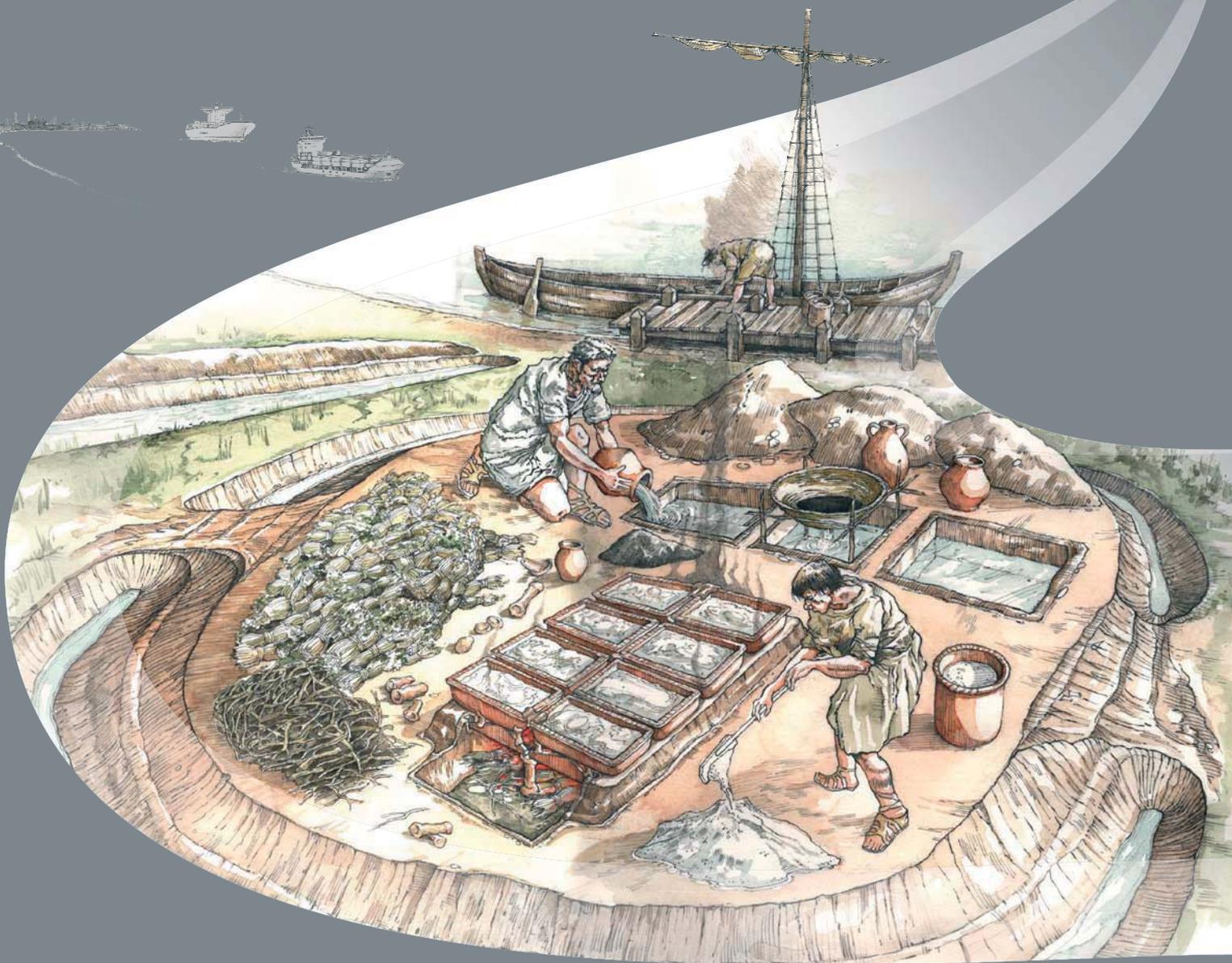


LONDON GATEWAY

IRON AGE AND ROMAN SALT MAKING IN THE THAMES ESTUARY

EXCAVATION AT STANFORD WHARF
NATURE RESERVE, ESSEX



SPECIALIST REPORT 9

CERAMIC BUILDING MATERIAL

BY RUTH SHAFFREY

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Introduction

All the ceramic building retrieved from site by hand has been fully recorded and entered into an Access database, available separately in the archive. Full recording included a brief fabric analysis of each fragment by eye and/or hand lens, as well as the recording of typological features, such as original dimensions, markings, number of corners, shape and size of any flanges, cutaways and other features. Notes were also made about evidence pertaining to use and or reuse such as attachment of mortar, wear or burning. Tegulae flange and cutaway types have been recorded according to the Oxford Archaeology type series (Poole 2011, fig. 130); the cutaway types have also been cross-referred to Peter Warry's classification (2006). Signature marks have also been recorded to OA classification (Poole 2011, fig. 133). The original purpose of the tile is discussed briefly here, but features relating to it have not been analysed in depth.

Sieved material was not recorded in detail, but was weighed and an estimate of fragment count recorded; it has not been included in the analysis. Discounting sieved fragments and material from medieval or later contexts, a total of 1686 fragments of ceramic building material weighing 251kg was retained during excavations at Stanford Wharf. These have a mean fragment weight of 149g and in keeping with this generally large fragment size, the material is largely fresh.

Virtually all the ceramic building material at Stanford Wharf was recovered from features of late Roman date (91%), of which the bulk (78% of the overall assemblage) was from late Roman phase 2 (LR2) contexts. These include a number of *in situ* structures, discussed in detail below. A small fraction of the ceramic building material was found in mid-Roman or earlier contexts, and a slightly larger quantity of material (6.25%) was found in general Roman or post-Roman layers. A small quantity of medieval tile was also recovered. This was briefly examined during the assessment stage, but has not been recorded in detail during post-excavation analysis. It includes some peg-tile and brick fragments of medieval or post-medieval date as well as three bricks with the stamp of the London Brick Company in the frogs.

The late Roman ceramic building material

Fabrics

Methodology

Roman fabrics were divided into broad groups and samples of each group retained and preserved within the archive. All diagnostic fragments were examined by eye or with a x10 magnification hand lens and assigned to a fabric type. Smaller non-diagnostic fragments were not identified. Where fabric types were felt to be variants of an overall type they were grouped and described accordingly.

Fabric descriptions

Fabric A1. Pale peach coloured dense clay fabric that weathers to a creamy colour at the edges and has a medium to coarse-grained cream moulding sand. Contains scattered medium grained quartz inclusions and occasional larger clay pellets of red and grey. This is identical to a fabric known to have been manufactured at Eccles (see below).

Fabric A1b. A variant of Fabric A1, noticeably more peachy in colour and with bands of quartz running through it. However, it is still of Eccles type.

Fabric A2. Very fine sandy fabric, with none of the larger sand typical of type A1/b and with regular voids. Frequent small (<5mm) reddish inclusions and some reddish streaks. Peach coloured on worn faces but pale brown on fresh surfaces.

Fabric B. Reddish-orange fine sandy and highly laminated fabric. It does not contain any larger inclusions or coarser sand grains. Peachy streaks.

Fabric C. A darker red, distinctly coarse gritty sandy fabric with frequent fine to coarse sand.

Fabric C1. Subsidiary version of fabric C with frequent coarse sand but in a paler matrix. Only one specimen of this type was observed.

Fabric D. Sandy fabric, tempered with white flint and quartz inclusions up to 8mm in size. Not as coarse as Fabric C.

Fabric E1. Very fine grained orange / peach fabric with a silty matrix and frequent very fine sand/quartz grains, plus the occasional muscovite mica grain

Fabric E1b. Variant of fabric E1 but with slightly increased coarser sand inclusions

Fabric E1c. Variant of E1, but very laminated

Fabric E2. Variant of E1, but with infrequent chalk and/or flint inclusions

Fabric E3. Similar to fabric E1, but of much paler colour. Also distinctly more worn than most other fabrics and with similarities to some of the briquetage fabrics. However, it was used for a variety of ceramic building material types, including box tile, tegulae, bricks and imbrices. In addition, seven fragments also have signature marks.

Fabric F. Very fine grained orange fabric with obvious muscovite mica.

Description

Although a number of fabric types are recorded here, many of them are subtle variations of each other (Table 9.1). The most prevalent fabric type is type E1, which accounts for 66% of the assemblage by weight and its subsidiaries (E1b, E1c and E2), which account for a further 14%. There are few patterns in the usage of these fabrics. Types E1b and E1c were not used for box flue tile, but this may simply be a result of the small numbers of box flue tile represented, while the lack of imbrices made of Type E2 may be because that fabric is only present in very small numbers.

Type A fabrics are rare, accounting for only 18 fragments (1.8kg). These types were used for both tegulae and imbrices (both sub-type A2), as well as the flat tile which may well be tegulae but not for brick. Type C fabrics are not common (64 fragments, 8.3kg), but were used for all forms except box tile (which are very under-represented in the assemblage). Only five fragments of Type B were recorded, all

either flat tile or tegulae. The small numbers of both A and C fabrics mean that these patterns are not statistically significant.

Function

Approximately 75% of the late Roman assemblage is tegulae, brick and flat tile that are likely to be either tegulae or brick but were not sufficiently diagnostic to be identified more certainly (Table 9.2). A quarter of the assemblage is brick, although further bricks were recorded on site but not retained. Almost 9% are fragments of imbrex and the remainder are flue tiles, or are indeterminate, with one fragment of tegula mammata. No other types of ceramic building material were identified during recording.

Tegulae

A total of 277 fragments (60kg / approximately 25% of the assemblage) are definite tegulae, with a further 497 fragments (52kg) of flat tile that are also likely to be from tegulae. Of the definite tegulae, 32 have missing flanges that appear to have been removed deliberately, possibly enabling them to be used more easily. No complete dimensions of tegulae survive except thickness, which ranges from 10-28mm and averages at 19mm.

Of a total of 142 identifiable flanges, 11 different profiles have been observed of which the most common are square 'A' types (78% by fragment count). There are a number of subtle variations within that type, for example curved basal internal angle or slightly sloping top or both of these. The curved flange forms are less prevalent with the most typical being the 'D' form (20 examples) and most other types being represented by single examples. Flanges vary considerably in dimensions, with flange height varying from 37-55mm and width from 13-35mm. However, this range can be present on a single tegula (one example varies from 18-31mm wide across the length of the tegula, despite being incomplete).

Cutaway forms were recorded where present. Upper cutaways are very uniform with virtually all (23 out of 26) being a simple square type A2 and the remainder a slightly sloping version of the same. There is no obvious correlation between fabric and form in either upper or lower cutaways, probably because of the lack of variation in the fabrics. There are six lower cutaway forms according to the

Oxford Archaeology recording system (which correspond to four of Warry's (2006) groups (Table 9.3). These can be broadly split between entirely diagonal C1 cuts (Warry Group B) and diagonal cuts with vertical moulded cutaway of an A3/C1 hybrid form (Warry Group C). A local idiosyncrasy shows the cut coming across the moulded section, rather than just up against it (1534, Fig. 9.1, no. 1). Two further cutaways, classified as A3b type, are a variant type with a cut that starts much higher up the flange (eg 5553, not illustrated). Four tegulae retain the vertical cutaway only (OA type A3, PW type C4).

Warry's detailed analysis of a sample of tegulae from across the country indicated a chronological progression in cutaway forms from his Group A in the first century AD, to his Group D starting in the mid 3rd century (Warry 2006, 56). His study also indicated that from a technical perspective, group D (OA A3a) works the best (ibid., 45). Objectively, there is clearly an emphasis on Warry's Groups B and C at Stanford Wharf; Group A is absent and there is only one fragment of Group D. If one assumes that it is not just random, there are two likely possibilities for this pattern. One is that there is a regional (or cultural) influence on styles, but according to Warry's figures, we should not expect to find any Group B forms here (Warry 2006, fig. 23). The other explanation is that the pattern is chronological. Thus the lack of Group A cutaways (indicating 1st century use), is in keeping with the late Roman date of most of the tile. In addition, if Warry's suggestion that type D cutaway forms are principally of late 3rd and 4th century date holds true, the scarcity of them indicates that the tile being bought onto Stanford Wharf was reused rather than freshly manufactured. This has implications for our understanding of tile supply to the site and is discussed further below.

Brick

Very few bricks survived sufficiently to be measurable. Two almost complete bricks from structure 6061 measure >300 x 270 x 58 mm (SF 1610) and 310 x 210 x 40mm (SF 160, measured on site). These are most likely to be pedalis bricks. Five other examples could be measured in one width only and these are 248, 250, 280 (two examples) and 300mm and between 30 and 40mm thick. They could be either pedalis or lydion bricks (Brodrigg 1987).

Flat tile

Almost 40% of the assemblage was recorded as flat tile because of a lack of distinguishing features, such as a flange or a thickness in excess of 40mm. Some of these are so thick that they are likely to be brick (45kg measure in excess of 30mm). Tile with only one surviving flat surface was recorded as flat/indeterminate (6.3kg). The remaining 52.4kg were identified as flat tile and most, if not all of these would have been tegulae. One possible tegula mammata was recovered from 1536, but is only a fragment.

Imbrex

A total of 162 fragments (22.3kg) of imbrices were recovered, making up 8.9% of the assemblage by weight. Imbrices vary from 10-17mm thick, but as they generally survived as small pieces no complete widths or lengths are present. They did not occur in any concentrations, and no more than nine fragments were found in any single context.

Flue tile

Flue tile is a rare occurrence in the assemblage, accounting for 1% (11 fragments from 5 contexts). The combing is generally coarse and the one surviving vent hole is circular (34mm diameter).

Markings

A very small number of animal prints were present on tegulae; these were not recorded in any detail, but rubbings of the prints are in the archive. Combing was present on a very small number of tiles (assumed to be box flue tiles) and on one occasion, in combination with a signature on a tegula (5553, see below). No tally marks or stamps were seen; this is in keeping with the tile from Mucking, which is similarly lacking in such markings (Jones forthcoming), and is typical of a non-military site.

Signature marks were found on 82 fragments of tegulae and bricks, as well as 34 fragments of flat tile that could be either brick or tegulae. Lengthy analysis of the signature marks has not been undertaken here because the tile was largely recovered from contexts of reuse, but a brief assessment indicates that the group has potential for further study. Signatures are present on fabric types C and E in roughly similar

proportions to their overall presence in the assemblage. The majority of the signatures are double finger marks (45), with roughly equal numbers of single and triple marks (19 and 15 respectively). A single tegula (5553, Fig. 9.1, no. 2) has a finger marked signature, possibly of type 1, with a matching combed mark, suggesting a combined method of applying the signature.

A variety of signature marks are present, although many could not be easily assigned to existing types, suggesting that there is more work to be done on our understanding of signature variation. The 26 identifiable signatures are virtually all of curved forms, but include a number of variants in shape (Fig. 9.1, nos 3 and 4) or have been combined with crossing or adjacent straight lines (Fig. 9.1, nos 5-8). Evidence from Beauport Park indicated that signatures can be associated with individual tile makers (Warry 2006, 90); thus, the generally similar nature of the signatures at Stanford Wharf could mean that the tiles have the same point of origin. The subtle variations within the scheme might be seen as representing different tile makers or groups of tile makers.

Evidence from in situ structures

Ceramic building material was recovered from a variety of secondary contexts, including dumped deposits, fills and layers. However, approximately one third (30% by weight) was recovered from eight contexts within five *in situ* structures (Table 9.4). This material has been examined in more detail in order that we can determine how it was used. A further hearth was recorded *in situ* but the tile was only sampled (6061).

Flue 5288, saltern 6090

This context is distinctive due to the large size of the fragments, which is more than double the site average. Tile does not seem to have been selected on the basis of thickness, but the vast majority are flat pieces; almost no imbrices are present and virtually all the tegulae are minus their flanges. In addition, a high proportion (18 out of 87 and relative to the rest of the site) have signature marks, and although this may be in part a result of the size of the surviving fragments, the distinction is marked in comparison to other surviving structures. The tile demonstrates very little wear but three-quarters is burnt or heat affected. The distinct nature of the material suggests

that tile was carefully selected and the lack of flanges indicates that tile was adapted as necessary for use in the structure. The high numbers of signature marks is intriguing, although it may be a result of higher survival rate due to the generally larger sized fragments.

Context 5725, saltern 6090

The average size of fragments from context 5725 is slightly higher than the site average and the group from this structure is distinguishable from the other *in situ* material by the predominance of brick, which accounts for 65% of the group by weight. A further 25% is identifiable tegulae, 12 out of the 25 fragments retaining their flanges. A total of eight fragments bear signature marks. The proportion of brick used in this feature is striking and may indicate that thicker tile was being carefully selected.

Hearth 1407, building 5760

The average size of fragments from hearth 1407 is slightly higher than the site average and approximately 40% of them were burnt or heat affected. Few markings were present on tile in this structure, only two signature marks, one animal print and some combing on box flue tile. Although there is an emphasis on bricks and tegulae, a mixture of tile types were used. Intriguingly, although only a few fragments of flue tile were found on the whole site, 85% (by weight) were used in this single structure. It seems unlikely that this type of tile was being deliberately selected, since they would have presented no functional advantage. The low numbers at Stanford Wharf generally suggest that either the tile was being collected from a site without heating structures or that flue tile was deliberately excluded from selection (except in this instance).

Dump 5555, saltern 6090

The tile from dump 5555 has an average mean fragment weight for the site (141g) and comprises a varied collection of tile dominated by tegulae and flat tile, of which approximately one third are burnt. Despite the high use of tegulae, no fragments have signature marks. Nine of the tegulae retain their flanges while another ten fragments survive as flanges only or have missing flanges.

Hearth 6061

Hearth 6061 was found *in situ* inside building 6090 and was recorded as comprising two courses of tile with three raised pillars surviving to three courses. A sample of bricks were removed from this structure, two of which have been exposed to extreme heat causing vitrification. Structure 6090 may also have utilised some large fragments of tegulae, which were recovered from overlying later 6062.

Discussion

Evidence from analysis of the fabric, form and details of the tiles reveal the assemblage of ceramic building material at Stanford Wharf to be relatively uniform. The vast majority of the fabrics are homogeneous, while the cutaway and flange forms demonstrate some variation within an overall limited range. The signature marks similarly show variations within a generally limited style that could be indicative of a number of different workers within the same place of manufacture or production over a number of decades (Warry 2006). The homogeneous nature of the fabrics indicates that either that most of the tile came from the same place of manufacture or at least that the same clays were being exploited.

Given the general uniformity of the tile detail, and the indication that it probably came from a single or very close sources, it is important to consider where these sources may have been. In addition, it is also useful to understand if the tile was reused from (presumably local) demolished buildings or whether it could have been surplus newly manufactured material from local production. The high mean fragment weight and generally low wear could mean the tile was new. However, few fragments could be reassembled, which might indicate that broken tiles were being brought onto site (although it is not clear what percentage of the assemblage was excavated). In addition, Warry's chronology of cutaway forms would indicate that the tile being used was not newly made (see above), and given the occasional tile of different types, such as flue and imbrex, it seems most likely that the tile reflects reuse of material from elsewhere. In terms of chronology, the use of tile at Stanford Wharf is confined almost entirely to the late Roman period, which would also be in keeping with the disuse of tile at nearby sites.

Tile is often recycled for use in ovens, hearths and crop dryers on rural settlements (Poole 2011, 316). If we assume the tile came from demolished buildings,

the likelihood is that these buildings were not very far away, although off-site, as there is little evidence of domestic occupation at Stanford Wharf. The presence of small quantities of flue tile and bricks of a type used in hypocausts indicate that at least some of the tile was coming from relatively wealthy settlements or villas.

One possibility is the rural settlement at Mucking, which Jones believed may have had Roman buildings of some wealth as evidenced by the flue tiles (forthcoming). In order to investigate the likelihood of a link between the two sites, a random selection of approximately 100 fragments of ceramic building material from Mucking was examined and the fabrics compared with reference samples from Stanford Wharf. The overall impression is that both sites made use of the same (limited) range of fabrics. The most common type E fabrics at Stanford Wharf are also common at Mucking, including the soft E3 fabric, whilst the least common fabrics such as the sandy type C, and the even rarer type A fabrics (pale coloured fabrics including those of Eccles type) are also rare at Mucking or were not observed due to the relatively small sample size. In addition, all the fabric types observed in the Mucking assemblage had all already been recorded at Stanford Wharf suggesting that there was very little difference, if any between the fabrics used at the two sites.

The similarity in fabrics and types of tiles, does not, however, prove that the tile from one was being taken and used at the other, but rather that both shared a source, with people at both Stanford Wharf and Mucking perhaps collecting tiles from nearby local villa sites. These nearby sites could have been on either side of the river as cross-river links been demonstrated by the distribution of other materials such as querns and pottery (Shaffrey, specialist report 10; Biddulph and Stansbie, specialist report 2), and it is plausible that tile was also moved across the river perhaps as ballast. In order to investigate this, the fabrics from Stanford Wharf were compared to samples from Northfleet villa and Springhead Roman town. This revealed some interesting similarities (Table 9.5). In addition to the 'Eccles' type fabric discussed above, several fabrics recorded at Stanford Wharf were found to be identical to types at Springhead and Northfleet when examined with a x10 magnification hand lens. The most common fabrics at Stanford Wharf, fabrics E1 and E1c, were identical to fabrics within Group B at Springhead and Northfleet, although they were far less common there. Other minor fabrics at Stanford Wharf were matched with fabrics at Springhead and Northfleet, including the grittier C fabric, which was very common at Springhead and Northfleet. The pale A2 type and the E1b type are similarly infrequent at both

sites.

The original source or sources of some of these fabrics are hard to determine. The A2 fabric occurs widely in coastal areas in south and south-east England (Betts and Foot 1994, 32-3). The type E1/E1 fabrics are apparently similar to those from the Radlett kilns in Hertfordshire, but a local clay source was deemed to be more likely (Poole 2011, 327). Given the higher frequency of this fabric group at Stanford Wharf, a source north of the Thames could be more likely, but remains unknown at present.

The similarity in fabrics between Stanford Wharf/Mucking and Springhead/Northfleet does not prove that the tile being reused at Stanford Wharf came from sites south of the river, but it indicates that tile kilns south of the river were supplying sites on the north side (for example Eccles) and possibly in reverse (E1 fabrics), although it is also possible that similar fabrics were created at multiple kilns exploiting similar clays. Further study of fabric types will elucidate this further.

The late Roman date of the tile at Stanford Wharf is clear evidence of a change in the way at least some hearths and kilns were being constructed during the latest phase of activity. This change was probably associated with large-scale reorganisation that also took place. It is clear that during this latest phase, tile and bricks were brought onto site for the building of some structures. Analysis of the tiles and bricks recovered from *in situ* contexts reveal careful selection of tile. Some features of selection are consistent across the structures, for example, the rare use of imbrices, no doubt a practical preference for flatter tile, or the removal of flanges from tegulae when the positioning of the tile required it. These features reflect practical considerations, as might the emphasis on brick in structures 5725 and 6061. However, the high number of flue tiles from feature 1407 does not have a functional explanation nor can the high number of 'signed' pieces from structure 5288 be explained by fragment size alone. These must be considered a reflection of the tile available rather than a deliberate choice. Thus the implication of the evidence is that tile was being collected and utilised on a structure by structure basis, with the tile being used reflecting what was available at that time. It is therefore likely that small quantities of brick and tile were collected nearby as required and brought onto site, rather than there being large amounts available on site at all times.

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Ceramic Building Material Tables

TABLE 9.1: FABRICS BY WEIGHT (%)

Fabric	%
A1	0.3
A1b	0.2
A2	0.2
B	0.1
C	3.1
C1	0.1
D	1.5
E1	66.3
E1b	2
E1c	11
E2	1
E3	8
F	1.4
Unknown	1.8
Various	3
Total	100

TABLE 9.2: QUANTIFICATION OF CBM TYPES BY WEIGHT

Form	Weight (g) %	
Tegula	60412	24
Flat	52425	20.8
Brick	59655	23.7
Brick/flat	44899	17.9
Imbrex	22317	8.9
Flat/indeterminate	6264	2.5
Box/flue	2829	1.1
Indeterminate	2202	0.9
Tegula Mammata	489	0.2
Grand Total	251492	100

TABLE 9.3: LOWER CUTAWAY TYPES

OA type	Warry No.	Warry Group	No
C1		6B	11
A3b	variant		2
A3		4C	4
A3/C1		5C	10
A3/C1b		5C	3
A3a		1D	2
TOTAL			32

TABLE 9.4: QUANTIFICATION OF CBM FROM IN SITU STRUCTURES

Ctx	No Frags	Wt (kg)	Mean fragment wt (g)
5288	87	28.7	330
5725	138	24.2	175
1407	96	18.7	195
5555	79	11.1	141

TABLE 9.5: COMPARISON OF FABRICS FROM STANFORD WHARF WITH THOSE FROM SPRINGHEAD AND NORTHFLEET

Stanford Wharf Fabric type	Springhead and Northfleet fabric group	% of assemblage at Stanford Wharf and Northfleet	% of assemblage at Springhead
Type A1/ A1b	Group Eccles fabric 17	0.5	0.28
Type A2	Group A fabric 12	0.2	2.5
Type C	Group C fabric 2 but also similar to Group G fabric X although not as coarse	3.1	48
Type E1, E1c	Group B fabric 7	77	15
Type E1b	Group D fabric 8 and 18	2	6



Figure 9.1: CBM

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