



# Preserving the Trust: The Pesticide Residue Project at the Museum of Anthropology

Kathleen Bond and Heidi Swierenga

---

Article originally published within:  
Canadian Conservation Institute. **Preserving Aboriginal Heritage: Technical and Traditional Approaches** (edited by Carole Dignard, Kate Helwig, Janet Mason, Kathy Nanowin and Thomas Stone). Ottawa, Ontario, Canada: Canadian Conservation Institute, 2008.

© Minister of Public Works and Government Services, Canada, 2008

Reproduced with the permission of the Canadian Conservation Institute.

**Disclaimer:** Information on materials is provided only to assist the reader. Mention of a product or company does not in any way imply endorsement by the Canadian Conservation Institute.

The conference papers are reproduced, published, and distributed by the Canadian Conservation Institute (CCI) under licence from the copyright holders. They are published by CCI as a service to the cultural heritage community and are not necessarily reflective of the policies, practices, or opinions of the Department of Canadian Heritage or the Government of Canada.

Article publié initialement dans :  
Institut canadien de conservation. **Préserver le patrimoine autochtone : approches techniques et traditionnelles** (sous la direction de Carole Dignard, Kate Helwig, Janet Mason, Kathy Nanowin et Thomas Stone). Ottawa (Ontario), Canada : Institut canadien de conservation, 2008.

© Ministre, Travaux publics et Services gouvernementaux, Canada, 2008

Reproduit avec la permission de l'Institut canadien de conservation.

**Mise en garde :** L'information sur les matériaux vise uniquement à aider le lecteur. La mention d'un produit ou d'une entreprise n'implique en aucun cas une recommandation de l'Institut canadien de conservation.

Les communications sont reproduites, publiées et diffusées par l'Institut canadien de conservation (ICC) en vertu d'une autorisation des titulaires du droit d'auteur. Publiées à titre de service à la communauté du patrimoine culturel, elles ne reflètent pas nécessairement les politiques, pratiques, ou opinions du ministère du Patrimoine canadien ou du gouvernement du Canada.



## Preserving the Trust: The Pesticide Residue Project at the Museum of Anthropology

**Kathleen Bond**  
Conservation Assistant  
Vancouver Art Gallery

**Heidi Swierenga**  
Conservator and Head of Collections Care and Management  
Museum of Anthropology at the University of British Columbia

### Abstract

*As part of a major expansion and renovation of its research, teaching, and programming spaces and services, the Museum of Anthropology at the University of British Columbia is conducting an assessment of its collection to determine the level and extent of pesticide contamination. This Pesticide Residue Project has three main components: testing of high-risk objects in the collection; determination of health and safety guidelines for continued handling and use; and consultation with originating communities. This paper looks at the project's original objectives and results to date.*

### Titre et Résumé

#### **La confiance, ça se conserve : le projet de résidus de pesticides au Musée d'anthropologie**

*Dans le cadre d'un important projet d'agrandissement et de rénovation de ses locaux et services consacrés à la recherche, à l'enseignement et à la programmation, le Musée d'anthropologie à l'Université de la Colombie-Britannique évalue sa collection, afin de déterminer le niveau et l'étendue de la contamination par des pesticides. Le projet de résidus de pesticides comporte trois principaux volets : l'évaluation d'objets à haut risque de la collection, l'élaboration de lignes directrices en matière de santé et de sécurité pour la manipulation et l'utilisation continues, et la consultation avec les communautés d'origine. Dans cet article, nous examinons les objectifs de départ du projet et présentons les résultats atteints jusqu'à ce jour.*

### Introduction

The Museum of Anthropology (MOA) is a research and teaching museum situated on Musqueam traditional territory at the University of British Columbia (UBC). Due to the number of requests for physical access to the collections, as well as loans of objects to communities, a study was undertaken to identify and confirm levels of heavy metal pesticide contaminants.

Pesticide contamination is a serious problem for many institutions. However, it was hoped that this would not be the case for MOA, which is a relatively small institution with only 35 000 objects in its collection. In addition, as a fairly young museum (60 years), MOA's overall risk of pesticide contamination was judged to be lower than that of older institutions.

Historical use of pesticides in museums is already well documented elsewhere (e.g. Caldararo et al. 2001; Goldberg 1996; Johnson 2001; Odegaard and Sadongei 2005), so will not be presented here. As with many museums, MOA's early history of pesticide use is unclear. However, there is little evidence to suggest that MOA ever used heavy metal pesticides itself. Beginning in the 1980s, pesticide treatments were better documented and were limited to organic compounds. By the 1990s, freezing was the primary method of pest eradication (Johnson 2007).

### Preliminary Survey of the Collection

To determine the extent of pesticide contamination at MOA, conservation staff undertook a small survey of 345 objects with a hand-held Niton X-ray fluorescence (XRF) spectrometer in the fall of 2004. The objects selected for testing were those assessed as being at high risk of contamination. High risk was defined as objects that were rumoured to have been treated, objects that came from collectors whom staff thought likely to have used pesticides as a preservative, and older objects containing fur, feathers, and hair that looked to be in very good condition for their age. Due to the select testing group, it was understood that the results would not accurately represent the contamination levels across the collection. Nonetheless, with 39% of the objects testing positive for arsenic, 55% positive for lead, and 12% positive for mercury, the results were both surprising and paralyzing for a museum that allows a high level of access to its collection.

The results of this preliminary study led to the decision to purchase an XRF to enable testing of all objects in the collection deemed high risk

for pesticide contamination. The results of the initial survey can be found in Figure 1. For ease of interpretation, XRF test results have been assigned ratings that were obtained in consultation with the Canadian Conservation Institute (Sirois 2006):

- N = negative or below detection limit
- T = trace levels (up to 99 ppm)
- L = low levels (100–999 ppm)
- M = moderate levels (1000–9999 ppm)
- H = high levels (10 000 – 49 999 ppm)
- VH = very high levels (50 000 ppm or more)

The results of the initial survey included tests intentionally performed on painted substrates and beaded areas for purposes of comparison. Since traditional ethnographic materials such as paint, pigments, and beadwork can inherently contain heavy metals, the elements identified on painted or beaded objects may not necessarily be related to pesticide use. Thus, testing areas that are painted or beaded can make the interpretation of the XRF results more difficult (Sirois and Sansoucy 2001, p. 62; Fonicello 2007).

### The Pesticide Residue Project (PRP)

The objectives of the PRP were three-fold:

- to identify heavy metal elements and their concentrations on objects in MOA's collection
- to determine the health risks inherent in the contamination levels
- to introduce and clarify the pesticide contamination issue to originating communities, advise them of the PRP, and invite their participation in the project

The first challenge that MOA faced is well known to other institutions that are grappling with the issue of pesticide contamination, i.e. securing the required funds to procure an XRF unit, as well as the staff

resources to test the collections. This was a daunting task in light of all the other competing needs of an institution under fiscal restraint. After pursuing several options, MOA was successful in gaining a grant from the Canadian Foundation for Innovation in 2000 to fund the Partnership of Peoples Project — an initiative to develop and build a research infrastructure that would greatly enhance physical access to the collections at the museum. Acquisition of an Innov-X α-4000 portable XRF unit was built into the grant application so that researchers (be they scholars, students, or descendants from whom the belongings originated) could have details about the contamination status of an object — thus enabling informed decisions concerning appropriate handling or use of the collections. Purchase of the unit, which was dependent on obtaining matching funding, was delayed until 2006.

With additional funds to conduct the testing provided by the Department of Canadian Heritage's Museum Assistance Program, MOA began a year-long assessment of objects in its collection in the fall of 2006 to determine the level and extent of heavy metal pesticide contamination. Objects were designated to be at risk for contamination if they were composed of organic material and were acquired by the museum, collected in the field, or made, before 1970. Special attention would be paid to areas that might come into contact with skin if the object was danced or otherwise used. Of the estimated 9000 ethnographic objects in the collection established to be at risk of contamination, the PRP planned to test 2500 objects originating from Northwest Coast communities.

Consultation with Canada's originating communities was of primary importance. Pesticide contamination of cultural material is a sensitive and sometimes contentious issue, particularly in the United

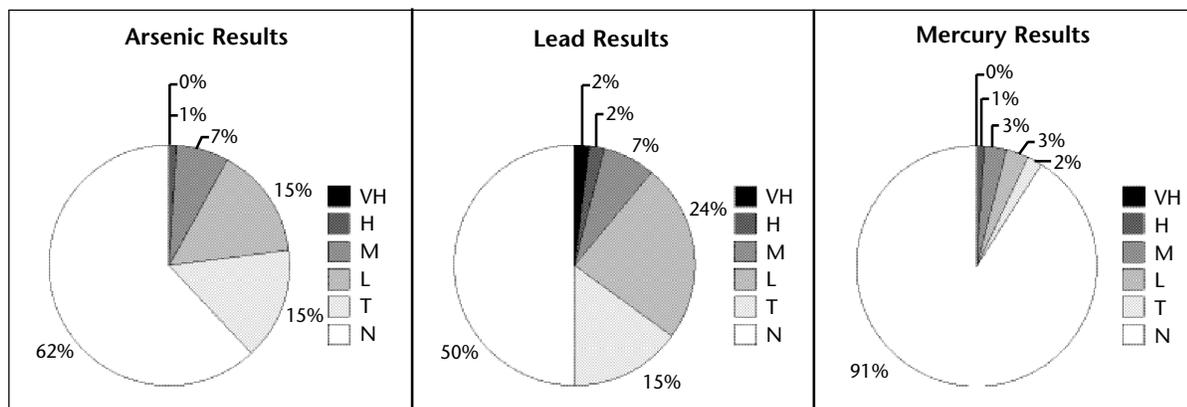


Figure 1. Results of the initial Pesticide Residue Survey of 345 objects in the fall of 2004.

States where sacred items are being returned to communities through the *Native American Graves Protection and Repatriation Act* (NAGPRA) legislation. To gain acceptance and participation, MOA's project was first introduced to originating communities by seeking permission to test their material. MOA wanted to know if there were any questions or concerns regarding testing procedures, as well as whether there were specific objects or collections that, for cultural reasons, should not be tested at all.

**Phase 1: Developing testing techniques and health and safety guidelines**

The year-long project had two parts. Phase 1 lasted for 2 months and was spent developing the most effective testing techniques for the broader survey. This included resolution of any technical issues pertaining to the XRF unit, evaluation of workflow and time estimates, establishment of the various testing parameters, and the initial evaluation of possible health risks indicated by preliminary test results. Included in this phase was the determination of materials inherent in ethnographic items that might contain heavy metals and therefore complicate the interpretation of the XRF results.

Test results gathered from the initial survey were taken to an Occupational Hygienist, an officer available through UBC's Department of Health, Safety and Environment. This consultation was undertaken to assist MOA in developing guidelines for object handling by museum staff and researchers, as well as for continued loan and use by originating communities.

Through UBC, a company specializing in occupational health and safety was brought to the museum to perform relevant workspace testing. As a result of the subsequent report, it was decided that museum staff and researchers would slightly upgrade existing handling procedures beyond the wearing of nitrile gloves. Survey testing and health and safety parameters established in the first phase of the project are listed in Table 1.<sup>1</sup>

**Phase 2: Community consultation and participation**

The second phase of the project was to determine the method and level of community consultation and participation, as well as to elicit feedback on the project in general. Staff recognized that contacting all originating community groups for which MOA

**Table 1. Parameters established during Phase 1 of the Pesticide Residue Project**

<b>Survey testing</b>	<b>Procedural</b>	Soil mode used for all testing.
		Tests duration: initially 60 seconds, now 120 seconds for greater accuracy.
		One to five tests per object.
		Arsenic, lead, and mercury test results and relevant catalogue information are entered into a MS Excel spreadsheet and assigned a colour-coded risk level of: N = not detected; T = trace; L = low; M = moderate; H = high; VH = very high.
	<b>Materials</b>	All organic materials on each object are tested.
		All areas of possible human skin contact through use are tested.
		Areas with pigment, paint, or beadwork are not tested.
<b>Health and safety</b>	<b>Storage</b>	All arsenic, lead, and mercury test results are entered into MOA's Collections Management Database for easy reference.
		Objects with a VH risk level are removed from visible storage and placed in a handling tray.
	<b>Handling</b>	Objects with M, H, and VH risk levels are tagged to indicate special handling guidelines.
		Museum staff are required to wear gloves when handling all objects and to wash hands frequently and before leaving the workspace.
		Museum staff should wear protective clothing and a dust mask fitted with a P100 respirator when vacuuming or handling dusty artifacts.
		Gloves, clothing, and other materials in direct contact with contaminated object surfaces should be considered contaminated.
	<b>Loan/use</b>	Loaned objects with M, H, and VH risk levels will be assigned specialized handling and use guidelines.

held collections would not be possible. Due to time constraints associated with the grant, as well as the fact that in many instances there was no known contact person, groups approached for this project were prioritized based on existing institutional relationships. Curatorial staff assisted in making contacts with communities. Curatorial or conservation staff then wrote to these individuals to introduce the project and identify the questions and areas of concern held by the museum. Community members were asked for feedback on several issues. For example, because the XRF unit looks like a gun, MOA had some concern about respectful testing guidelines and the appropriateness of testing particular objects. Finally, each group was asked how they would like to see the project results presented.

Museum staff took advantage of any opportunity to provide information about the PRP beyond the originally identified communities. Groups of Elders were approached regarding the testing of their belongings housed at the museum.<sup>2</sup> A general information letter and invitation to join the project was included in community newsletters that MOA sent out in the spring and fall of 2007 to provide updates on the Partnership of Peoples Renewal Project. Short presentations and demonstrations were conducted during “behind the scenes” tours at the museum. During the 31st Annual BC Elders Gathering that took place in Vancouver, a PRP information brochure was included with the take-home package. It was hoped that these introductions to the project, however brief, would open discussions between the different groups and the museum. The conclusions reached to date can be found in Table 2.

Consultation with external communities proved to be a very slow process, often taking months to obtain a response to the initial contact letters. As a result, the project was modified to make good

use of time and funding, and high-risk items other than those from North American communities were tested in the interim. The lack of response from some communities was interpreted as either a lack of concern about the PRP or an indication that pesticide contamination was not a priority at the time. When consultations were completed, communities seemed content to let the project continue with no recommendations for respectful testing, and no serious concerns expressed about the pesticide issue in general. To quote one response: “We are confident that you will treat objects from our area with respect and care as you work to determine whether any contaminants are on them” (Sanborn 2007). This begs the question — is it necessary to ask permission?

Although the MOA has not encountered any negative feedback in regards to its PRP, the issue of pesticide contamination of ethnographic objects has proven to be contentious in some museums in the United States (Jemison 2001; Loma’omvaya 2001; Palmquist 2002). Is it that the majority of MOA’s collection is non-sacred and, therefore, less distressing to originating communities? Or that at 60 years of age MOA is a relatively young museum, and there was simply less time for treatment practices using heavy metal pesticides to be employed? The issue of pesticide contamination may be more removed from communities in Canada that have not had collections returned to them. These communities have not yet had to deal directly with contaminated belongings and, as a result, it is not a priority for them. Despite the limited feedback, it was decided that the PRP would follow the example of institutions that have made consultation with Native communities a priority (Johnson et al. 2005; Odegaard and Sadongei 2001; Secakuku 2001).

The consultations thus far have been a positive and successful experience. MOA has learned the value

**Table 2. Conclusions from Phase 2 of the Pesticide Residue Project**

<b>Native consultation</b>	<b>Testing procedures</b>	No concerns expressed about respectful testing or materials tested.
	<b>Other concerns</b>	No concerns expressed regarding handling, loan, or repatriation.
	<b>Test results report</b>	MS Excel spreadsheet of test results and assigned risk levels.
		Interpretation of health and safety risks for objects with M, H, and VH risk levels.
		Handling and use guidelines for objects with M, H, and VH risk levels.
		Fact sheets on arsenic, lead, and mercury toxicity.
		Additional information as requested.
<b>Future projects</b>	Interest in possible satellite testing of objects returned to communities.	

of gaining permission as a method of engagement. Contacting communities for consultation on the project serves many purposes other than the moral imperative of obtaining permission. It allows us to introduce the issue of contamination, provide information on the PRP, and demonstrate that MOA considers addressing health risks posed by previous preservation techniques to be a serious issue and a research priority. Just as importantly, the contacts made through this project will be valuable links to communities for future consultation on conservation activities. Community consultation will continue to be a part of this MOA project.

### Results to date

As of October 2007, 4300 tests have been completed on approximately 2500 objects. As depicted in Figure 2, the results show that lead poses the greatest health and safety risk in MOA's collection, followed by arsenic, and then mercury. It is possible that some of the lead detected can be attributed to dust from lead white paint that was used on many of the masks in the collection (Hawks 2001). However, because the objects and casework in MOA's visible storage area are dusted frequently, this is not likely a significant factor in the results.

The test results of MOA's PRP show that there is a health and safety risk inherent in its collection, although the number of objects with moderate, high, and very high risk levels is small. The health and safety guidelines for handling and use of contaminated objects are still being developed through UBC's Department of Health, Safety and Environment. Initial results indicate that only moderate, high, and very high risk objects will require additional guidelines beyond the use of gloves.

## Conclusions and Future Work

After the year-long PRP is completed, the initiative will continue in the same manner — though on a smaller scale. Testing will proceed on First Nations objects as communities are contacted and testing parameters will change as feedback is received. Once health and safety guidelines for handling, use, and storage of contaminated items have been drafted, feedback from community members will be elicited on whether the guidelines are acceptable and culturally appropriate. Looking forward, MOA hopes to establish an outreach program that will allow for the testing of items returned to First Nations communities or community centres from other institutions, as well as items from small museums in the area. In addition, once the museum is finished its Partnership of Peoples Renewal Project, we hope to provide workshops on care and handling of borrowed or repatriated collections. Although the contamination levels in MOA's collections appear to be relatively low, there is an obligation to inform communities of the general issue. Not knowing of the concern does not diminish the possible health risks, and sharing the knowledge will preserve the trust that is growing between the communities and our museum.

### Endnotes

1. All XRF test results and proposed health and safety guidelines pertain only to three heavy metal contaminants: arsenic, lead, and mercury. They do not encompass all pesticide residues that may have been used on the collection in the past. Other residues such as those left by organic pesticides, while known to be potentially hazardous, have neither been tested for in the MOA collection nor their health effects researched extensively to this date. We hope to make this a research priority in the future.

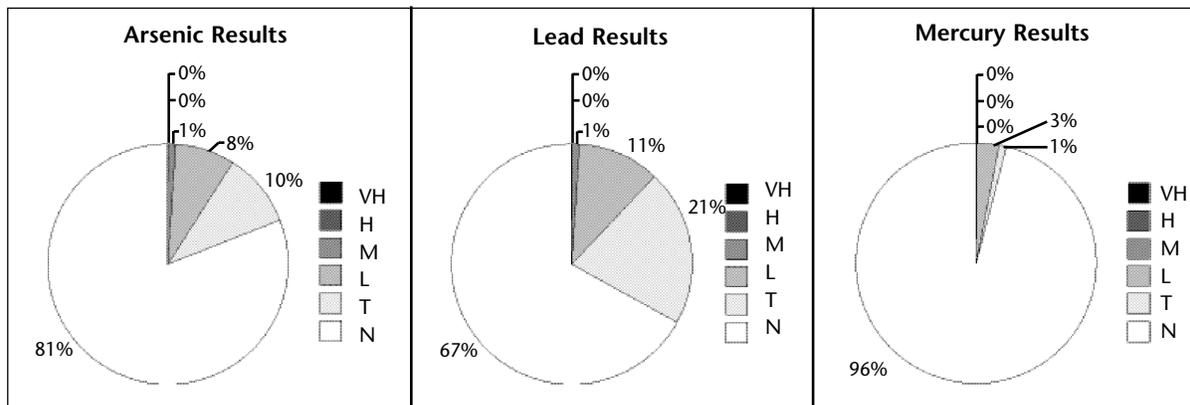


Figure 2. Results of the Pesticide Residue Project as of October 2007.

2. As part of the larger Partnership of Peoples Renewal Project at the MOA, groups of First Nations Elders were often at the museum to discuss the appropriate display and grouping of items from their communities in the museum's renovated visible storage area. These face-to-face meetings were used to introduce the issue of pesticide contamination, provide a demonstration of how the XRF worked, and discuss any concerns the community might have.

## Bibliography

Caldararo, N., L. Davis, P. Palmer, and J. Waddington (editors). "The Contamination of Museum Materials and the Repatriation Process for Native California: Proceedings of a Working Conference at the San Francisco State University, 29 September to 1 October 2000." *Collection Forum* 16, 1–2 (Winter 2001).

Fonicello, N.A. "Unique Problems with the Use of the Handheld XRF Spectrometer for Pesticide Surveys of Ethnographic Collections." *Ethnographic Conservation Newsletter* 28 (February 2007), pp. 4–8.

Goldberg, L. "A History of Pest Control Measures in the Anthropology Collections, National Museum of Natural History, Smithsonian Institution." *JAIC* 36, 1 (1996), pp. 23–43.

Golder Associates Ltd. *Report on Occupational Hygiene Assessment of Heavy Metal Exposures Resulting from Pesticide Use on Artifacts Made of Organic Materials*. Submitted to University of British Columbia, Department of Health, Safety and Environment, Burnaby, BC, March 2008.

Hawks, C. "Historical Survey of the Sources of Contamination of Ethnographic Materials in Museum Collections." *Collection Forum* 16, 1–2 (Spring 2001), pp. 2–11.

Hawks, C.A., and S.L. Williams. "Arsenic in Natural History Collections." *Leather Conservation News* 2, 2 (1986), pp. 1–4.

Jemison, G.P. "Poisoning the Sacred." *Collection Forum* 17, 1–2 (Fall 2001), pp. 38–40.

Johnson, E. (Curator of Asian Studies (retired), Museum of Anthropology, Vancouver). Personal communication, 2007.

Johnson, J. (editor). "Contaminated Collections: Preservation, Access, and Use. Preservation of Native American and Historical Natural History Collections Contaminated with Pesticide Residues. Proceedings of the Conference at the National Conservation Training Center, Shepherdstown, WV, April 6–9, 2001." *Collection Forum* 17, 1–2 (Fall 2001).

Johnson, J., S. Heald, K. McHugh, E. Brown, and M. Kaminitz. "Practical Aspects of Consultation with Communities." *JAIC* 44, 3 (2005), pp. 203–215.

Loma'omvaya, M. "NAGPRA Artifact Repatriation and Pesticides Contamination: The Hopi Experience." *Collection Forum* 17, 1–2 (Fall 2001), pp. 30–37.

Odegaard, N., and A. Sadongei. "The Issue of Pesticides on Native American Cultural Objects: A Report on Conservation and Education Activities at University of Arizona." *Collection Forum* 16, 1–2 (Winter 2001), pp. 12–18.

Odegaard, N., and A. Sadongei. *Old Poisons, New Problems: A Museum Resource for Managing Contaminated Cultural Materials*. Walnut Creek: Altamira Press, 2005.

Palmquist, M. "Poisoned Gods." *SF Weekly* (September 4, 2002). [www.sfweekly.com/2002-09-04/news/poisoned-gods/full](http://www.sfweekly.com/2002-09-04/news/poisoned-gods/full) (accessed December 12, 2007)

Sanborn, A. (Executive Director, Umista Cultural Centre, Alert Bay). Personal communication, 2007.

Secakuku, S. "Issues in Communication and Training Venues: Museums and Tribal Communities." *Collection Forum* 17, 1–2 (Fall 2001), pp. 44–48.

Sirois, P.J. (Senior Conservation Scientist, Analytical Research Laboratory, Canadian Conservation Institute, Ottawa). Personal communication, 2006.

Sirois, P.J., and G. Sansoucy. "Analysis of Museum Objects for Hazardous Pesticide Residues: A Guide to Techniques." *Collection Forum* 17, 1–2 (Winter 2001), pp. 49–66.

Task Force on Museums and First Peoples. *Turning the Page: Forging New Partnerships Between Museums and First Peoples* (a report jointly sponsored by the Assembly of First Nations and the Canadian Museums Association). Ottawa: 1992.

## Biographies

Kathleen Bond graduated from the Master of Art Conservation program at Queen's University in Kingston, Ontario in 2005, specializing in the conservation of ethnographic and historic artifacts and completing her thesis on the use of portable XRF units in determining arsenic contamination in ethnographic leather. Prior to attending Queen's, she completed an undergraduate degree in History at the University of British Columbia in 1995. Kathleen has worked in the conservation labs of the Canadian Museum of Civilization, the Vancouver Art Gallery, and the Vancouver Museum. At the time of the symposium she was the Project Conservator for the Museum of Anthropology's Pesticide Residue Project. She is currently Conservation Assistant at the Vancouver Art Gallery.

### Contact Information

Vancouver Art Gallery  
750 Hornby Street  
Vancouver BC V6Z 2H7  
Canada  
E-mail: kbond@vanartgallery.bc.ca

Heidi Swierenga obtained a Master of Art Conservation from Queen's University in Kingston, Ontario in 2000, specializing in the conservation of ethnographic objects. While completing the requirements for the graduate program she completed conservation internships in contemporary art and ethnographic material at the Vancouver Art Gallery and the Glenbow Museum, respectively. Prior to entering the Queen's program she completed a B.F.A. in Photography at Concordia University in Montreal, Quebec. She is currently Conservator and Head of the Collections Care and Management department at the University of British Columbia (UBC) Museum of Anthropology. Heidi teaches courses on the conservation of organic and inorganic materials within the Department of Anthropology at UBC. She is also currently the lead for the Collections Research Enhancement Project — a component of the museum's Renewal Project involving the digitization, survey, mounting, and move of the museum's collections.

### Contact Information

Museum of Anthropology  
6393 NW Marine Drive  
Vancouver BC V6T 1Z2  
Canada  
Tel.: 604-822-2981  
E-mail: heidiswi@interchange.ubc.ca