The Petrology of the Pottery from Aldin Grange

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Introduction

A sample of twelve sherds of pottery from the Aldin Grange production site was chosen for thin-section and chemical analysis. The chemical analysis, using Inductively-Coupled Plasma Spectroscopy (ICPS) demonstrated that the products of the two investigated kilns at Aldin Grange could be distinguished from pottery produced at other northern English production sites and that, in addition, the products of the two kilns, A and B, could also be distinguished.

The aims of the thin-section analysis were:

- to provide a petrographic description of the ceramic fabrics
- to compare these with other northern English whitewares
- to look for differences between the fabrics of the two Aldin Grange kilns, especially any that might allow the two groups of pottery to be identified by eye

Description

TSNO	Context	REFNO	Description
V123	69	1	Kiln A
V124	69	2	Kiln A
V125	69	3	Kiln A
V126	60	4	Kiln A
V127	60	5	Kiln A
V128	73	6	Kiln A
V129	54	7	Kiln A
V130	22	8	Gully 47
V131	201	9	Kiln B
V132	201	11	Kiln B
V133	203	10	Kiln B
V134	203	12	Kiln B

All twelve samples has a very similar appearance in thin-section. The fabric consists of a light-firing clay which contains abundant quartzose silt. In addition, all of the sherds are tempered with coarser inclusions, the majority of which are quartz and quartz sandstone.

Details of the rock and mineral inclusions were recorded for all sections and are listed below:

Quartzose sand

Moderate quantities of quartzose sand were present in all samples. The grains are mainly less than 1.0mm across. Some of the quartz grains are rounded, others angular (often with straight edges in section, probably indicative of overgrowth). A number of fragments of sandstone with an iron-rich cement were present.

Sandstone

Finer-grained sandstone, with an average grain size of 0.2mm to 0.3mm, were present in three samples (V123, V124 and V126). These sandstones consist of interlocking grains with no cement.

Iron ore and iron-cemented sandstone

Rounded fragments of opaque iron ore, some with angular quartz inclusions, and iron-cemented sandstone with similar sized quartz inclusions (up to 0.2mm across) were present in six samples (V127, V128, V129, V131, V132 and V134).

Shale or mudstone

Sparse rounded fragments of brown shale were present in five samples (V124, V128, V130, V132 and V134). In one instance a fragment was surrounded by a dark halo and was itself black, suggesting that it had an organic content. A fragment of brown siltstone was present in one sample, V127.

Clay pellets

White or light-coloured clay pellets, some with laminar structure and more properly classified as shale/mudstone, were present in three samples (V129, V133 and V134).

Muscovite

Some samples contain sparse laths of muscovite, up to 0.3mm long. These may have originated as accessory minerals in a quartz sandstone. In other sections, however, the muscovite flakes are smaller and more numerous. In these cases the muscovite is likely to have entered the fabric alongside the quartz silt.

The incidence of muscovite is difficult to determine with any accuracy. Not only are there two probable pathways by which it entered the fabric but variations in firing temperature are likely to have resulted in the differential alteration of the mineral.

Quartz silt

Abundant angular quartz silt was present in all samples, together with unidentified accessory minerals up to 0.1mm across.

Discussion

The only differences observed between the samples were either related to their firing temperature (muscovite and birefringence) or only affect sparse, larger inclusions. These differences might be significant but this cannot be proved by thin-section analysis, since only two or three inclusions occur per sample. A simple listing of presence/absence shows that there is higher incidence of opaque iron ore/sandstone, shale/mudstone and white/light clay in the Kiln B samples. However, this is by no means a clear-cut difference between the two groups and could easily be due to random variations.

Table 1

TSNO	Description	Opaque iron ore/sst	Shale/mudstone	White/light clay pellets
V123	Kiln A			
V124	Kiln A		Y	

V125	Kiln A			
V126	Kiln A			
V127	Kiln A	Y		
V128	Kiln A	Y	Y	
V129	Kiln A	Y		Y
V130	Gully 47		Y	
V131	Kiln B	Y		
V132	Kiln B	Y	Y	
V133	Kiln B			Y
V134	Kiln B	Y	Y	Y

The petrological characteristics of the Aldin Grange pottery are similar to those of other northern English medieval whitewares. However, in comparison to most samples of pottery produced using Coal Measure white-firing clays, Aldin Grange fabrics contain much more quartz silt. Similarly, they contain less white clay pellets than these clays and do not have any evidence for the mixture of different coloured clays, producing a variegated matrix. Given its location, the Aldin Grange potters clay was almost certainly ultimately derived from the Coal Measures. However, it seems to have undergone some reworking, either by alluvial or glacial action.

The quartz silt and in particular the accessory minerals present as part of this silt, are probably responsible for the differences in chemistry noted between Aldin Grange and other Coal Measure clays.

The coarser fraction: quartz, sandstone, shale/mudstone and opaque iron ore, are probably all derived from Carboniferous strata but all have a wider natural occurrence in northern England as a result of fluvio-glacial action.

Conclusion

Thin section analysis indicates that the presence of abundant quartz silt is the most distinctive aspect of the Aldin Grange pottery although it might be possible to identify sub-fabrics through the recording of opaque iron ore, shale and clay pellets. However, it is clear that this subdivision would not result in a split into Kiln A and Kiln B products, although all three inclusion types are more common in Kiln B and may be partly responsible for the chemical differences between these two groups. Calcium, barium and strontium were all noted as being more common in Kiln A samples than in Kiln B ones but there was no evidence from the thin-sections to explain this difference. All three elements would be expected to be found in calcite or other calcareous inclusions, such as limestone. However, such inclusions may have been present in small quantities in the Kiln A samples, but at too low a frequency to be revealed in thin-section.. Alternatively, they might have been present but burnt out during firing (although one might expect the calcium, barium and strontium to disappear along with the inclusions, unless they were incorporated into newly-formed compounds during firing. None of the samples show any sign of leached or burnt out inclusions.

Potential

There is little potential in further thin-sectioning of the Aldin Grange pottery, since the 12 samples have revealed little inter-sample variation. However, thin-section analysis of raw clay collected from the site during excavation and samples of burnt clay from the kiln superstructure would be worthwhile since they could be used to test some of the models put forward here for the clay procurement and preparation methods employed by the Aldin Grange potters.