Assessment of the ceramic building material from Woolpack Lane, Nottingham (JSAC 1097)

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Excavations in a cave at Woolpack Lane, Nottingham, by JSAC, revealed that the cave had been used as a malt kiln and that after abandonment the structure had been backfilled with material which included a large amount of ceramic building material.

Recording of this material suggests that it includes production waste together with debris from one or more structures. Examination of the nib types found on the flat tiles shows several distinct methods of manufacture. However, the similarity in fabric and the presence of several different nib types amongst the definite waste tile suggests that they are all the products of the same industry.

A small quantity of post-medieval or modern tile was found in context 124.

Description

Two hundred and seventy three fragments of tile were recovered, representing no more than 264 tiles. They weighed in total 23.560 Kg, indicating a mean weight of 86gm per fragment.

Fabric

The fragments were examined at x20 magnification and divided into 15 fabric groups on the basis of the rock and mineral inclusions present, the texture and the firing temperature and redox conditions in the kiln (Table 1). In some cases there are fragments of mudstone present which have a higher iron content than the groundmass and in others there are lenses and pellets of calcareous clay. Both of these probably originated in the Mercian Mudstone, but may have been obtained from an alluvial deposit derived from the mudstone rather than being dug from a fresh exposure. Rounded quartz sand was added to several fabrics, and is present as sparse grains in most. This sand is probably derived from the local Triassic sandstone, but probably again through the intermediary of an alluvial sand rather than crushed sandstone. The sandstone fragments noted in several fabrics are probably also derived from the Triassic, but again more probably come from detrital sands than direct from the outcrop.

Table 1

Fabric Number	Defining characteristics	Interpretation	Number of fragments	Mean thickness	Weight
1	Abundant quartz sand. Sparse iron-rich	Standard fabric	92	15.0	7.588Kg

	sandstone. Abundant brown mudstone/clay inclusions. Oxidized throughout				
2	as 1 but overfired	waste	13	15.8	1.463Kg
3	Coarser than 1 with moderate large iron-rich inclusions	Coarse fabric	74	15.1	6.176Kg
4	As 1 with a reduced core	Standard fabric	26	15.9	2.528Kg
5	as 3 with a reduced core	Coarse fabric	30	14.8	2.245Kg
6	as 1 with white clay lenses	Standard fabric, contaminated with white slip	16	15.0	1.676Kg
7	Sparse quartz sand. Pellets and lenses of white marl	A Mercian mudstone fabric	4	16.0	0.297Kg
8	Sparse quartz sand. Black, vitrified core	waste	3	14.0	0.230Kg
9	Sparse quartz sand. Abundant iron rich inclusions. Vitrified core	waste	4	23.0	0.312Kg
10	Sparse quartz. Abundant iron-rich inclusions. Reduced core	A second Mercian mudstone fabric	2	13.5	0.086Kg
11	Sparse quartz. Sparse large marl inclusions. Fine sandy to silty groundmass	A third Mercian mudstone fabric	5	17.0	0.538Kg
12	as 1 but no iron-rich sandstone or mudstone inclusions	A distinct fabric	3	17.0	0.333Kg
13	Abundant fine quartz sand, iron-rich inclusions and mudstone fragments	A distinct fabric. Post-medieval?	1	19.0	0.087Kg

14	as 13 but coarser	Same as 13	1	22.0	0.053Kg
15	as 7 but vitrified	waste	1	15.0	0.088Kg

Form

The majority of the tiles come from flat roof tiles secured to the roof with projecting nibs of clay (nib tiles). Several tiles were curved, but in several cases there were interpreted as being due to the warping of flat tiles in the kiln, in some cases to the extent that they could never have been used. Nevertheless, there was one possible valley tile from context 200. A valley tile is the opposite of a hip tile, and has a roughly trapezoidal shape, curved along the axis of symmetry. However, unlike a hip tile, the sanded lower surface is convex, indicating that the tile was designed to sit in the valley between two gable roofs meeting at ninety degrees. Hip tiles, and presumably valley tiles as well, appear to be a late medieval introduction, and are mainly found in 15th-century and later deposits. However, a dendrochronologically-dated deposit at Reading Oracle suggests that they may have been in production by the beginning of the 14th century.

There are at most five fragments of ridge tile, of which only one can be positively identified. This fragment has an added crest which seems to have been formed of a central vertical slab with supporting strips added to either side at its junction with the ridge. The other pieces are curved fragments which might be ridge tiles, warped flat tiles or hip tiles.

Thickness

The tile thickness was measured for every fragment, in an attempt to see if there were more than one group of tiles present. The thicknesses range from 10m to 25mm.In the event, the tiles have a mean thickness of 15.24 mm with a standard deviation of 2.18mm. For individual contexts this mean thickness only varies from 14.23mm (119) to 16mm (202). This suggests that every context contains a subsample of the same collection of tiles. The spread of thicknesses does appear to vary, with the well, context 203 and context 200 producing tiles with a narrower range of thickness values. It was observed that the overfired tiles were often thicker than the remainder, presumably because they had started to vitrify.

Context	StdDev of thickness	Sum of Nosh	Average of thickness
WELL	0.58	4.00	14.67
203	0.95	13.00	15.29
200	1.09	26.00	14.90
119	1.48	20.00	14.23
205	1.72	8.00	15.83
202	1.83	6.00	16.00
KILN - UPPER FILL	1.85	18.00	14.38

SUMP	2.09	62.00	15.13
kiln - lower fill	2.47	41.00	15.97
201	2.58	47.00	15.63
136	2.78	26.00	14.86
108	NA	2.00	15.00
Grand Total	2.18	273.00	15.24

This positive skewing in the thickness values shows clearly in a histogram of tile thickness (Fig 1).

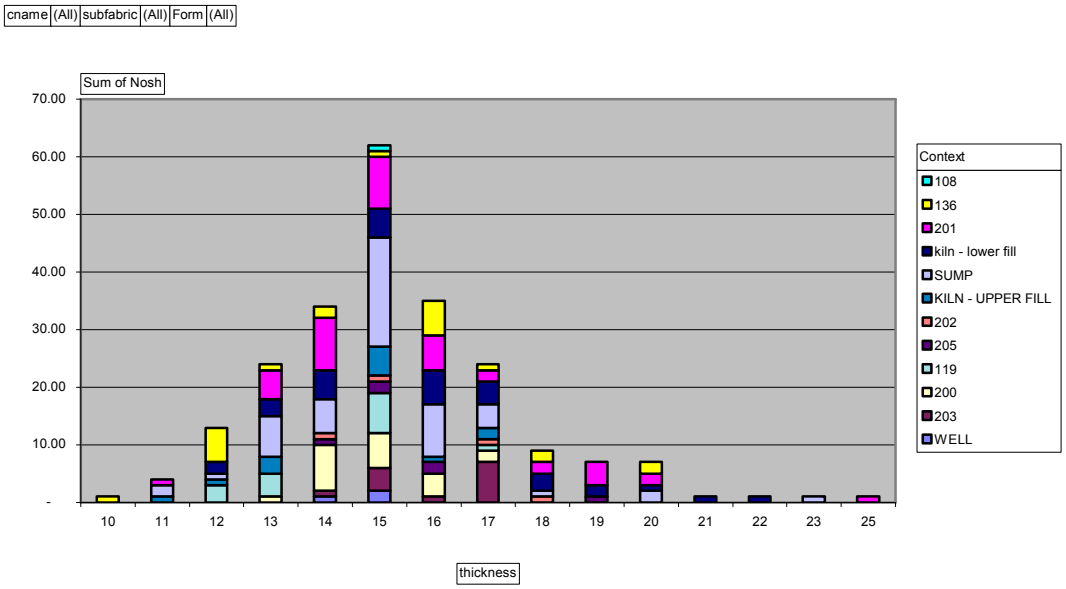

Figure 1

There is no variation in thickness with form, as demonstrated in Fig 2.

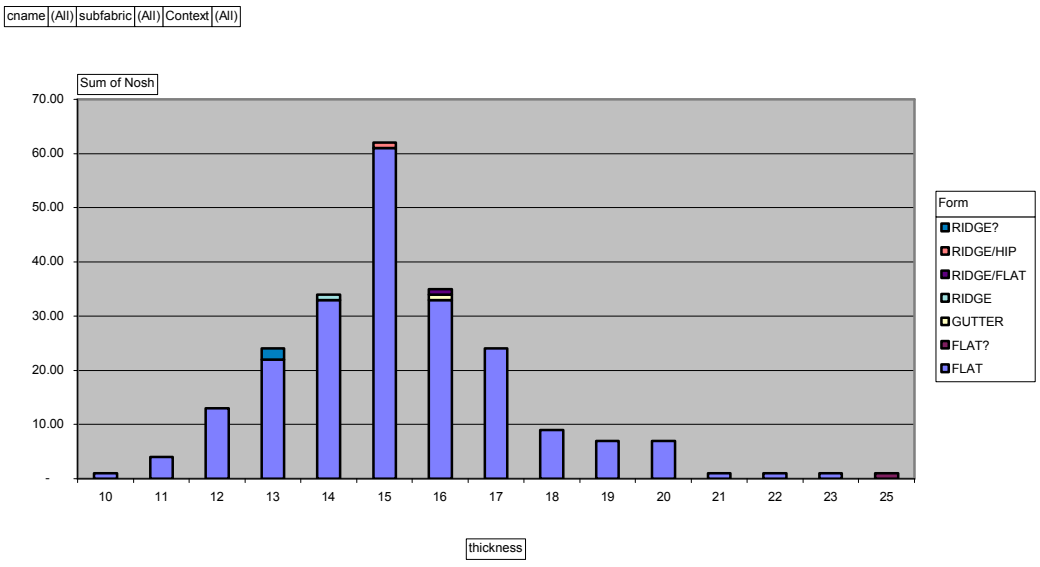

Figure 2

Manufacture and typology

Like most flat roof tiles, the tiles were made using a wooden open mould which we can infer from the tile thicknesses was slightly over 15mm deep. No complete tile lengths could be reconstructed but in eight cases the tile wide could be estimated (ranging from 180 to 200 mm). This mould was placed on a flat surface, in which were one or two depressions which would form the nibs. The mould and surface were then dusted with sand and a lump of clay thrown into the mould with sufficient force to flatten the clay against the sides and base of the mould. The excess clay was then removed by dragging a tool, probably a piece of wood, along the top of the mould, parallel with the longer side of the tile. The mould would then have been lifted off the tile, leaving vertical drag lines on the sides of the tile, and when the tile was sufficiently dry to be moved it would be prized away from the flat surface, sometimes leaving finger impressions on the sides of the tile.

Thirty four fragments of tile had one or more nibs present. Of these 24 were sufficiently well-preserved to record the exact shape of the nib. In a few cases it was clear that the tile had had two nibs, placed at equal distances from the tile sides, whilst in others it was clear that there had been only one nib.

The nibs, in most cases, seem to have been formed by making an impression in the base of the sanded mould. In some cases this impression was roughly circular and might have been made with a former but in most it seems to have been a rough rectangular depression, perhaps made with the thumb. In which case, the base of the mould would have to have been made out of a soft material rather than solid wood or stone, which seems most likely.

Once the tile had been removed from the mould, the nib was usually further moulded with the fingers, often by pushing the clay body against what would become the lower side of the nib when in use, thus sharpening this angle.

It is possible in some cases that the nib was formed from added clay, but even in these cases it is likely that the reason for this is that the original moulded nib had broken off when the tile was removed from the mould.

An example of each nib type has been selected for illustration and retention.

Glaze

Forty-eight fragments of tile had traces of plain lead glaze (Table 1). However, in most cases these consisted of a few spots of glaze and there was no evidence for the deliberate glazing of any of the flat tiles. One ridge tile and one possible ridge or flat tile also had some glaze and in the case of the ridge tile, which had a decorated crest, this was deliberate.

Table 2

Form	PATCH	SOME	SPLASHES	SPOT	SPOTS	Grand Total
FLAT		23	1	11	10	45
FLAT?	1					1
RIDGE		1				1
RIDGE/FLAT		1				1
Grand Total	1	25	1	11	10	48

Evidence for use

Thirteen fragments of flat roof tile showed evidence for use. This evidence was of two types: mortar and sooting. The mortar was mostly on the lower, sanded (and nibbed) side of the tiles and but includes two pieces with mortar on the upper side and two with mortar on all surfaces. The latter might indicate the use of the tiles as levelling courses in mortared walls but in most cases the mortar seems to indicate that the times were used on a roof where the overlap between the tiles was filled with mortar. Four tiles have sooting on the tile surface. In three cases this sooting was on the lower surface and in one on the upper surface. This probably indicates that the tiles came from structures with an open hall in which soot was allowed to rise to the roof space where it either seeped out through gaps in the tiles or was drawn out through a louver, which could be made of wood or pottery. At least one fragment of a pottery louver (or finial) was present in the collection (but, being made in a pottery fabric is assessed elsewhere.

These used tiles occur in six excavated contexts with no concentrations, forming between 0% and 10% of assemblages by fragment count. The thicknesses of the used tiles ranges from 14mm to 20mm and shows a slightly higher mean thickness than the remainder (Table 3).

Table 3

Use	203	200	KILN - UPPER FILL	SUMP	kiln - lower fill	201	Grand Total
MORTAR LOWER			1	1	2		4
MORTAR ON ALL SURFACES	1				1		2
MORTAR UPPER				2			2
PATCH MORTAR SIDE AND UPPER				1			1
S00TED LOWER					1	1	2
SOOTED LOWER; MORTAR TRACES UPPER		1					1
TRACE OF SOOT UPPER						1	1
Grand Total	1	1	1	4	4	2	13

Table 4

Context	Sum of Nosh	Average of thickness
203	1	16
200	1	14
KILN - UPPER FILL	1	17
SUMP	4	18
kiln - lower fill	4	15
201	2	14
Grand Total	13	16

Assessment

The evidence for the status of the tile fragments from Woolpack Lane is summarised in Table 3. It shows that definite waste and definitely used tiles occur together and this, together with the lack of evidence for variations in the deposition of tiles of different thickness, indicates that each context has a similar collection of tiles. In all probability, the tile is a mixture of building debris and production waste and the slight skewing of the thickness distribution is due to the used tiles being slightly thicker than the waste (which would imply that most of the tiles for which we have no data are also waste, a reasonable assumption.

Table 5

Context	ND	USED	WASTE	Grand Total
WELL	4			4
203	12	1		13
200	24	1	1	26
119	18		2	20
205	6		2	8
202	6			6
KILN - UPPER FILL	17	1		18
SUMP	55	4	3	62
kiln - lower fill	35	4	2	41
201	43	2	2	47
136	23		3	26
108	2			2
Grand Total	245	13	15	273

The tile, therefore, is in a secondary context and may be considerably earlier than its deposition date, despite the fresh condition and large size of the pieces. The presence of spots of glaze on the tiles, and the rare streaks of white-firing clay in the fabrics, suggests that these peg tiles were being produced alongside glazed, slip-decorated floor tiles. This,

and the presence of a gutter tile, suggests a later medieval date (most likely later 14th or 15th century).

Despite the secondary context, the assemblage provides a very good glimpse of the products of the Nottingham tile industry, including an unusual and distinctive method of nib production and a large sample of the tile fabric, from which it should be possible to characterised the products of the industry and establish what raw materials were being used to produce them. The Nottingham tile industry was clearly an important later medieval industry in the city, and glazed floor tiles from this industry have been found over a wide area of midland and northern England. By characterising the roof tile fabrics it would be possible to see if these too were widely traded.

For these reasons, it is suggested that further work is carried out on the tile assemblage and that this work should be used to augment the work undertaken for this assessment, after which a paper should be published on the tiles.

The recommended work consists of illustrating and photographing a representative series of nib forms; examining a sample of the tiles in thin section, to establish the identity of the clay and temper used in their manufacture; analysing a sample of the tiles using Inductively-Coupled Plasma Spectroscopy, to investigate the possibility of providing a chemical fingerprint for Nottingham tiles by for comparison with existing data for York and Beverley tiles; and finally producing an academic report on the tiles.

Retention

A sample of the nibbed tiles and a sample of each fabric should be retained, as should all tiles with a complete or estimated width. Tiles should be also be retained so that they can be used in fabric reference collections, to aid future identification of Nottingham tiles. The remaining tiles can be discarded, preferably by being buried on or close to the site where they were found so as not to confuse future archaeologists.

Costing

Table 6 shows the cost at 2004/5 charge-out rates of the recommended work

Table 6

Task	Description	Unit cost	Quantity	Amount
1	Illustration of tiles	£15.00	18	£270.00
2	Thin section analysis	£22.50	15	£337.50
3	Chemical analysis	£23.50	15	£352.50
4	Updating report	£180.00	1	£180.00
Total				£1,140.00

VAT	£199.50
Grand total	£1,339.50

Acknowledgements

We are grateful to Jane Young for examining the nib types on the flat tiles and for commenting upon them.