

# **Detection and Mitigation of Organic and Inorganic Pesticide Residues on Large Haudenosaunee Medicine Faces at the Rochester Museum & Science Center:**

**In support of the RMSC 2009 NAGPRA Grant**

**Prepared For**

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## **Introduction:**

An objective of this NAGPRA grant is to determine if organic or inorganic based pesticide residues from historic applications are present on Large Haudenosaunee Medicine Faces that may be handled and worn by the Haudenosaunee community. Should contaminants be discovered, the mitigation of these contaminants is paramount.

The screening process was accomplished by use of surface wipe samples and a portable X-ray fluorescence instrument (XRF). Surface wipe samples have been used in similar investigations for screening and following the progress of mitigation with success<sup>1,2</sup>. Surface wipe samples were analyzed for mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS), arsenic samples were analyzed using Atomic Absorption Spectroscopy (AAS) and chlorinated pesticides were screened using Gas Chromatography (GC) at a contract environmental testing laboratory with New York State certification. A Bruker Tracer-III XRF was used to perform direct analysis on the surface of the objects.

Upon completion of this investigation it will be determined if arsenic, mercury or chlorinated pesticides residues are present at detectable levels on the objects selected from the Rochester Museum and Science Center's NAGPRA inventory. The analysis of surface wipe samples from each medicine face in addition to the use of XRF will determine if contamination is present. Detection of any contamination above the action level of 1.0 µg/wipe will be further investigated. No written records have been found of treatments with pesticides but these records are also incomplete.

## **Methodology:**

A portable X-ray fluorescence instrument (XRF) was used to screen all objects for presence of arsenic, mercury and lead. The Bruker Tracer-III-V (40 KeV) was used to perform an X-ray analysis of the painted side, non-painted side and hide (if present). The length of each analysis point was 60 seconds unless otherwise noted.

The XRF was used to analyze multiple points on the surface of each object. Up to four points were analyzed on the painted side (outside / front). If horsehair was present, one or two points on the horse hair hide were analyzed. Up to three points were analyzed on the unpainted (inside) of the object.

Surface wipe samples were collected from selected objects based on the results of XRF screening. Pre-moistened Palintest dust wipes were utilized in obtaining qualitative samples from the surface of each medicine face. Up to three wipe samples were taken per medicine face. The first surface wipe sample was taken for chlorinated pesticides. This wipe sample was taken over the entire surface of one side of the object (inside

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<sup>1</sup> Reuben, P. A. *Collection Forum* **2006**; 20(1-2):33-41.

<sup>2</sup> Reuben, P. A. *Decontaminating Sacred Objects of the Haudenosaunee*, Proceedings of the Preserving Aboriginal Heritage: Technical and Traditional Approaches, Symposium 2007, Canadian Conservation Institute, Ottawa, On. 2008; pp 195-199.

unless otherwise noted). This wipe sample was analyzed for twenty-two (22) chlorinated pesticides using EPA Method 8081A. As needed, a separate wipe sample was taken and analyzed for either arsenic or lead using EPA Method 6010B. A separate sample for mercury was taken and analyzed using EPA Method 7471A. Wipe samples for arsenic, mercury or lead were taken over one-half of the surface of one side (painted or unpainted). Each surface to be sampled was wiped once with a serpentine motion covering the entire sample area. The wipe was then folded in upon itself and the same surface was wiped again. The wipe was folded again and used to wipe the surface for a third time. Wipe samples were then placed in properly labeled glass sample jars supplied by the NYS certified contract environmental laboratory.

## Results:

Below are summary tables based on the analysis of surface wipe samples from objects selected in this project or X-ray fluorescence analysis performed directly on the object surface.

**Table 1.) No Arsenic, mercury, lead or organic contaminations detected on these objects.**

<b>Objects with no contaminants detected</b>		
<b>Catalog #</b>	<b>Accession</b>	<b>Object type and origin</b>
AE4184	35.299.31	Wooden medicine face, Cattaraugus Reservation
AE4134	35.268.2	Wooden medicine face, Cattaraugus Reservation
AE5727	35.280.22	Wooden medicine face, Cattaraugus Reservation
AE5709	35.285.56	Wooden medicine face, Cattaraugus Reservation
AE349	23.32.24	Wooden medicine face, Cattaraugus Reservation
AE371	23.32.45	Wooden medicine face, Cattaraugus Reservation
AE363 (A)	23.32.77	Wooden medicine face, Cattaraugus Reservation
AE366	23.32.40	Wooden medicine face, Cattaraugus Reservation
AE2276	31.147.1	Wooden medicine face, Cattaraugus Reservation
AE2481	34.141.3	Wooden medicine face, Cattaraugus Reservation
AE3623	35.252.1	Wooden medicine face, Cattaraugus Reservation
AE2681	35.266.2	Cornhusk medicine face, Cattaraugus Reservation
AE2750	35.266.4	Cornhusk medicine face, Cattaraugus Reservation
AE3964	35.266.10	Cornhusk medicine face, Cattaraugus Reservation
AE2751	35.266.5	Cornhusk medicine face, Cattaraugus Reservation
AE3479	35.266.6	Cornhusk medicine face, Cattaraugus Reservation
AE3483	35.266.8	Cornhusk medicine face, Cattaraugus Reservation
AE3965	35.266.11	Cornhusk medicine face, Cattaraugus Reservation
AE3966	35.266.12	Cornhusk medicine face, Cattaraugus Reservation
AE3242	35.340.1	Cornhusk medicine face, Cattaraugus Reservation
AE3621	35.340.5	Cornhusk medicine face, Cattaraugus Reservation
AE4098	35.340.8	Cornhusk medicine face, Cattaraugus Reservation
AE3480	35.340.3	Cornhusk medicine face, Cattaraugus Reservation
AE3481	35.340.4	Cornhusk medicine face, Cattaraugus Reservation
AE330	23.32.4	Cornhusk medicine face, Alleghany Reservation
AE505	24.61.10	Cornhusk medicine face, Alleghany Reservation

Table 1) continued.

<b>Objects with no contaminates detected</b>		
<b>Catalog #</b>	<b>Accession</b>	<b>Object type and origin</b>
AE363 (b)	23.32.37	Cornhusk face, Cattaraugus Reservation
AE368	23.32.42	Cornhusk face, Cattaraugus Reservation
AE368	23.32.43	Cornhusk face, Cattaraugus Reservation
AE482a	25.69.1	Cornhusk face, Cattaraugus Reservation
AE482b	25.69.2	Cornhusk face, Cattaraugus Reservation
AE2480	34.141.1	Cornhusk face, Cattaraugus Reservation
AE2480	34.141.2	Cornhusk face, Cattaraugus Reservation
	84.171.1	Cornhusk face, Cattaraugus Reservation
AE762	26.70.1	Cornhusk face, New York State
AE769	26.26.2	Cornhusk face, New York State
	73.00.02.1	Cornhusk face, New York State
AE2914	29.259.77	Cornhusk face, New York State
AE2914	29.259.36	Cornhusk face, New York State
AE10316	66.222.2	Wooden medicine face, Onondaga
AE1135	28.185.1	Cornhusk face, New York State
AE2880	29.259.27	Wooden medicine face, Tonawanda Reservation
AE2881	29.259.28	Wooden medicine face, Tonawanda Reservation
AE10256	66.356.1	Wooden medicine face, Tonawanda Reservation
AE10271	66.356.3	Wooden medicine face, Tonawanda Reservation
AE10272	66.356.4	Wooden medicine face, Tonawanda Reservation
AE4177	35.290.13	Wooden medicine face, Cattaraugus Reservation
	77.00.68.1	Cornhusk face, Iroquois

**Table 2.) These objects contain lead paint.**

<b>Objects with lead paint</b>		
<b>Catalog #</b>	<b>Accession</b>	<b>Object type and origin</b>
AE2006	35.295.30	Wooden medicine face, Cattaraugus Reservation
AE4176	35.295.31	Wooden medicine face, Cattaraugus Reservation
AE4050	35.299.30	Wooden medicine face, Cattaraugus Reservation
AE4856	35.303.1	Wooden medicine face, Cattaraugus Reservation
AE4857	35.303.2	Wooden medicine face, Cattaraugus Reservation
AE2800	35.290.2	Wooden medicine face, Cattaraugus Reservation
AE2760	35.290.1	Wooden medicine face, Cattaraugus Reservation
AE3462	35.290.4	Wooden medicine face, Cattaraugus Reservation
AE5706	35.290.14	Wooden medicine face, Cattaraugus Reservation
AE3165	35.339.18	Wooden medicine face, Cattaraugus Reservation
AE3516	35.268.23	Wooden medicine face, Cattaraugus Reservation
AE4042	35.268.27	Wooden medicine face, Cattaraugus Reservation
AE4043	35.268.28	Wooden medicine face, Cattaraugus Reservation
AE3166	35.268.18	Wooden medicine face, Cattaraugus Reservation
AE5705	35.268.32	Wooden medicine face, Cattaraugus Reservation
AE3164	35.268.17	Wooden medicine face, Cattaraugus Reservation
AE4033	35.268.25	Wooden medicine face, Cattaraugus Reservation
AE4041	35.268.26	Wooden medicine face, Cattaraugus Reservation
AE4027	35.268.24	Wooden medicine face, Cattaraugus Reservation
AE4142	35.268.30	Wooden medicine face, Cattaraugus Reservation
AE4143	35.268.31	Wooden medicine face, Cattaraugus Reservation
AE4139	35.268.29	Wooden medicine face, Cattaraugus Reservation
AE3334	35.268.21	Wooden medicine face, Cattaraugus Reservation
AE4138	35.257.1	Wooden medicine face, Cattaraugus Reservation
AE3333	35.268.20	Wooden medicine face, Cattaraugus Reservation
AE3177	35.268.19	Wooden medicine face, Cattaraugus Reservation
AE3515	35.268.22	Wooden medicine face, Cattaraugus Reservation
AE5707	35.268.33	Wooden medicine face, Cattaraugus Reservation
AE2847	35.280.24	Wooden medicine face, Cattaraugus Reservation
AE2848	35.280.11	Wooden medicine face, Alleghany Reservation
AE1690	29.273.1	Wooden medicine face, Seneca
AE1171	27.81.463	Wooden medicine face, Seneca, NY
AE9499	61.334.1	Wooden medicine face, Iroquois, NY/Canada
AE10257	66.356.2	Wooden medicine face, Tonawanda Reservation

**Table 2 continued:**

<b>Objects with lead paint</b>		
<b>Catalog #</b>	<b>Accession</b>	<b>Object type and origin</b>
AE3335	35.280.13	Wooden medicine face, Alleghany Reservation
AE4039	35.280.16	Wooden medicine face, Alleghany Reservation
AE4047	35.280.17	Wooden medicine face, Alleghany Reservation
AE4048	35.280.18	Wooden medicine face, Alleghany Reservation
AE3513	35.280.14	Wooden medicine face, Cattaraugus Reservation
AE4034	35.280.15	Wooden medicine face, Cattaraugus Reservation
AE5728	35.280.23	Wooden medicine face, Cattaraugus Reservation
AE4158	35.285.52	Wooden medicine face, Cattaraugus Reservation
AE4210	35.285.53	Wooden medicine face, Cattaraugus Reservation
AE3517	35.285.47	Wooden medicine face, Cattaraugus Reservation
AE4031	35.285.49	Wooden medicine face, Cattaraugus Reservation
AE4214	35.285.57	Wooden medicine face, Cattaraugus Reservation
AE5708	35.285.55	Wooden medicine face, Cattaraugus Reservation
AE4144	35.288.26	Wooden medicine face, Cattaraugus Reservation
AE4137	35.288.25	Wooden medicine face, Cattaraugus Reservation
AE5726	35.315.11	Wooden medicine face, Cattaraugus Reservation
AE4045	35.315.10	Wooden medicine face, Cattaraugus Reservation
AE4036	35.290.6	Wooden medicine face, Cattaraugus Reservation
AE4038	35.290.7	Wooden medicine face, Cattaraugus Reservation
AE4040	35.290.8	Wooden medicine face, Cattaraugus Reservation
AE4044	35.290.9	Wooden medicine face, Cattaraugus Reservation
AE4136	35.290.11	Wooden medicine face, Cattaraugus Reservation
AE10	26.63.1	Wooden medicine face, Cattaraugus Reservation
AE404	23.47.1	Wooden medicine face, Cattaraugus Reservation
AE3478	35.340.2	Cornhusk medicine face, Cattaraugus Reservation
AE509	24.61.13	Wooden medicine face, Alleghany Reservation
AE2874	29.259.21	Wooden medicine face, Grand River Reservation
AE2870	29.259.17	Wooden medicine face, Onondaga Reservation
AE2872	29.259.19	Wooden medicine face, Onondaga Reservation
AE10315	66.222.1	Wooden medicine face, Onondaga Reservation
AE405	23.47.2	Wooden medicine face, Seneca Reservation New York
AE406	23.47.3	Wooden medicine face, Seneca Reservation, New York
AE578	25.75.1	Wooden medicine face, Seneca Reservation, New York
AE10273	66.356.5	Wooden medicine face, Tonawanda Reservation
AE309	25.69.1	Wooden medicine face, Cattaraugus Reservation
AE500	24.61.5	Wooden medicine face, Alleghany Reservation
AE7238	38.376.1	Wooden medicine face, Cattaraugus Reservation
AE7238	38.367.2	Wooden medicine face, Cattaraugus Reservation

**Table 3.) Arsenic, mercury or lead detected on these objects using XRF analysis. These objects require additional steps before use.**

Museum ID		Object type and origin	Sample Location	XRF Analysis		
Catalog #	Accession			Arsenic	Mercury	Lead
AE309	25.69.1	Wooden medicine face, Cattaraugus Reservation	outside	X		X
			inside	X		
			hair	X		
AE500	24.61.5	Wooden medicine face, Allegheny Reservation	outside		X	X
			inside		X	X
			hair			

Note: X denotes detection by XRF.

**Table 4.) Chlorinated Pesticides detected on these objects based on wipe samples.**

Museum ID			Concentration	Pesticide Name
Catalog #	Accession	Object Name		
AE5705	35.268.32	Wooden medicine face, Cattaraugus Reservation	0.92	Endrin Ketone
AE3333	35.268.20	Wooden medicine face, Cattaraugus Reservation	0.44	4,4'-DDT
AE4034	35.280.15	Wooden medicine face, Cattaraugus Reservation	0.56	4,4'-DDT

Note: Action level used was 1.0 µg/wipe.  
Concentrations units are µg/wipe sample.

### Discussion:

A condition survey was performed on each object in this project prior to analysis and sampling. No evidence of past or present insect infestation was observed on the objects surveyed in this project. All of the wooden medicine faces had paint in good condition with no flaking. Chips in the paint as observed and typical wear marks on raised edges were noted. Several of the medicine faces had repairs that appear to have been made during construction. Medicine face AE309 appeared to have the most cracks present due to storage post construction. Several of the objects constructed of cornhusk had minor damage but were in good condition overall. Damage to the cornhusk faces was mainly loose cob noses.

Ninety-four wooden and cornhusk medicine faces were selected from the list of objects subject to NAGPRA. No significant contamination issues were noted on these objects. Based on these favorable results, an additional twenty-six medicine faces were investigated for a total of 120 objects. All objects underwent screening using the XRF

for lead, arsenic and mercury. Tables 1 through 3 separate the objects based on results of the XRF screening.

As seen in Table 2, lead was detected on seventy-two objects. Given the age of the objects, the lead observed on the front of object was likely due to the paint formulation. Lead was also observed on the inside or unpainted of certain objects. As no sign of paint was observed on the inside, it is most likely a result of lead residues being dislodged from the painted side and transferred to the inside by normal handling.

Arsenic was observed on one object. Object AE309 was observed to have a high amount of arsenic on the hide of the horsehair. Arsenic was also observed to be on the inside of the wooden medicine face. The arsenic on the inside of the medicine face was likely transferred from the horsehair through normal handling.

Mercury was observed on one object. Object AE500 was observed to have elevated levels of mercury and lead present on both the painted side (front) and non-painted side (back) of the medicine face. Given the age and color of the medicine face (red), it is likely that vermilion (mercury-sulfide pigment) was used to enhance the color of the paint.

No detectable levels of lead, mercury or arsenic were observed on 48 medicine faces in this project. These objects were screened in the same manner as all objects in this project. These results are likely due to the choice of materials used in the construction of the objects.

Pesticide wipe samplings were not based on XRF results and were taken to meet the fundamental objective of screening for organic pesticides (chlorinated). Included in the pesticide screening were the following compounds: aldrin, alpha-BHC, beta-BHC, gamma-BHC (lindane), delta-BHC, Chlordane, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Dieldrin, Endosulfan I & II, Endosulfan Sulfate, Endrin Ketone, Endrin Aldehyde, Hepachlor, Heptachlor epoxide, Methoxychlor and Toxaphene. The wipe samples were taken using the procedure developed in the previous project. A summary of pesticide detections based on the analysis of wipe samples are summarized in the Table 4. As no detections were above the action level of 1.0 µg/wipe sample, no further action is recommended. The results for all medicine faces are in the appendix of this report.

The grant objective of testing ninety-four large wooden and cornhusk medicine faces from the Cattaraugus Reservation for inorganic and organic contaminants was achieved. As no significant level of contamination was observed, resources reserved for retesting after contaminate removal were used to screen an additional twenty-six medicine faces.

Test results show that the use of the Brüker Tracer III handheld XRF in the screening of inorganic contaminants on these objects was efficient and cost effective. Surface wipe samples results supported the results of the XRF for arsenic, mercury and lead. The combination of the two methods greatly reduced the cost and time required to complete this project while providing the necessary non-destructive test methods desired by the Tribal Representatives.



## **Recommendations:**

The forty-eight objects with no contamination issues may be released and used in their current state. The seventy-two objects with lead paint present may be handled and/or worn with notification of the presence of lead paint and the potential hazard of lead paint. It is highly recommended that the traditional practitioners consider the application of a new coat of paint on existing painted surfaces. This is important as it will reduce the transfer of lead residues from the painted side of the object to the non-painted side of the object by simple contact of the user.

Wooden medicine face AE 309 was observed to have elevated levels of arsenic in the hide of the horsehair and on the inside surface of the object. It is recommended that the horsehair be removed and analyzed separately to confirm it is the source of arsenic. If confirmed as the source, the reuse of the hair is not recommended. It is strongly recommended that the Native American Consultants be contacted for the disposition of the horsehair. The remaining portions of the object should be cleaned using a technique such as the Surface Active Displacement Solution. This technique uses a dilute alcohol water mixture to reduce the surface tension and is followed by a surfactant water mixture (soap/water) to encapsulate the contaminant. The last step is to rinse the surface with clean water to remove the encapsulated contaminant. Given the level of arsenic present, this may be done by either the traditional practitioner after repatriation or with support of the RMSC prior to the repatriation.

Wooden medicine face AE 500 was observed to have elevated levels of mercury and lead on both the inside and outside. The likely source is the paint. It is recommended that a new coat of paint be applied to the front of the wooden medicine face to minimize the additional transfer of mercury or lead. It is recommended that the inside be cleaned using the same technique described for object AE309 above. Again, this cleaning may be either performed by the traditional practitioner or with the support of the RMSC prior to repatriation.

**End of Report**

Appendix A.) All results from XRF and analysis of surface wipe samples.

Identification			XRF Analysis				Wipe sample results (µg/wipe)			
Museum ID			Pb, Hg, As only				Arsenic	Mercury	Lead	Pesticide
Cat #	accession #	Object Name	Paint	Hair	inside	other				
AE2006	35.295.30	face, wood	Pb	none	none				ND	
AE4176	35.295.31	face, wood	Pb	none	none			13.7	ND	
AE4050	35.299.30	face, wood	Pb	none	none			103 out /59.2 in	ND	
AE4184	35.299.31	face, wood	none	none	none				ND	
AE4856	35.303.1	face, wood	Pb	none	none				ND	
AE4857	35.303.2	face, wood	Pb	none	none			32.8	ND	
AE2800	35.290.2	face, wood	Pb	none	none				ND	
AE2760	35.290.1	face, wood	Pb	none	none				ND	
AE3462	35.290.4	face, wood	Pb	none	none				ND	
AE5706	35.290.14	face, wood	Pb	none	none	Zn, Ti			ND	
AE3165	35.339.18	face, wood	Pb	none	none				ND	
AE3516	35.268.23	face, wood	Pb	none	none				ND	
AE4042	35.268.27	face, wood	Pb	none	none				ND	
AE4043	35.268.28	face, wood	Pb	none	none				ND	
AE3166	35.268.18	face, wood	Pb	none	Pb				ND	
AE5705	35.268.32	face, wood	Pb	none	none				0.92	
AE3164	35.268.17	face, wood	Pb	none	none				ND	
AE4033	35.268.25	face, wood	Pb	none	none			308	ND	
AE4041	35.268.26	face, wood	Pb	none	none				ND	
AE4134	35.268.2	face, wood	none	na	none				ND	
AE4027	35.268.24	face, wood	Pb	none	none				ND	
AE4142	35.268.30	face, wood	Pb	na	none		ND	0.0802	ND	
AE4143	35.268.31	face, wood	Pb	na	none				ND	
AE4139	35.268.29	face, wood	Pb	na	Pb		0.6	0.149	48.7 in	
AE3334	35.268.21	face, wood	Pb	none	Pb		0.4	0.306	ND	
AE4138	35.257.1	face, wood	Pb	N/A	none				115 out	
AE3333	35.268.20	face, wood	Pb	none	none	copper			0.44	
AE3177	35.268.19	face, wood	Pb	none	none				ND	
AE3515	35.268.22	face, wood	Pb	none	none				ND	
AE5707	35.268.33	face, wood	Pb	none	Pb				ND	
AE2847	35.280.24	face, wood	Pb	none	Pb		ND	0.254	2.6 in	
AE2848	35.280.11	face, wood	Pb	none	none				ND	
AE3335	35.280.13	face, wood	Pb	none	none				ND	
AE4039	35.280.16	face, wood	Pb	N/A	none	Pb, mouth			ND	
AE4047	35.280.17	face, wood	Pb	none	none	Pb, mouth			ND	
AE4048	35.280.18	face, wood	Pb	none	none	none			ND	
AE5727	35.280.22	face, wood	none	none	none	Pb, mouth			ND	
AE3513	35.280.14	face, wood	Pb	none	Pb		ND	0.488	27.3 in	
AE4034	35.280.15	face, wood	Pb	none	none	glove, Zn			68.1	
									0.56	

Appendix A continued

Identification			XRF Analysis				Wipe sample results (µg/wipe)			
Museum ID			Pb, Hg, As only				Arsenic	Hg	Lead	Pesticide
Cat #	accession #	Obj. Name	Paint	Hair	inside	other				
AE5728	35.280.23	Face. wood	Pb	none	none	Pb mouth				ND
AE4158	35.285.52	Face. wood	Pb	none	none	Pb mouth				ND
AE4210	35.285.53	Face. wood	Pb	none	none					ND
AE5709	35.285.56	Face. wood	none	none	none					ND
AE3517	35.285.47	Face. wood	Pb	none	Pb		ND	0.167	4.9 in	ND
AE4031	35.285.49	Face. wood	Pb	N/A	none	Pb, lips				ND
AE4214	35.285.57	Face. wood	Pb	none	none					ND
AE5708	35.285.55	Face. wood	Pb	none	none					ND
AE4144	35.288.26	Face. wood	Pb	N/A	none					ND
AE4137	35.288.25	Face. wood	Pb	N/A	Pb		0.2	0.167	6.4 in	ND
AE5726	35.315.11	Face. wood	Pb	N/A	none					ND
AE4045	35.315.10	Face. wood	Pb	none	none					ND
AE4036	35.290.6	Face. wood	Pb	none	Pb	teeth, Pb				ND
AE4038	35.290.7	Face. wood	Pb	none	none					ND
AE4040	35.290.8	Face. wood	Pb	none	none					ND
AE4177	35.290.13	Face. wood	na	na	none					
AE4044	35.290.9	Face. wood	Pb	none	none	Pb, teeth				ND
AE4136	35.290.11	Face. wood	Pb	na	none					ND
AE10	26.63.1	Face. wood	Pb	Pb	none					ND
AE309	25.69.1	Face. wood	Pb	As	As		29.2 out/178 in			ND
AE349	23.32.24	Face. wood	none	none	none					ND
AE371	23.32.45	Face. wood	none	none	none					ND
AE404	23.47.1	Face. wood	Pb	none	none					ND
AE363 (A)	23.32.77	Face. wood	none	none	none					
AE366	23.32.40	Face. wood	none	na	none					
AE2276	31.147.1	Face. wood	none	na	none					ND
AE2481	34.141.3	Face. wood	none	none	none					ND
AE3623	35.252.1	Face. wood	none	na	none					
AE7238	38.367.1	Face. wood	Pb	none	none				29 out / 11.4 in	ND
AE7238	38.367.2	Face. wood	Pb	none	none				28.4	ND
AE2681	35.266.2	Face, husk	none	na	none			0.0585		ND
AE2750	35.266.4	Face, husk	none	na	none			0.088		ND
AE3964	35.266.10	Face, husk	none	na	none			0.0194		ND
	77.00.68.1	Face, husk	none	na	none			0.0264		ND
AE2751	35.266.5	Face, husk	none	na	none			0.068		ND
AE3479	35.266.6	Face, husk	none	na	none			0.0905		
AE3483	35.266.8	Face, husk	none	na	Pb			0.0685	7.7	

Appendix A continued.

Identification			XRF Analysis				Wipe sample results (ug/wipe)			
Museum ID			Pb, Hg, As only				As	Hg	Pb	Pesticide
Cat #	accession #	Obj. Name	Paint	Hair	inside	other				
AE3965	35.266.11	Face, husk	none	na	none					
AE3966	35.266.12	Face, husk	none	na	none					
AE3242	35.340.1	Face, husk	none	na	none					
AE3621	35.340.5	Face. wood	none	na	none					
AE4098	35.340.8	Face. wood	none	na	none					
AE3480	35.340.3	Face. wood	none	na	none					
AE3478	35.340.2	Face. wood	Pb	none	Pb			2.8		
AE3481	35.340.4	Face. wood	none	na	none				ND	
AE330	23.32.4	Face, husk	none	na	none		0.075		ND	
AE505	24.61.10	Face, husk	none	na	none		0.094		ND	
AE363 (b)	23.32.37	Face, husk	none	na	none					
AE368	23.32.42	Face, husk	none	na	none		0.0494		ND	
AE368	23.32.43	Face. wood	none	na	none		0.0404		ND	
AE482a	25.69.1	Face, husk	none	na	none		0.0265		ND	
AE482b	25.69.2	Face, husk	none	na	none		0.048			
AE2480	34.141.1	Face, husk	none	na	none		0.152			
AE2480	34.141.2	Face, husk	none	na	none		0.154			
	84.171.1	Face, husk	none	na	none		0.0795		ND	
AE762	26.70.1	Face, husk	none	na	none					
AE769	26.26.2	Face, husk	none	na	none					
	73.00.02.1	Face, husk	none	na	none					
AE2914	29.259.77	Face, husk	none	na	none				ND	
AE2914	29.259.36	Face, husk	none	na	none				ND	
AE500	24.61.5	Face, wood	Hg, Pb		Hg, Pb		20.7 in/1.12 out	18.2 in/32.8 out	ND	
AE509	24.61.13	Face, wood	Pb	none	none				ND	
AE2874	29.259.21	Face, wood	Pb	none	none				ND	
AE2870	29.259.17	Face, wood	Pb	na	none				ND	
AE2872	29.259.19	Face, wood	Pb	na	none				ND	
AE10315	66.222.1	Face, wood	Pb	na	none				ND	
AE10316	66.222.2	Face, wood	none	none	none			13.7	ND	
AE405	23.47.2	Face, wood	Pb	none	none			59.2	ND	
AE406	23.47.3	Face, wood	Pb	na	none		0.5	130 out	ND	
AE578	25.75.1	Face, wood	Pb	none	none		0.442		ND	
AE1690	29.273.1	Face, wood	Pb	na	na					
AE1135	28.185.1	Face, wood	none	na	none					
AE1171	27.81.463	Face, wood	Pb	none	none				ND	

Appendix A continued.

Identification			XRF Analysis				Wipe sample results (ug/wipe)			
Museum ID			Pb, Hg, As only				As	Hg	Pb	Pesticide
Cat #	accession #	Obj. Name	Paint	Hair	inside	other				
AE9499	61.334.1	Face, wood	Pb	none	none				ND	
AE2880	29.259.27	Face, wood	none	na	none					
AE2881	29.259.28	Face, wood	none	na	none					
AE10256	66.356.1	Face, wood	none	none	none					
AE10257	66.356.2	Face, wood	Pb	none	none					
AE10271	66.356.3	Face, wood	none	none	none					
AE10272	66.356.4	Face, wood	none	none	none					
AE10273	66.356.5	Face, wood	Pb	none	none					

Note: Pb = lead

ND = non-detection

Zn = zinc.

As = arsenic

Hg = mercury