Characterisation of some Medieval Pottery from Knaresborough, North Yorkshire

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As part of the post-excavation analysis of the medieval pottery from sites near Wetherby on the A1, West Yorkshire, being carried out by Jane Young, samples of medieval pottery and other ceramics from production sites in western Yorkshire were analysed.

Pottery production is documented at Knaresborough, North Yorkshire, although no pottery waste is known from the town. However, excavations in the town have produced several collections of medieval pottery, of which a notable feature is a glazed ware of late 12th-century character.

Two samples of this glazed ware were selected by Jane Young and submitted to the author for thin section and chemical analysis (Table 1). Both have a similar fabric when examined at x20 magnification.

Table 1

Sample No	JY Fabric	Form
V2529	Fabric 1	JUG
V2530	Fabric 1	JUG

Description

The two samples have been assigned the sample numbers V2529 and V2530. Both are from jugs with late 12th to early 13th-century typological features.

The thin sections were produced by Steve Caldwell and stained using Dickson's method (Dickson 1965). The chemical analyses were undertaken at Royal Holloway College, London, under the supervision of Dr J N Walsh, Department of Geology, using Inductively-Coupled Plasma Spectroscopy (ICP-AES).

Petrological Analysis

Fabric 1

Description

The following inclusion types were noted in thin section:

- Angular quartz. Abundant grains of monocrystalline, unstrained quartz, mainly up to 0.5mm across with some up to 1.0mm across. Several have one or more flat faces, indicating overgrowth and some have a dark brown clay/iron coating.

- Medium-grained sandstone. Sparse fragments of sandstone up to 1.0mm across composed of grains of quartz, orthoclase feldspar and plagioclase feldspar up to 0.5mm across. The rock has a mixture of dark brown clay/iron and silica cements, in which the silica is secondary to the clay/iron.

- Orthoclase feldspar. Sparse fragments of altered feldspar up to 1.0mm across.

- Plagioclase feldspar. Sparse fragments of fresh plagioclase feldspar up to 1.0mm across.

- Muscovite. Sparse laths up to 0.5mm long.

- Rounded quartz. Sparse fragments, including polycrystalline mosaic quartz, up to 1.0mm across.

- Rounded mudstone. Sparse fragments with traces of bedding. Those in V2529 are of similar colour and texture to the groundmass whereas those in V2530 are mainly dark brown, or mottled, and are of moderate frequency.

- Voids. Sparse angular voids up to 1.0mm across. Some of these voids have a darkened halo surrounding them, suggesting that they held organic inclusions, although they are not typical in shape to those containing grass or rootlets.

The groundmass consists of optically anisotropic baked clay minerals, abundant muscovite laths up to 0.05mm long and moderate angular quartz up to 0.05mm across. That of V2530 includes streaks of dark brown clay and is in general a redder colour than V2529.

Interpretation

The two samples differ only in the presence and amount of dark brown mudstone present and both appear to have been formed from weathered light-firing mudstone. This mudstone and the resultant clay are distinctive in the amount of fine-grained muscovite (perhaps better classed as sericite) present. However, the general scarcity of quartz silt and the light firing colour, suggesting a low iron content, suggest that the parent clay is of Coal Measures origin.

The majority of the inclusions are derived from sandstones, either of Coal Measures or Millstone Grit origin. The rounded quartz grains might be of Permian origin, although no examples of near-spherical shape, 'Millet seed' grains, were present.

Chemical Analysis

A range of major elements was measured as percent oxides (Appendix 1) and a range of minor and trace elements were measured as parts per million. Silica was not measured directly but was estimated by subtraction of the total measured oxides from 100%. The samples have estimated silica contents of 67.2% and 68.8%.

The data were normalised to Aluminium (Al2O3) to take account of the variations in silica, some of which is contributed by the added quartz sand temper.

The difference in composition between the two samples is likely to be due to the clay ironstone inclusions present in V2530. The latter sample has higher Iron, Lithium, Nickel, Vanadium and Cobalt values, most of which are probably present in the clay ironstone but also has higher Magnesium, Sodium and Potassium, which are probably not.

The Lead values indicate contamination with glaze in both samples.

Several other fabrics made from light-firing, mudstone-derived clays have been sampled in Yorkshire, both in areas of Coal Measure clays and Middle Jurassic mudstones (Brandsby). Most differ in the details of their texture and silt-sized inclusions.

The Knaresborough samples were compared with those from the Winksley and Lumley Farm, Grantley, production sites. They have a higher Magnesium, Barium and Strontium content and a lower Titanium, Cerium and Samarium content. Factor analysis of this dataset (Fig 1) separates the Winksley Fabric 1 samples (which have a clean light-firing groundmass) and to a lesser extent the Winksley Fabric 2 samples (which have a red-firing, clean groundmass) and one of the Knaresborough samples (V2529). The remaining Knaresborough sample falls into the same cluster as the remaining Winksley and Lumley Farm samples. This separation is due in the main to high weightings for Phosphorus, Strontium, Calcium and Barium.

The analysis was repeated excluding Phosphorus, Calcium, Strontium and the Rare Earth Elements and in this second factor analysis four factors were found. A plot of the first two factors (Fig 2) again separates the Winksley Fabric 1 samples from the remainder as a result of high F1 scores (high weightings for Zirconium, Titanium and Vanadium) and separates the Knaresborough samples through their high F2 scores (high Magnesium, Potassium and Barium scores). The F2 scores also separate the Winksley from the Lumley Farm samples. The F3 and F4 scores do not distinguish any of the three sites.

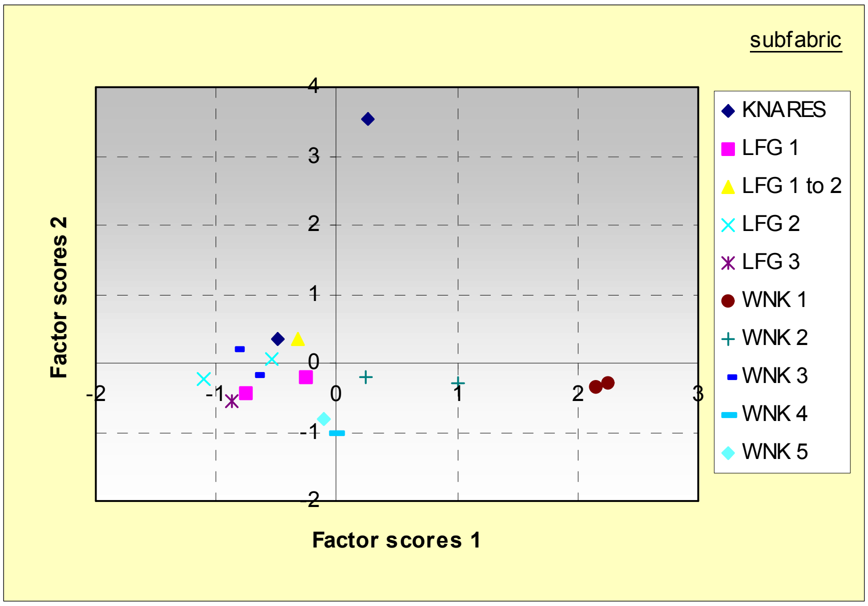

Figure 1

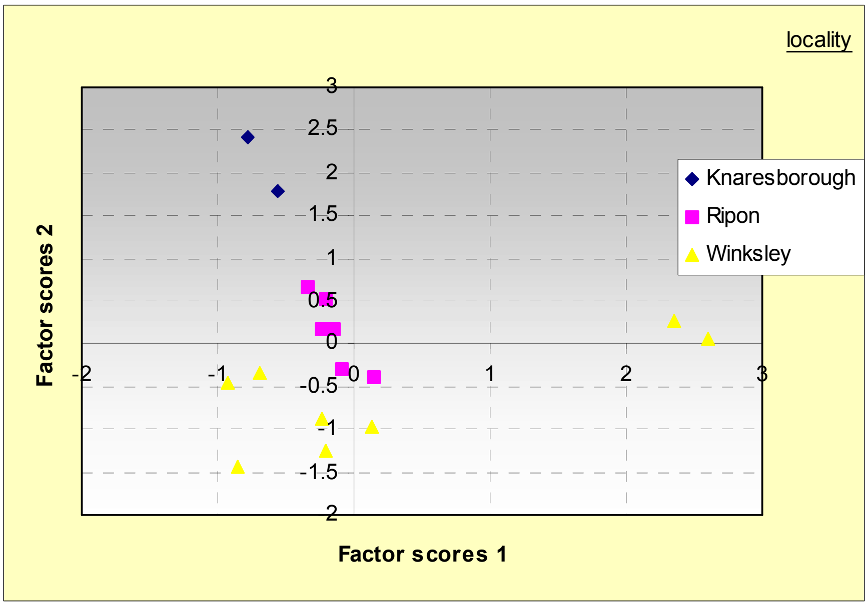

Figure 2

Discussion and Conclusions

The two Knaresborough samples were probably produced in the same centre although there are differences in both their petrological characteristics and chemical composition. These differences appear to be due to the presence of clay ironstone nodules in the mudstone and groundmass of V2530.

It is likely that the parent clay is derived from the Coal Measures. These do not outcrop in Knaresborough itself but are found within 3 km of the town, to both the north and southwest.

The sand temper is derived from feldspathic sandstones, of two grades (with maximum grain sizes of c.1.0mm and c.0.5mm) with a possible contribution from the Permian. If so, this might indicate the use of a sand from the Nidd valley, which cuts through Coal Measures sandstones and Permian deposits.

The chemical differences which distinguish the Knaresborough samples from Winksley and Lumley Farm products are minor and are mainly due to the Magnesium and Barium contents.

Appendices

Appendix 1

TSNO	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO
V2529	21.54	5.11	1.15	0.63	0.3325	2.15	0.8	1.04	0.032
V2530	19.57	6.37	1.26	0.32	0.475	2.26	0.72	0.12	0.028

Appendix 2

TSNO	Ba	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Zn	Co
V2529	869	122	43	109	31	20	199	93	23	62	44	77	44	6	1	3	2	1240	66	8
V2530	641	98	26	135	46	16	120	107	18	49	39	68	40	5	1	3	2	2074	57	13

Bibliography

Dickson, J. A. D. (1965) "A modified staining technique for carbonates in thin section." *Nature*, 205, 587.