

## The source of the raw materials used in the glazed ware production at Potterhanworth, Lincolnshire

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Although the production of unglazed, handmade, shell-tempered pottery at Potterhanworth in Lincolnshire is well-known the existence of a glazed ware industry has only recently been established for certain. This follows the discovery of definite wasters in 1999 (PRB99) and 2000 (PBRA00) during fieldwork by APS. Subsequent work by Pre-Construct Archaeology Lincolnshire recovered further evidence for glazed ware production (Site Code POTT02).

Sherds from both sites were submitted for examination to see whether it was possible without recourse to scientific examination to establish the materials which were used to make these glazed wares. Further aims of this study were, firstly, to compare the raw materials used in the different collections, since a study of the manufacturing techniques and forms has shown that they represent different periods of production and, secondly, to establish whether there are any clear differences between the Potterhanworth glazed ware and that produced at Lincoln.

### Description

#### **POTT02 POTT**

The unglazed shell-tempered ware from the 2002 excavations was divided into four groups visually by J Young. These groups differ in the apparent quantity and size of shell fragments and in the quantity of quartz sand (Table 1). A sample of half a dozen sherds of each subfabric was examined under x20 magnification using a binocular microscope and the visible inclusion types seen in each sherd were noted and, where appropriate, described.

**Table 1**

Subfabric	Shell frequency	Shell size	Quartz frequency
POTT 1	Abundant	Medium	Sparse
POTT 2	Common	Coarse	Moderate
POTT 3	Moderate	Coarse	Common
POTT 4	Moderate	Coarse	Moderate

The character of the bivalve shell inclusions was noted. Most of the larger fragments were angular with sharp angles which are consistent with crushing and with no sign of rounding at all. However, some of the smaller calcareous inclusions include delicate microfossils which were probably either already present in the clay matrix when dug or weathered from a fossiliferous limestone by natural processes.

The structure of the shell fragments was examined as was their surface ornamentation. The only types present were nacreous shell with irregular rounded, unornamented surfaces. Evidence was also sought for the presence of algal or fungal boreholes, which were filled with a dark cement (almost certainly sparry calcite). These were present in virtually every sample, but usually only in three or four shells. The only exceptions were two subfabric 4 samples (33 and 34) where these bored shells were moderately common.

Dark sparry calcite cement, sometimes attached to bivalve shell fragments and sometimes containing angular shell fragments but usually present as sheets, was noted and occurred in 20 of the 35 samples. It was much more common in subfabrics 2 and 3 (17/20 samples) than in 1 and 4 (3/15 samples). This is perhaps a reflection of the larger size of the shell in those fabrics.

The maximum size of the quartz grains in the samples was noted, together with an estimate of their frequency. The grains are in the main rounded and include milky grains. Rare examples of overgrown grains typical of those originating in the lower Carboniferous were seen but there was no obvious difference in the character of the quartz sand between samples. No examples of chert or fine-grained white sandstone were noted, but this is not surprising given the low frequency of quartz in most of the samples. There was a strong correlation between size and frequency, suggesting that the quartz sand was ill-sorted with most grains being less than 0.5mm across with just a few larger grains, up to 1.5mm across. Quartz sand was abundant mainly in subfabric 3 samples and always sparse in subfabric 1 samples (Table 2). The few samples which were classified as 'moderate' suggests that there are in fact two groups, one with deliberately added quartz sand (subfabric 3) and one without (subfabrics 1, 2 and 4).

**Table 2**

	1	2	3	4	Grand Total
abundant		2	9	1	12
moderate			1	1	2
sparse	6	8		7	21
Grand Total	6	10	10	9	35

The presence of angular red iron ore and finegrained ferruginous sandstone was noted in each sample. It was only moderately common in four samples, and in 15 samples was completely absent (Table 3). A fragment of shelly limestone found at POTT02 had a cement which was composed partly of dark sparry calcite and partly of red iron ore/sandstone of similar colour and texture to the grains found in these samples (but more commonly in some of the glazed wares). In some cases in the shelly ware the iron ore appears to be the filling of boreholes which would be consistent with this origin. However,

the low frequency of this material shows that in the main the limestone from which the shell was obtained was not cemented with iron but with calcite.

**Table 3**

angular red iron	1	2	3	4	Grand Total
moderate >2.0mm	3	1			4
none		3	6	6	15
sparse >1.0mm	3	6	4	3	16
Grand Total	6	10	10	9	35

### **PBR99 and PBR00**

Twenty-two sherds, mainly from PBR99 context 043, were examined under x20 magnification and the major and minor inclusions noted, together with a note of the character of the groundmass.

The fabric is tempered with a medium-grained quartzose sand, with grains up to 1.0mm across. In addition, sparse heat-altered calcareous inclusions and angular fragments of iron-rich material are present. The shape of the calcareous inclusions suggests that they are probably fossil shell although all structure has gone as a result of the high firing temperature. Some of these inclusions are rounded and may have been limestone rather than shell. The iron-rich nodules appear red and earthy in texture in lower-fired samples but can be black or completely heat-altered in higher-fired pieces. In some cases only a void with a microcrystalline black lining remain. The quartzose sand consists of rounded grains of quartz, some of which have a milky appearance, ranging up to 1.0mm across. Fine-grained sandstone fragments are tentatively identified but require thin-section analysis to confirm the identification. Rounded fragments of chert, some almost black, were noted in some sherds as was a single fragment of angular flint, 3mm across.

The clay matrix is clean and laminae are visible in the broken sections. These were presumably produced during the wedging of the clay and are unlikely to reflect the stratification of the parent clay. However, for them to develop in the first place indicates that fine-grained inclusions (which would not be visible by eye) are rare.

The fine-textured clay matrix is typical of local Jurassic clays, such as the Oxford clay and the Lias clays. In the Lincoln area there are no obvious visual differences between these clays although sometimes iron-rich faecal pellets of silt size are seen in thin-section. The sand is coarser than the wind-blown sands which can be found on the flanks of the Jurassic scarp and the Witham Gap and in pockets on the hill top (these tend to have few grains larger than 0.5mm across) but are typical of the river terrace sands found in the Trent and Witham valleys. The presence of fine-grained sandstones and cherts are typical of both deposits. Grains derived from lower Cretaceous deposits ('Greensand quartz')

are absent from definite examples of this ware (although they were present in a single sherd, which contained no shell fragments and is likely to be a Toynton All Saints product). Similarly, there are no definite grains of lower Carboniferous sandstone or the distinctive overgrown quartz grains of which it is composed. Both the Greensand quartz and Millstone Grit-derived sand grains occur in sands in the Ancholme valley and the dip slope of the Jurassic scarp and are probably an indication of fluvio-glacial deposits derived from the north. Given the condition of the calcareous inclusions it is difficult to guess at their identity and origin. It is tempting to see the shell as being accidental contamination from the clay or shell temper used to make the Potterhanworth shelly ware. However, some of the grains are definitely rounded.

### **Shell-tempered clay from POTT02**

Two fragments of shell-tempered clay were examined. They contain abundant shell fragments but sparse quartzose sand and angular red iron-rich nodules similar in character to those in the PBR99 glazed ware occur.

### **Previous find from Potterhanworth School (in LAS Type Series)**

A sherd of a splash-glazed jug found at Potterhanworth School and now in the LAS fabric type series contained the same range of inclusions as the 1999 finds:

- Rounded quartz, including milky grains up to 0.5mm across.
- Rounded chert up to 0.5mm across.
- Angular heat-altered shell fragments up to 3.0mm across
- Angular red iron-rich inclusions up to 5.0mm across.

### **POTT02 Tile**

A fragment of tile from context 1007 is extremely worn on the upper surface and has a knife-trimmed edge. It is likely, therefore, to have been manufactured and used as a floor tile, despite the fact that in its present state it is only 14mm thick.

The fabric contains moderate rounded quartzose sand, similar in character to that in the 1999 glazed ware. However, not only is shell absent but the groundmass is variegated with light-coloured streaks and rounded fragments of micaceous red-firing laminated shale or mudstone occur throughout the body. These latter traits are typical of products of the Lincoln tile industry, which from the later 12<sup>th</sup> century was based in the High Street in Wigford and exploited clay and probably sand dug from the hillside in the South Common.

### **POTT02 POTTG Fabric A**

Three sherds classified as Fabric A by J Young from context 2009 and eight sherds from context 1009 were studied. Those from 2009 were over-fired but contained a similar range of inclusions to those from the 1999 excavations:

- Rounded quartz, including milky grains, up to 0.5mm across.
- Rounded chert up to 0.5mm across.
- Rounded fine-grained sandstone up to 0.5mm across.
- Angular heat-altered shell fragments up to 3.0mm across
- Angular red iron-rich inclusions up to 5.0mm across (mostly vitrified).

One of these sherds was decorated with applied white clay strips. This white clay was inclusionless.

The sherds from 1009 were lower fired and included one piece with characteristics of Lincoln glazed ware. The remainder had the same range of inclusions as those from context 2009.

### **POTT02 POTTG Fabric B**

A sherd classified as Fabric B by J Young from context 2009 was studied. It was overfired but contained a higher quantity of iron-rich inclusions and little or no shell, in contrast to the POTTG Fabric A samples. A group of 12 sherds from context 1009 could be divided into two sub-groups. Seven sherds contained a similar range of inclusions as that from context 2009 and were all relatively high-fired. Some of the iron-rich inclusions were tabular. Four sherds, however, had a lower firing temperature and alongside some iron-rich inclusions were rounded laminated shale or mudstone fragments. This sub-group has a similar appearance to the floor tile fabric.

### **Conclusions**

There are no differences in character visible by eye or under x20 magnification between the quartzose sands used in any of these vessels. Those samples which contain laminated shale/mudstone may be Lincoln products rather than made at Potterhanworth and there are no overfired examples of this group (which is represented by the floor tile and four 'Fabric B' sherds from POTT02 Context 1009. One sherd from the 1999 excavation is likely to be a Toynton All Saints product. The remainder are probably Potterhanworth glazed ware, POTTG. This ware can be divided into two sub-fabrics, A and B. Sub-fabric A contains sparse shell and sparse iron-rich inclusions alongside the quartzose sand which is common to all of these samples, and to Lincoln glazed wares. Sub-fabric B contains moderate to abundant iron, some of which is tabular, and no surviving shell or recognised voids where shell was originally present. This sub-fabric is identified as a Potterhanworth product mainly on the grounds that

sherds were present which appear to have been fired at higher temperatures than the typical medieval pottery of central Lincolnshire.