Characterisation Studies of Clays and Pottery from Easingwold, North Yorkshire (EAS'06)

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Excavations at Manor Road, Easingwold, North Yorkshire, were carried out by Fern Archaeology and revealed a circular structure with a possible flue, stoke hole or earlier gully and a surrounding ring of stake holes, suggesting a retaining wall of wattles. The floor of the structure was sunk below the contemporary ground level and its primary fill (C1014) contained abundant charcoal fragments, pieces of unburnt clay and pieces of burnt clay. A complete profile of a gritty whiteware jar (reduced grey) was present in the fill and similar jar fragments were present in the preceding flue/gully and in the secondary fill of the feature, C1015.

The function of this structure is unknown and one suggestion was that it was the base of a clamp kiln. Subsequent detailed analysis of the pottery indicated that almost all the sherds had external sooting, typical of vessels used in cooking but not on kiln waste. Furthermore, the total quantity of sherds present was very low, and mostly accounted for by the single near-complete vessel. Nevertheless, to test the suggested clamp kiln model further samples of the unfired clay, the fired clay and the pottery jars were selected for thin section (TS) and chemical analysis (ICPS – Inductively-Coupled Plasma Spectroscopy).

Table 1

TSNO	Sitecode	Context	Ref	Fabric	Form	Action
V4041	eas'06	C1014	23A	LEP1	JAR	TS;ICPS;DR
V4043	eas'06	C1014		EAS CLAY	SAMP	TS;ICPS
V4056	eas'06	C1015		EAS CLAY	SAMP	ICPS
V4057	eas'06	C1015		EAS CLAY	SAMP	ICPS
V4059	eas'06	C1014		EAS CLAY	SAMP	ICPS
V4061	eas'06	C1014		EAS FCLAY	DAUB?	TS;ICPS
V4062	eas'06	C1015		LEP1	JAR	ICPS
V4063	eas'06	C1015		LEP1	JAR	ICPS
V4064	eas'06	C1015		LEP1	JAR	ICPS
V4065	eas'06	C1015		LEP1	JAR	ICPS
V4066	eas'06	C1015		LEP1	JAR	ICPS

Thin Section Analysis

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http://www.postex.demon.co.uk/index.html

A copy of this report is archived online at
http://www.avac.uklinux.net/potcat/pdfs/avac2006156.pdf

Chemical Analysis

Offcuts from each sample were prepared by removing all potentially contaminated outer margins and surfaces and crushing the remaining pellet to a fine powder. The powders were then submitted to Royal Holloway College, London, where Inductively Coupled Plasma Spectroscopy was carried out under the supervision of Dr J N Walsh. A range of major elements was measured and expressed as percent oxides (App 1) and a range of minor and trace elements was measured and expressed as parts per million (App 2). Silica was not measured but was estimated by subtracting the total measured oxides from 100%.

The mean silica contents for the fired and unfired clay and the pottery samples all lie within the same confidence levels (Table 2) although the clays have a slightly higher mean and a greater variance.

Table 2

Group	**N**	**Mean**	**Conf. (±)**
EAS CLAY	4	68.99	9.92
EAS FCLAY	1	74.85	----
LEP1	6	68.45	3.39
Entire sample	11	69.22736364	3.034254976

The data were normalised to aluminium, in order to take account of the dilution effect of variable silica content, and the normalised data were examined.

The fired and unfired clay have very similar chemical compositions and there is little doubt that they came from the same source. The pottery and clay, however, vary in their element concentrations (Table 3). In other cases the range of values for the three groups overlap but there is a narrower range for the pottery (e.g. K2O and Ce). For the remaining elements the values for the three groups overlap but even for these, a factor analysis of the data reveals two factors which between them distinguish the pottery and clay samples.

Element	LEP1	EAS CLAY	EAS FCLAY
Fe2O3	Lower	Higher	Intermediate
Mg0	Lower	Higher	Intermediate
Na2O	Lower	Higher	Higher
TiO2	Higher	Lower	Lower
MnO	Lower	Higher	Higher
Li	Lower	Higher	Higher
Zr	Lower	Higher	Higher
Yb	Lower	Higher	Higher

Zn	Lower	Higher	Higher

A factor analysis of all the normalised data from Easingwold found four significant factors of which a combination of the first and second factors distinguished the pottery from the clay samples (Fig 1). The complete profile, like all the pottery samples, has a negative F1 score but also has a larger negative F2 score than any of the clay samples.

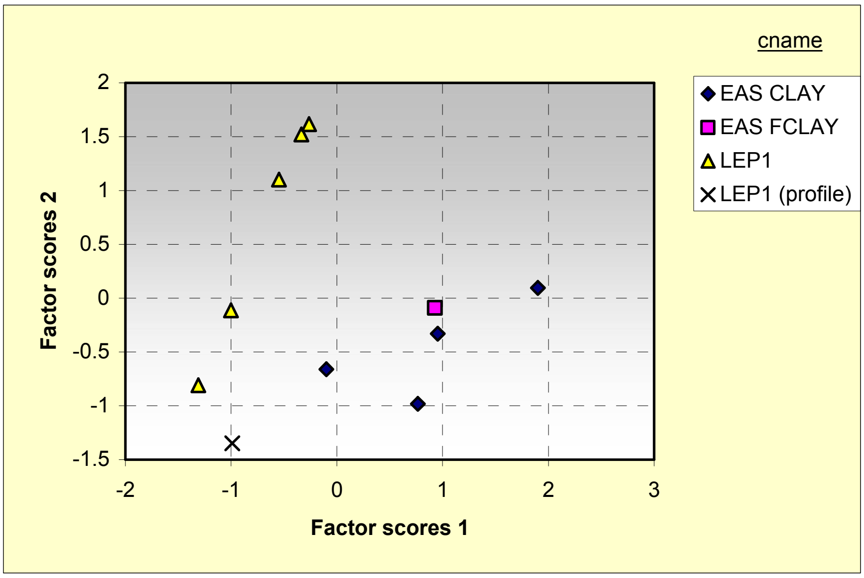

Figure 1

The Easingwold data were then examined together with data from a range of medieval ceramics made on the fringes of the North Yorkshire Moors using Middle Jurassic estuarine clays, the most likely source of the LEP1 jars (Table 3).

Table 3

locality	Cname	Description	Samples
Brandsby	BRAN	Production waste	4
hartlepool	NYWW	Consumer site, source of vessels unknown	6
Rievaulx	RIEVAULX FLAT	Flat roof tiles, documentary evidence suggests production at Wethercote	6
Stearsby	RYEDALE	Production waste	1
York	BRAN	Consumer sites	16
	BRANRED	Consumer sites (red-firing version of Brandsby-type ware)	1
	YORK	Consumer sites	13

Factor analysis of the data found five significant factors and a bi-plot of the first two (Fig 2) indicates that the F1 scores separate two of the Hartlepool whitewares from the remainder. This is due to high values for some of the Rare Earth Elements (about twice the values found in other samples). The Easingwold clays are distinguished by a combination of negative F1 scores and high F2 scores. The LEP1 pottery samples form part of the general North Yorkshire Whiteware cluster but have higher F2 scores than the majority of the other whitewares. The F3 scores (Fig 3) distinguish the Rievaulx roof tiles from the remainder and low F3 scores distinguish the Hartlepool whitewares from the rest. Again, the remaining samples form a single cluster (but including the Easingwold clay samples) and within that cluster the LEP1 samples have lower mean F4 scores than the other groups.

The chemical analyses therefore clearly distinguish the samples of pottery from Easingwold from the clays and place them as a distinct sub-group within the North Yorkshire Whitewares.

Table 4

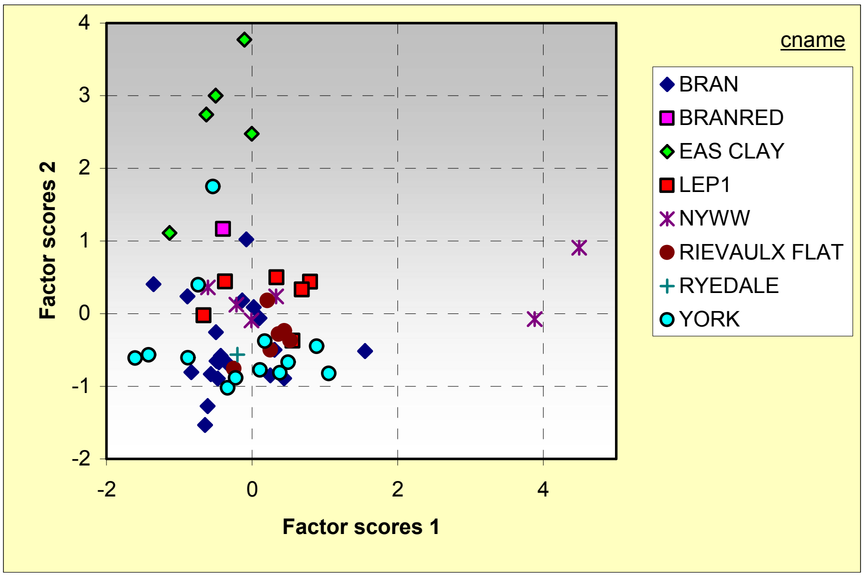

Figure 2

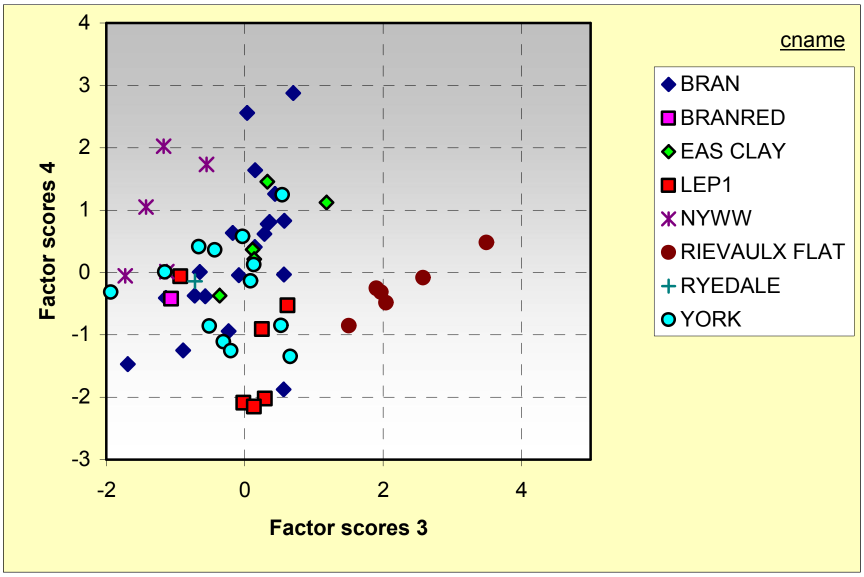

Figure 3