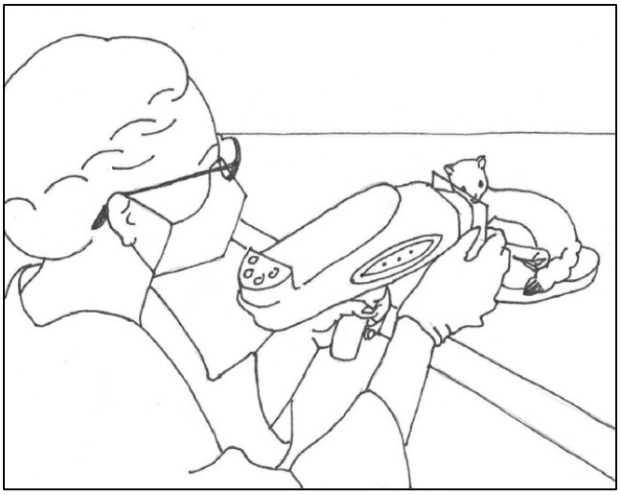
PESTICIDE TESTING

Introduction

Pesticides containing toxic chemicals were often used to prevent insect infestations in collection materials prior to 1970. The practice was common in both museums and private collections, and especially on materials made of fur, feathers, leather, textiles, and plant fibers, as well as in taxidermy mounts. These residues remain, often with no visible signs, and can present risks to human health and safety.

Broadly speaking, pesticides can be divided in two categories: inorganic pesticides, with compounds based on arsenic, bromine, mercury, and lead make up the first category. Organic pesticides, for example strychnine, paradichlorobenzene (PDB), and dichloro-diphenyl-trichloroethane (DDT) make up the second category. This leaflet focuses on **inorganic pesticide** detection.



MACC uses a non-destructive analytical technique known as X-Ray Fluorescence (XRF) spectrometry to identify inorganic residues on surfaces. This technique can be used directly —against the artwork— or indirectly using small samples collected from the surface.

Pesticide testing can be an important part of repatriation, and grants may be available to assist with the costs of testing NAGPRA items. Always obtain permission from the tribe before testing Native collections.

Limitations

This technique is used only to identify whether or not the heavy metals are present, not their quantity or concentration.

Organic pesticides cannot be identified using XRF; they require a different technique. This means that even if results are negative for arsenic, bromine, mercury, and lead the materials may still have been treated with another type of pesticide.

As with all chemical testing, false negatives are possible. This occurs when toxic chemicals are present but not detected due to the sampling method, the area sampled, or other mitigating factors. Please be aware that hazards may still exist even with a negative test result.

Protocols for XRF testing are not standardized, and the specific instrumentation and technique vary among conservation labs. The indirect testing method may be more effective for arsenic and bromine, but less effective at detecting mercury and lead.

These instructions are for the indirect testing method. Please contact MACC before sampling to be sure this is the right testing method for you and for our rates.

Preparing Samples for Testing

Assume that pesticides are present. Protect yourself by wearing nitrile gloves and a dust mask. After sampling, dispose of the gloves and mask and wash your hands with soap.

Identify 3-5 sampling locations on the artwork or artifact to be tested, choosing areas that are both unobtrusive and are likely to contain pesticide residues, such as a crevice or seam, inside and outside, and using locations that are not adjacent to one another. Any white powder found on an artifact is a good candidate for testing.

Be mindful that pigments or dyes may be moisture-sensitive and loosely bound pigments may be removed during sampling.

Fill a clean beaker with ~100 ml of distilled or deionized water.

Lightly moisten a cotton swab in the distilled or deionized water. The swab should be damp, but not so wet that it is glistening. (Excess moisture can be rolled off onto a clean paper towel.) Roll the swab gently over the surface of the object. Once or twice, with gentle pressure, is all that is needed. Avoid rolling back and forth over the same area several times, as this is more likely to result in removing original material. You won't be able to see the sample but don't worry, it's there.

Remove the cotton tip of the swab with tweezers or scissors and place it in a small plastic zip-lock bag.

Repeat this on each area to be sampled, removing all cotton tips and placing them in the same bag. If sampling more than one object, *use separate bags for each object* and label the bags clearly. Send the samples to MACC.

Next Steps

MACC will prepare a report for you that explains the results. If your results are negative, remember that pesticides may still be present. Always handle collection items with caution and minimize contact.

If your results are positive, label the materials as toxic and use gloves and a respirator as personal protection when handling. Throw the gloves away after use so as not to transfer the pesticide to other items. Consult with a medical toxicologist or your doctor for further testing and advice on health risks.

On-Site Testing

XRF is portable and can be brought to your facility for direct testing. Please enquire about the fees for this service.

The Midwest Art Conservation Center is a non-profit organization for the preservation and conservation of art and artifacts, providing treatment, education, and training for museums, historical societies, libraries, other cultural institutions, artists, and the public.

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