Characterisation of the Medieval Pottery from Lumley Farm, Grantley, West Yorkshire

Alan Vince

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 West Yorkshire were analysed.

Pottery waste from Lumley Farm, Grantley, was discovered in 1992 when a farmer discovered a previously unknown medieval pottery kiln on his land while clearing an area for the construction of a Dutch barn. The site was cleared by Harrogate Museums Service, and a large amount of medieval pottery recovered from a relatively small site. The pottery is unpublished and deposited in Harrogate Museum (Kershaw 1996). Typological study by Jane Young suggests that the pottery is of later 12^{th} to early 13^{th}-century date and is the predecessor of the Winksley production site, which lies in the parish immediately to the north of Grantley.

Six samples of pottery waste were selected by Jane Young and submitted to the author for thin section and chemical analysis (Table 1). Three samples are from unglazed jars (V2523-25) and the remainder from glazed jugs (V2515-16 and V2526). Using a binocular microscope at x20 magnification, Jane Young divided the samples into three fabrics (and one indeterminate fabric).

Table 1

Sample No	JY Fabric	Form	Chemical analysis 1	Chemical analysis 2
V2515	Fabric 1 to 2	JUG	High F2	High F1
V2516	Fabric 3	JUG	High F1	Negative F2
V2523	Fabric 2	JAR	High F5	Moderate F1 and F2
V2524	Fabric 2	JAR	High F4	Moderate F1 and F2
V2525	Fabric 1	JAR	High F3; Negative F5	High F2
V2526	Fabric 1	JUG	High F1; High F3; High F5	High F2

Description

The six samples have been assigned the sample numbers V2515-16 and V2523-26. In thin section, they were found to belong to a single, homogenous fabric group. 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

Description

The following inclusion types were noted in thin section:

- Angular quartz. Abundant fragments of overgrown, monocrystalline unstrained quartz up to 1.5mm across. The original grain boundaries are sometimes identifiable through their lower quantity of inclusions. Some fragments have a dark brown coating.

- Angular coarse-grained sandstone. Sparse fragments of sandstone up to 1.5mm across, composed of quartz grains identical to those described above.

- Angular fine-grained sandstone. Sparse fragments of a sandstone, also composed mainly of overgrown quartz, but better-sorted and finer textured than the coarse-grained sandstone (average grain size c.0.2mm).

- Rounded clay/phosphate pellets. Sparse fragments up to 1.0mm across. These may be post-burial filling of voids which previously contained limestone.

- Angular opaques. Sparse fragments up to 0.5mm across.

- Rounded dark brown clay pellets. Moderate fragments up to 1.0mm across. Some were clearly soft when the pot was produced and have lenses of brown clay trailing off into the groundmass. There are no signs of lamination although the grains are usually oval in outline.

- Organic inclusions? Sparse voids c.1.0mm long and c.0.1mm wide, possibly from organic inclusions or perhaps bivalve shell.

- Microcline feldspar. Sparse angular fragments up to 1.5mm across.

- Perthite. Sparse angular fragments up to 1.5mm across.

The groundmass consists of optically anisotropic baked clay minerals, abundant angular quartz grains up to 0.2mm across, sparse rounded quartz grains up to 0.2mm across, sparse muscovite up to 0.1mm long, and sparse unidentified angular accessory minerals. Brown phosphate fills many of the moderate laminae.

Interpretation

The majority of the inclusions present are probably derived from Millstone Grit sandstones, mostly coarse-grained but including some fine-grained rocks. The dark brown clay pellets might be derived from a weathered mudstone and are certainly quite different from the groundmass.

The groundmass has a low iron content and is very silty. However, there are no fragments of siltstone present and it was probably derived from a weathered, unconsolidated silt. Such silts occur as part of the rhythmic deltaic deposition of seatearths, coals, siltstones and mudstones in the Coal Measures.

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 six samples all have similar silica contents, ranging from 69.7% to 76.6% (mean 73.8%, SD 2.6). The lowest value is found in glazed jug, suggesting perhaps that there is more temper added to the unglazed jars.

The data were normalised to Aluminium (Al_2O_3) to take account of the variations in silica, some of which is contributed by the added quartz sand temper.

Factor analysis of the normalised chemical data reveals that there are five significant factors. The first, which separates two samples (V2516 and V2526) from the remainder, is determined by high Barium (Ba), Cerium (Ce), Lead (Pb) and Yttrium (Y) weightings and by negative Chromium (Cr, Phosphorus (P_2O_5) Cobalt (Co) and Manganese (MnO) weightings. The two samples with high F1 scores also have higher Al_2O_3 values, suggesting that the positive weightings come from elements more common in the groundmass (and lead glaze) and the negative weightings from elements more common in the quartzose temper (and post-burial phosphate concretions). A single sample (V2515) has a high F2 score. This is due to high weightings for Calcium (CaO), Neodymium (Nd), Lanthanum (La) Ytterbium (Yb) and Zirconium (Zr).

Two samples (V2525 and V2526) have high F3 scores, due to high weightings for Copper (Cu), Iron (Fe_2O_3) and Potassium (K_2O) and a high negative weighting for Zinc (Zn). One sample (V2524) is separated from the remainder by its F4 score, which is due to high negative weightings for Samarium (Sm), Sodium (Na_2O) and Scandium (Sc) and by high positive scores for Nickel (Ni), Lithium (Li) and Magnesium (MgO). Finally, Factor 5 scores separate two samples with high scores (V2523 and V2526) and one with a negative score (V2525). F5 scores depend mainly on a high weighting for Titanium (TiO_2).

It should be emphasised, however, that none of the measured values fall outside 2 SD of the mean values whilst the least similar sample to the remainder is V2515, which is distinguished by its iron, calcium, manganese and zirconium values.

There is a strong positive correlation (0.97 Pearson coefficient) between Phosphorus and Chromium, which suggests that the Chromium in these samples may be present in the post-burial phosphate to a greater degree than in the parent clay. No strong correlations were found between Lead and the remaining elements, suggesting that the contamination of V2516 has not lead to contamination by other elements. The sample does have a much higher Zinc value than the remainder, but this is probably due to its lower temper content and the normalised value is unexceptional.

Discussion and Conclusions

The Lumley Farm, Grantley, samples were all produced from the same fabric, which is probably a silty Coal Measures seatearth tempered with a coarse sand derived in the main from Millstone Grit sandstones but with a finer grained sandstone and possibly mudstone fragments also present. It is therefore a detrital sand.

In thin section, two distinctive features are the presence of rounded quartz grains and unidentified accessory minerals in the groundmass. The low quantity of muscovite, given the high amount of quartz silt, is also distinctive.

In any chemical characterisation of the fabric, the phosphorus and chromium values should be excluded, since they may well be enhanced by post-burial concretion, as should the lead values, which in one case is certainly due to glaze contamination. The remaining elements, however, appear to have been present in the parent clay and temper.

When this restricted set of elements is analysed using factor analysis five factors are found. The first two factors (Fig 1) show a correlation with Jane Young's visual fabrics. Fabric 1 samples have similar compositions and a high F2 score. Fabric 1 to 2 has a high F1 score. The Fabric 2 samples have similar scores and Fabric 3 is distinguished by its negative F2 score. This suggests that the visual fabrics may represent different batches of clay and if so it is interesting to note that the Fabric 1 group contains both a glazed jug and an unglazed jar sherd, suggesting that the same clay was used for both forms.

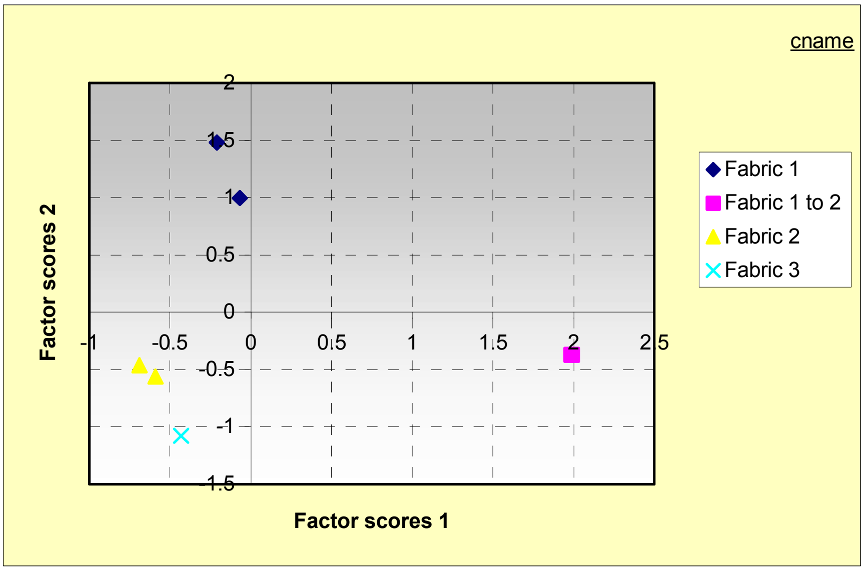

Figure 1

Appendices

Appendix 1

TSNO	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO
V2515	17.11	2.90	0.69	0.27	0.35	1.34	0.74	0.15	0.02
V2516	22.21	3.66	0.98	0.16	0.29	2.00	0.89	0.11	0.01
V2523	18.26	3.08	0.81	0.13	0.34	1.59	0.79	0.15	0.03
V2524	17.10	2.80	0.62	0.13	0.45	1.46	0.72	0.10	0.01
V2525	19.56	3.74	1.00	0.18	0.39	1.96	0.76	0.11	0.01
V2526	18.91	3.35	0.83	0.21	0.49	1.83	0.86	0.06	0.01
Mean	18.86	3.26	0.82	0.18	0.39	1.70	0.79	0.11	0.01
SD	1.91	0.39	0.15	0.05	0.07	0.27	0.07	0.03	0.01

Appendix 2

TSNO	Ba	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Zn	Co
V2515	336	97	14	80	33	12	81	79	13	49	44	76	44	6	1	3	1	179	82	14
V2516	491	100	15	136	45	16	100	107	17	49	53	107	53	7	1	3	2	2182	108	14
V2523	339	103	15	112	37	13	79	77	12	44	43	70	42	5	1	2	1	376	83	17
V2524	330	88	13	78	31	13	76	71	14	42	40	71	40	7	1	3	1	272	86	11
V2525	382	92	20	125	40	14	85	83	16	47	45	79	45	6	1	3	2	290	73	15
V2526	436	77	20	104	37	14	94	77	19	44	45	82	45	7	1	3	2	645	58	13
Mean	386	93	16	106	37	14	86	82	15	46	45	81	45	6	1	3	1	657	82	14
SD	65	9	3	23	5	1	9	13	3	3	4	14	4	1	0	0	0	763	16	2

Bibliography

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