Characterisation of Medieval Whiteware from Chester, Cheshire

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Six samples of medieval whitewares from an excavation in Chester were submitted to the author as part of the pilot study for a regional review of whiteware production in Northern England, funded by English Heritage.

The samples were analysed using Inductively Coupled Plasma Spectroscopy and thin section analysis (Table 1).

TSNO	Context	Action	class	Trench	Cname	Description	Form
AG302	62	ICPS	POTTERY	IV	NWWW	FLAT BASE OF JUG;NO SIGN OF GLAZE;BASE SIMILAR TO ROUEN JUGS	JUG
AG303	95	ICPS	POTTERY	IV	NWWW	HORIZONTAL GROOVES EXT;REDUCED PLAIN GLAZE MIXED WITH RED SLIP?	JUG
AG304	97	TS;ICPS	POTTERY	IV	NWWW	EXT GLAZE MIXED WITH RED SLIP?	JUG
AG305	99	ICPS	POTTERY	IV	NWWW	EXT CUGL	JUG
AG306	134	ICPS	POTTERY	IV	NWWW	THIN-WALLED CUGL EXT	JUG
AG307	175	ICPS	POTTERY	IV	NWWW	EXT CUGL OVER RECT RSD	JUG

Binocular Microscope Study

Each sample was examined at x20 magnification both on the original breaks and surfaces and on a fresh break. All contained sparse to moderate rounded fragments of white clay, some of which had a blue-grey core. These are probably relict clay and are typical of Coal Measures whiteware clays. Muscovite (white mica) was sparse, but where present ranged up to 0.2mm across. White sandstone fragments, composed of overgrown well-sorted grains c.0.3mm across were absent in some samples and sparse in others. However, some large angular fragments occurred, up to 4.0mm across. Quartz sand was present in all samples. All contained abundant angular quartz up to 0.1mm across, visible most clearly in fresh breaks. Larger quartz grains were also present, being moderate in some samples and abundant in others. Many of these quartz grains were overgrown and their size range is similar to that of the sandstone fragments. Other grains were rounded, including some with matt surfaces and high sphericity, typical of Permo-Triassic sands and sandstones. The groundmass consisted of fine-grained white/cream to pink clay.

TSNO	White Clay pellets	Muscovite laths	White sandstone	Fine Quartz sand	Groundmass
AG302	Moderate	Sparse	None	Abundant c.0.1mm and moderate	Pink

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				c.0.3mm including rounded grains	
AG303	Moderate	Sparse	Sparse (also red sst)	Abundant bimodal c.0.1mm and c0.3mm	Pink
AG304	Sparse	Sparse	None	Abundant c.0.1mm and moderate c.0.3mm	White
AG305	Sparse	None	Sparse	Abundant bimodal c.0.1mm and c.0.3mm	White
AG306	Sparse	Rare	None	Abundant bimodal c.0.1mm and c.0.3mm	White
AG307	Sparse	Sparse	Sparse	Abundant bimodal c.0.1mm and c.0.3mm, some rounded and some up to 2.0mm	White

Thin-Section Analysis

Only one sample was thin-sectioned, AG304. The sample contained moderate subangular and rounded quartz grains c.0.3mm across; sparse rounded opaque grains c.0.3mm across; sparse rounded clay pellets up to 1.0mm across (lighter in colour than the groundmass, but similar in texture) and sparse rounded chert/altered rhyolite grains c.0.3mm across. The groundmass consisted of optically anisotropic baked clay minerals and sparse angular quartz grains c.0.1mm across. Thin streaks and lenses of red clay were mixed with the main light brown clay.

Chemical Analysis

Offcuts from each sample were prepared by Alison Oliver who removed the outer surfaces from a c.1-2gm fragment and crushed the remaining pellet to a fine powder, which was then submitted to Royal Holloway College, London, for analysis using Inductively Coupled Plasma Spectroscopy. This analysis was supervised by Dr J N Walsh and the frequency of a series of elements was measured. The major element values were expressed as percent oxides (App 1) and the trace elements were expressed in parts per million. Silica was not measured but was estimated by subtracting the total measured oxides from 100%. Before further analysis, the data were normalised to aluminium.

The Chester data (coded as NWWW – North West Whiteware) were compared with two samples from Carlisle museum, thought to be either produced at Cockermouth or possibly southwest Scotland (NWWW – Carlisle); samples from the late medieval kiln at Sneyd Green, Stoke on Trent, Staffordshire (MWWNS; Ford 1995;); and samples from an unglazed, red-painted whiteware from south Staffordshire (MWWSS).

Estimated silica content (66.43% +/- 4.43%) was similar for all the samples although in total a range of 17% was present. Such a range in the major element present has a diluting effect on the other measured elements, most of which would have been present in the clay fraction and this is the reason for normalising the data.

Factor analysis of the data found four factors of which Factors 2 and 3 distinguished the Chester samples from the comparanda. This is shown in Fig 1 where a biplots of Factors 3 and 4 allows all four groups to be separated.

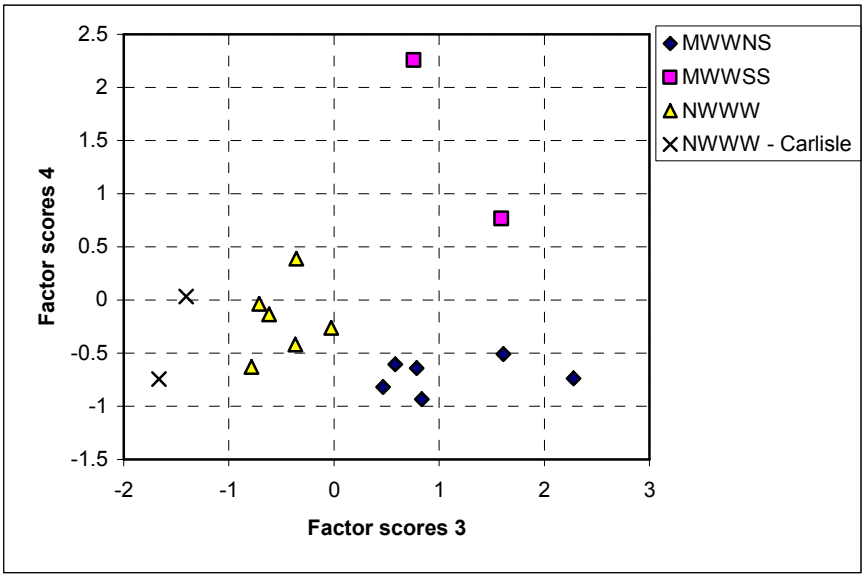

Figure 1

Discussion

The binocular microscope and thin section evidence combine to indicate the use of a Coal Measures white-firing clay, probably a seatearth associated with a seam of coal, which contained some red clay, which from the thin section appears to be intimately mixed (i.e. the parent clay itself probably was variegated rather than a white clay being contaminated during preparation by the potter). This clay was then tempered with variable quantities of quartz sand, which appears to have two components: a Permo-Triassic sand containing well-rounded, highly spherical grains of quartz and minor chert/rhyolite, and a sand formed from the weathering of a well-sorted fine-grained sandstone, mostly white but including some cemented with iron-rich cement. This sandstone is probably the source of the sparse muscovite laths. Similar sandstones outcrop in the Coal Measures and the size and lack of

rounding on some of the inclusions suggest that this rock outcropped fairly close to the sand source. The general similarity in composition at x20 magnification and in the ICPS results suggests that the samples could all come from a single source. The most likely source would be in the Buckley area, where medieval pottery waste is known from Ewloe (Davey 1977). However, other outcrops of Coal Measures occur in Cheshire and it is possible that these were also utilised. The quartzose sand inclusions are very likely to have been deposited by the Dee, either in the modern river or an earlier terrace.

Bibliography

Davey, P J (1977) *Medieval pottery from excavations in the north west*. Liverpool, University of Liverpool

Ford, D A (1995) *Medieval Pottery in Staffordshire, AD800-1600: A Review*. Staffordshire Archaeol Stud 7 Stoke-on-Trent, City Museum & Art Gallery

Appendix 1

TSNO	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO
AG302	27.45	4.68	0.73	0.24984375	0.29	2.57	0.94	0.1814990625	0.01
AG303	28.69	3.77	0.72	0.459471	0.38	2.61	1.07	0.392756826	0.05
AG304	27.33	5.13	0.72	0.279804	0.25	2.53	0.92	0.251678824	0.02
AG305	23.24	2.65	0.53	0.16992775	0.26	1.9	0.92	0.1210195665	0.02
AG306	21.63	2.08	0.64	0.359676	0.31	2.37	0.87	0.132158056	0.02
AG307	23.19	3.34	0.51	0.22986775	0.31	1.86	0.81	0.2513792065	0.03

Appendix 2

TSNO	Ba	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Zn	Co
AG302	648	158	59	227	110	25	134	126	66	49	82	208	143	29.6	4.9	9.7	3.2		57	15
AG303	543	130	41	234	63	22	187	157	30	74	71	129	60	8.8	1.3	3.4	2.1		89	7
AG304	525	156	60	188	68	23	148	127	24	65	61	107	47	6.7	1	2.6	1.9		81	12
AG305	312	137	88	164	55	16	113	142	16	45	51	97	41	5.8	0.8	1.6	1.1		56	5
AG306	443	136	832	186	34	17	234	126	11	56	58	110	48	6.4	0.9	1	0.9		48	3
AG307	333	91	127	158	65	17	129	130	35	52	57	114	56	10.2	1.7	4.3	2.1		62	7

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