Characterisation of the Medieval Pottery from Hope Farm, Baildon, West 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 West Yorkshire were analysed.

The production of medieval pottery at Baildon is known from documentary sources of 14th to 16th-century date and through the discovery of production waste. In 1891 finds of pottery and iron slag were made at Hope Hill and in 1964 B Stubbs excavated a kiln on the north slope below Baildon Moor (Wilson & Hurst 1965, 218). The site was subsequently visited by Steve Moorhouse, who located further pottery and associated earthworks. It also has historic significance since in the early years of the 20th century Mortimer Wheeler, as a schoolboy at Bradford, used to fieldwalk the area prospecting for kiln sites.

Six samples of pottery waste were selected by Jane Young and submitted to the author for thin section and chemical analysis. The samples all come from jugs and all appear to have a similar fabric, although two samples (V2504 and V2508) are heavily overfired, giving them a very different appearance, both in the hand and in thin section.

Description

The six samples have been assigned the sample numbers V2503 to V2508. In thin section, they were found to belong to a single, though variable 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:

- Coarse-grained sandstone. Abundant subangular fragments up to 2.0mm across. The rock is composed of a mixture of quartz and feldspar grains, with evidence of the overgrowth of the quartz grains. Some fragments have a kaolinitic cement whilst others have an iron-rich cement.

- Opaque grains. These are of two types: rounded grains up to 0.3mm across and larger, angular fragments, with sparse vesicles c.0.05mm across or smaller. The latter might be associated with iron production, but there is no evidence for fayalite slag inclusions and it is possible that the vesicles were produced as a byproduct of the firing process.

- Rounded brown mudstone. These fragments have clear bedding indicated by variations in iron content, up to 2.0mm across. Present in three sections only: V2505-7.

- Rounded white-firing mudstone. These fragments have a more pronounced bedding than the brown mudstone and include fragments with dark, organic, cores (V2504 and V2508). In one instance a rounded white mudstone was present in a sample with a red-firing groundmass (V2507) but in three others the groundmass is of a similar colour to the mudstone fragments (V2503, V2504 and V2508).

- Plagioclase feldspar. Sparse subangular fragments up to 0.5mm across.

- Muscovite. Sparse sheaves of muscovite up to 0.5mm long.

- Perthite. Sparse subangular fragments up to 1.5mm long.

- Orthoclase feldspar. Sparse subangular fragments up to 1.5mm long.

- Rounded siltstone. Sparse rounded fragments up to 1.0mm across and varying in grain size from c.0.1mm across to c.0.2mm across.

The groundmass of these samples is variable. Two samples have a light-firing matrix with prominent opaque grains (V2503 and V2508). Three have a red-firing matrix, with abundant mudstone inclusions (V2505, V2506 and V2507) and one has a variegated matrix with numerous dark brown streaks alternating with bands of light-firing clay (V2504).

Interpretation

The inclusions in these samples probably have three sources:

- a detrital sand or gravel derived in the main from the Millstone Grit and Coal Measures. This sand is not derived from the crushing of Millstone Grit from a single outcrop because (a) it shows signs of sorting, (b) the rock fragments include a variety of lithologies, albeit a limited one. The Millstone Grit is an arkose and the various large feldspar fragments observed in the sections probably came from this rock.

- brown-firing Coal Measure mudstones.

- white-firing Coal Measure mudstones or shales, some of which are organic.

In some cases, the mudstone fragments are probably relict clay from the weathered mudstone parent clay but in others they contrast in colour and texture with the groundmass and are probably detrital, as might be expected in a stream whose catchment includes both Millstone Grit and Coal Measures deposits. There are no inclusions present which need come from any distance from Baildon and it is therefore likely that the inclusions and clays were obtained directly from the outcrops rather than through the intermediary of a glacial sand or clay.

As in other potteries exploiting the Coal Measures mudstones, there is a probability that the potters were selecting clays for the firing colour and mixing together brown and white-firing clays, either to produce different shades or to make use of contaminated clay or one or the other firing colour.

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 65% to 69% (mean 66.4%). Sample V2506 has the highest silica content and is also visibly coarser in texture.

Factor analysis of the chemical data indicates that four of the samples have very similar compositions whilst two are outliers. V2503 has a high F1 score whilst V2506 has a strong negative F2 score, together with a slightly higher F1 score than the remainder. High F1 scores are the result primarily of barium and, to a lesser extent, strontium values whilst F2 scores are the result of high weightings for the rare earth elements and magnesium and negative F2 scores indicate high zirconium, lead, and zinc. It is quite likely that the chemical difference between V2503 and the remainder is simply due to a single baryte grain (strontium can substitute for barium in baryte). However, in comparison with samples from Thorner, West Yorkshire, where baryte inclusions were visible in thin section the difference between this sample and the remainder is very slight.

Sample V2506, on the other hand, is visually distinct, as a result of the coarseness of the inclusions (and has a higher estimated silica content). It also contains the lowest magnesium, titanium, manganese, lithium, strontium, lanthanum, cerium, neodymium, samarium, europium, cobalt contents, and the highest zirconium, zinc and lead contents of the analysed sherds. These differences probably do indicate the use of a different clay source although the only difference in the range of inclusions noted is that no muscovite sheaves were seen and the high lead content is almost certainly due to glaze contamination.

Discussion and Conclusions

The thin section and chemical data indicate that the Baildon potters were using weathered Coal Measure mudstones, including light-firing clays which have been leached as a result of pedogenesis. The presence of organic shale fragments in two of these samples supports this interpretation. The fabrics were tempered with a coarse detrital sand.

Appendices

Appendix 1

TSNO	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO
V2503	23.47	5.93	0.81	0.25	0.25	1.82	0.72	0.06	0.015
V2504	22.37	6.94	0.81	0.3	0.23	1.77	0.7	0.07	0.01
V2505	22.64	8	0.87	0.34	0.44	1.76	0.69	0.08	0.007
V2506	20.28	6.74	0.45	0.29	0.25	1.49	0.61	0.08	0.005
V2507	22.6	7.5	0.82	0.31	0.22	1.57	0.69	0.09	0.012
V2508	22.73	8.43	0.84	0.35	0.16	1.6	0.73	0.07	0.02

Appendix 2

TSNO	Ba	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Zn	Co
V2503	619	101	19	113	41	16	91	92	15	43	51	91	51	6	1	3	2	250	48	9
V2504	320	110	29	99	36	17	71	105	20	44	48	93	48	7	1	3	2	868	41	9
V2505	336	117	28	104	40	17	79	100	18	43	50	96	50	7	1	4	2	509	50	9
V2506	319	100	26	57	37	15	53	87	16	45	37	68	37	5	1	3	2	1233	58	6
V2507	270	112	31	93	42	17	67	69	17	43	44	89	44	7	1	3	2	317	60	8
V2508	264	96	25	96	41	17	67	110	19	50	44	88	45	8	1	4	3	397	51	10

Bibliography

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