protective clothing has a shelf life and/or requires special storage measures, such as avoidance of sunlight, ozone, or moisture and temperature extremes.
10. Very thin ultra-lightweight gloves in rubber and polyethylene often offer poor chemical and mechanical resistance.

For more properties of glove materials, definitions of terms, links to glove manufacturers and suppliers, and an online version of the guide, visit the Committee's website and wiki pages:

www.conservation-us.org/HealthandSafety

Appendix 3
Sample Job Hazard Analysis Form

Job Title:	*Job Location*:	*Analyst*	*Date*
Task #	*Task Description*:		
Hazard Type:	*Hazard Description*:		
Consequence:	*Hazard Controls*:		
Rational or Comment:			

US Department of Labor. Occupational Health and Safety Administration. *Job Hazard Analysis*: OSHA 3071 2002 (Revised).
https://www.osha.gov/Publications/osha3071.pdf

JHA example

Working on scaffolding to clean a sculpture in a gallery or outdoors

Smith, JR. Job Hazard Analysis: Your Key Safety Tool. *AIC News* 39(6), p. 13-15.

What can go wrong?	Chemical spill on you, floor or soil; damage to collection item by spilling chemicals on item. Scaffolding not erected properly.
What are the consequences?	Flammables on clothes. Skin irritation or splash in eyes. Damage to collection item. Faulty scaffolding/no fall protection training = injury or falling to death.
How could it happen?	Not replacing cap on container. Container not stabilized/secured on platform. Tight working space, cramped conditions. Improper knowledge/training or inspection of erecting scaffolding. Improper use of fall protection system preventing a fall.
What are other controlling factors?	Proper chemical handling procedures. Splash goggles, rubber apron, proper long-sleeved gloves. Proper training and protocols for working in high places. Proper training of + inspection of erecting scaffolding. Working at height protocols and training.
How likely is it that the hazard will occur?	Chemical spill on workers + item, very likely. Fall from height, likely.