Silver Content Survey of Southwestern American Indian Silver Jewelry

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Introduction

Grants awarded by The Bay and Paul Foundations (2008) and the Stockman Family Foundation Trust (2010) to the Arizona State Museum (ASM), at the University of Arizona, made it possible to give conservation attention to the Museum's American Indian silver jewelry collection.

The grants enabled:

- 1) A condition assessment of the collection.
- 2) Photography of objects in the collection that had never or recently been photographed.
- 3) Non-destructive analysis of the silver content in the collection using a portable X-Ray Fluorescence (pXRF). 4) Re-housing of the collection.

			Standards	,	
56%	65%	70%	75%		 Nine silver alloy standards, ranging
56%	65%	70%	75%		were prepared (Fig.2).
					• The standards ranging
85%	90%	92.5%	95%	99.9%	purchased as jeweler's
					silver solder.
	(S AND				• The standards ranging

Results and Observations

- 1) A greater than expected distribution (14-96%) in silver content exists in the ASM's silver jewelry collection.
- 2) A surprising quantity (around 80%) of the analyzed silver objects are entirely made using silver that has a silver content lower than 85%.
- 3) Within this collection, existing trends in the silver content are apparent. This suggests that objects attributed to different American Indian tribes are fabricated with differing levels of

The goal of the pXRF analysis was to conduct a preliminary evaluation of the silver content of the alloys used in the fabrication of the jewelry objects. It was proposed that, if successful, data from this survey will be used to develop a more comprehensive study of composition and alloy distribution in American Indian silver jewelry.

The ASM has a collection of 758 Southwestern American Indian jewelry objects from the Greater Southwest (including Arizona, New Mexico, Utah, and Mexico). In total, 574 objects made entirely from silver or containing silver have been analyzed. The objects analyzed include buttons, rings, bracelets, squash blossom necklaces, concha belts, bow guards, bola ties, and other traditional items that are frequently ornamented with stone bezels and inlays (Fig.1).

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Fig.2: Nine Silver alloy standards ranging from 56% to 99.9%. ASM 2011.



from 85% to 99.9% were fabricated by a silversmith.

• All of the standards were analyzed with a Niton XIi pXRF instrument with an americium source.

• A calibration curve (Fig.3) was constructed by plotting the percent silver in the standards versus the instrument response. The resulting curve was found to be linear. The method of least squares was used to construct a best fit straight line through the points. The equation for the line was used to calculate the

silver content.



Fig.5: Navajo Naja pendant (80-47-258). ASM 2011. The silver content in this pendant was found *to be 88.4% <u>+</u> 1.5%.*



Fig.1: Zuni Pueblo pin (E-7433). ASM 2007.

Fig.3: The resultant calibration curve from the pXRF analysis of the nine silver alloy standards.

concentration and associated error for each sample.

Analysis

- The silver objects in the AMS's 0 jewelry collection were analyzed with the Niton XIi pXRF instrument with an americium source (Fig.4).
- At least one reading was made on Ο each object (Fig.5). Objects made from one piece of silver were analyzed once; objects containing a number of silver pieces were analyzed multiple times.
- The results for each object were 0 evaluated using the above equation to obtain the silver concentration and associated error.

Fig.4: Ida Pohoriljakova analyzing a silver bracelet using the Niton Xli pXRF. ASM 2011.



Conclusions

- 1) Surveying the silver content of the ASM's silver jewelry collection has proven to be an effective means of gaining further insight into the collection.
- 2) Availability of this data along with curatorial information, conservation history, and a condition assessment in a Microsoft® Access database will influence recommended storage and exhibition conditions, handling and accessibility to the collection, and curatorial assignments.
- 3) This assessment will offer a starting point for advanced studies on Southwestern American Indian silversmithing technology, practices, and development.

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