



*Staffordshire Hoard  
Research Report 14*

XRF Analysis of Triangular Green Inlay  
in Staffordshire Hoard Object K744

Andrew Meek

2013

This report forms part of  
*The Staffordshire Hoard: an Anglo-Saxon Treasure*  
edited by C. Fern, T. Dickinson and L. Webster  
and published by the Society of Antiquaries of London

## **Information about this report**

This report was produced in 2013 as part of Stage 1 of the project, i.e. before fragments were joined and catalogued.

The inlay is part of catalogue number 75 – a pommel in cast silver, of cocked hat form with double sword-rings, with cast interlace, niello and glass decoration.

The work was carried out in the Department of Conservation and Scientific Research in the British Museum with aid of funding from National Geographic.

It is copyright Birmingham City Council.

DEPARTMENT OF CONSERVATION AND SCIENTIFIC RESEARCH

XRF analysis of triangular green inlay in Staffordshire Hoard object K744

Science Report PR07444-5

Andrew Meek

**Abstract:** Silver gilt fragment K744 from the Staffordshire Hoard was submitted to the British Museum Research Laboratory for non-destructive analysis. The aim of this analytical project was to discover the nature of the materials used to produce the green inlay.

The triangular glass inlay in object K744 is made from a soda-lime-silica glass. The XRF spectra, coupled with the vast majority of previous analyses suggest that it is a natron-based glass.

The green colouration is caused by the presence of iron. Its colouration is similar to many other Anglo Saxon glass vessels. It is possible that the inlay is a reworked piece of vessel glass, cut to shape and polished prior to insertion in the object.

CSR Project no. PR07444  
Staffordshire Hoard number: K744

19 February 2013

## Introduction

Silver gilt fragment K744 from the Staffordshire Hoard was submitted to the British Museum Research Laboratory for non-destructive analysis. The aim of this analytical project was to discover the nature of the materials used to produce the transparent green inlay.



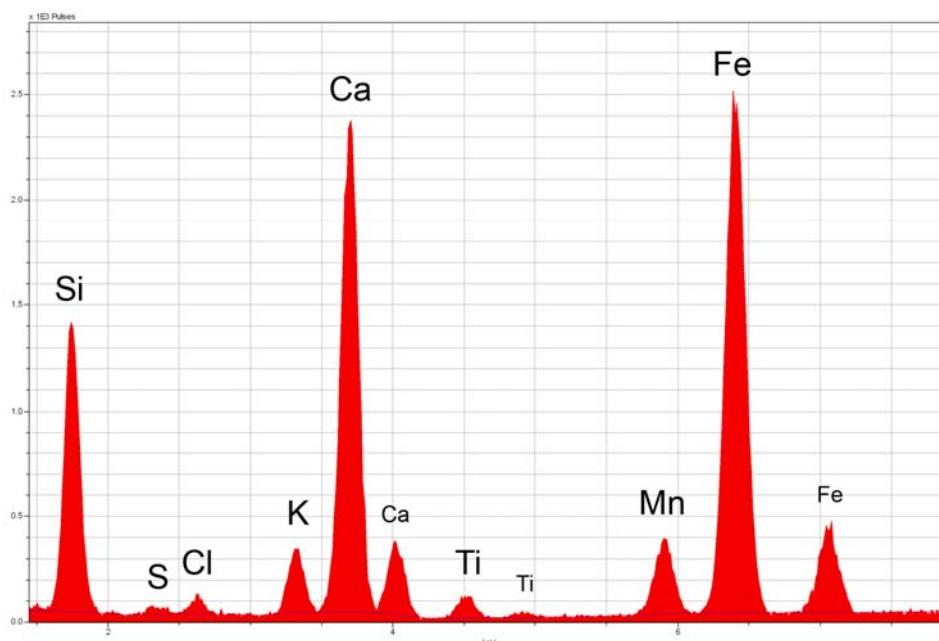
**Figure 1:** (a) K744, silver gilt fragment, (b) detail of the transparent green glass inlay on K744

## Method

Unprepared surfaces of the inlay were analysed qualitatively using a Bruker ARTAX spectrometer using the following operating conditions: helium atmosphere, 50 kV, 0.5 mA current, 0.65 mm diameter collimator and 400 seconds counting time.

Corning A glass standard was analysed under the same conditions. By comparing the spectra produced by analysis of the inlays with that for this glass of known composition it was possible to provide some semi-quantitative estimates for the composition of the inlays.

## Results and discussion



**Figure 2:** Significant region of the XRF spectrum obtained from the analysis of the green glass inlay in K744.

**XRF analysis of triangular green inlay in Staffordshire Hoard object K744  
Science Report PR07444-5**

The XRF results suggest that this triangular inlay is made from a soda-lime-silica glass with significant levels of calcium (Ca, >5%) and iron (Fe, ~1%). The levels of potassium (K) present are too low to suggest that this is a potassium-based glass. It is therefore likely to have either been produced using a soda-rich plant ash or mineral (natron) as its main alkali source (see Figure 2). The use of natron glass is consistent with the vast majority of Anglo Saxon glass so far analysed, so it is suggested that this is the type of glass seen in the green inlay (see Freestone *et al.* 2008).

The green colouration is caused by the presence of iron. Iron can produce a range of colours in glass from light blue-green to deep amber. The colouration is affected by the presence of other elements in the glass and the reducing/oxidising environment of the furnace.

The colour of the inlay is similar to some other Anglo Saxon objects investigated by Freestone *et al.* (*ibid*; for examples see Figures 3 and 4). These objects are from the late sixth to seventh century, a similar date to the metal objects found in the Staffordshire Hoard (c.550-675, Fern pers. comm. 2012).

It is possible that the inlay is a reworked piece of vessel glass. It does not appear to have a curved profile, but may have been polished flat before being inserted into position. Small serrations visible in Figure 1b on the top and right edges of the inlay may suggest that it was cut to shape by nibbling. However, these may be signs of damage caused by use or are post-depositional alterations.



**Figure 3:** Transparent greenish glass bag beaker, seventh century, found in a cemetery at Faversham, Kent. (1321.'70; © Trustees of the British Museum).



**Figure 4:** Four transparent greenish glass claw beakers, late sixth to seventh century, found in a barrow at Taplow, Buckinghamshire (1883,1214.13-16; © Trustees of the British Museum).

## Conclusions

The transparent triangular glass inlay in object K744 is made from a soda-lime-silica glass. The XRF spectra, coupled with the vast majority of previous analyses suggest that it is a natron-based glass.

The green colouration is caused by the presence of iron. Its colouration is similar to many other Anglo Saxon glass vessels. It is possible that the inlay is a reworked piece of vessel glass, cut to shape and polished prior to insertion in the object.

Andrew Meek

Susan La Niece

19 February 2013

## References

Fern, C. 2012. Personal communication. Email received 17 December 2012.

Freestone, I., Hughes, M. J. and Stapleton, C. P. 2008. 'The Composition and Production of Anglo-Saxon Glass' In: Evison, Vera I. *Catalogue of Anglo-Saxon Glass in the British Museum*, British Museum Research Publication **167**, London: British Museum Press, pp. 29-46.



# *Staffordshire Hoard Research Reports*

Staffordshire Hoard Research Reports were produced by the project

## *Contextualising Metal-Detected Discoveries: Staffordshire Anglo-Saxon Hoard*

Historic England Project 5892

The Staffordshire Hoard is owned by the Birmingham City Council and the Stoke-on-Trent City Council and cared for on their behalf by Birmingham Museums Trust and The Potteries Museum & Art Gallery.

The Staffordshire Hoard research project was conducted by Barbican Research Associates Ltd and funded by Historic England and the owners.

This report was additionally grant-aided by National Geographic.



City of  
**Stoke-on-Trent**

