

A medieval pottery kiln in Hallgate, Doncaster, South Yorkshire

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SUMMARY

Excavations between Hallgate and Wood Street, Doncaster, South Yorkshire, revealed a medieval pottery kiln and small waster dumps. The site was close to that of a later kiln excavated in the 1960s by the staff of Doncaster Museum. The new kiln (Hallgate 95) proved to be somewhat earlier in date (mid 11th to early 12th century) and to have been used for firing vessels in a range of different fabric types, probably simultaneously.

INTRODUCTION

Publication of rescue excavations carried out in Hallgate and the Market Place in Doncaster during the 1960s (Buckland *et al.* 1979, Hayfield 1984) established the presence of 12th- and 13th-century pottery production within the medieval town. Analysis of the material hinted at the presence of earlier pottery manufacture close to the sites of these excavations. In 1995 a proposal by the Tetley Pub Company Ltd. to convert a building at 53/54 Hallgate into a public house resulted in a two-stage archaeological investigation at the rear of the building, between Hallgate and 9 Wood Street (Figure 1). Excavations revealed a medieval kiln, pits, post-holes, part of the Roman cemetery and other Romano-British features. Analysis of the pottery assemblage from the kiln and associated features demonstrated a phase of pottery production pre-dating that already discovered. The site will be referred to as Hallgate 95, in order to distinguish it from the kiln published by Buckland *et al.* (1979).

THE KILN AND ASSOCIATED FEATURES

During the initial, evaluative, phase of excavation a large feature was located containing a significant amount of pottery and evidence of intense heating. In view of uncertainty about prospects for further investigation the feature was partially excavated and two separate bowl-shaped cuts (308 and 311) were identified containing four separate deposits. When a second phase of excavation was agreed it became possible to expose the complete feature, by then

identified as a kiln. Recovery of the complete plan was hampered by the necessity of excavating it in two stages, as well as by the presence of a modern wall cut which had truncated the upper part along its length.

As finally excavated, the kiln consisted of three cuts arranged in a linear fashion, which were identified as a central furnace with two opposing flues (Figure 2). No internal structures or evidence of a superstructure were located and it appeared to be an example of a type 2a kiln as defined by Musty (1974). In this it resembled the kilns recorded by Buckland *et al.* (1979) and Hayfield (1984).

The overall length of the kiln, including the flues was 4.6 m. The central furnace was oval and measured 1.80 m by 1.30 m and approximately 0.50 m deep. The southern flue was 1.60 m by 1.00 m, compared to the northern flue which was 1.20 m long with a maximum width of 0.95 m. This flue had a narrower opening, 0.52 m wide. Five separate deposits were recorded within the kiln, two of which were believed to have formed during its operation. The lowest of these (context 1122) was composed of natural sand (0.05 m–0.07 m deep) burnt by the heat of the kiln. One hundred and eighty-two sherds of pottery were found within this layer, apparently having been pressed into the loose material. This distinctively-coloured layer was restricted to the central area of the kiln and clearly marked the extent of the firing chamber.

Context 1112 formed the base of the northern and southern flues and overlapped context 1122. It was very dark and appeared to be the result of direct

A MEDIEVAL POTTERY KILN IN HALLGATE, DONCASTER, SOUTH YORKSHIRE

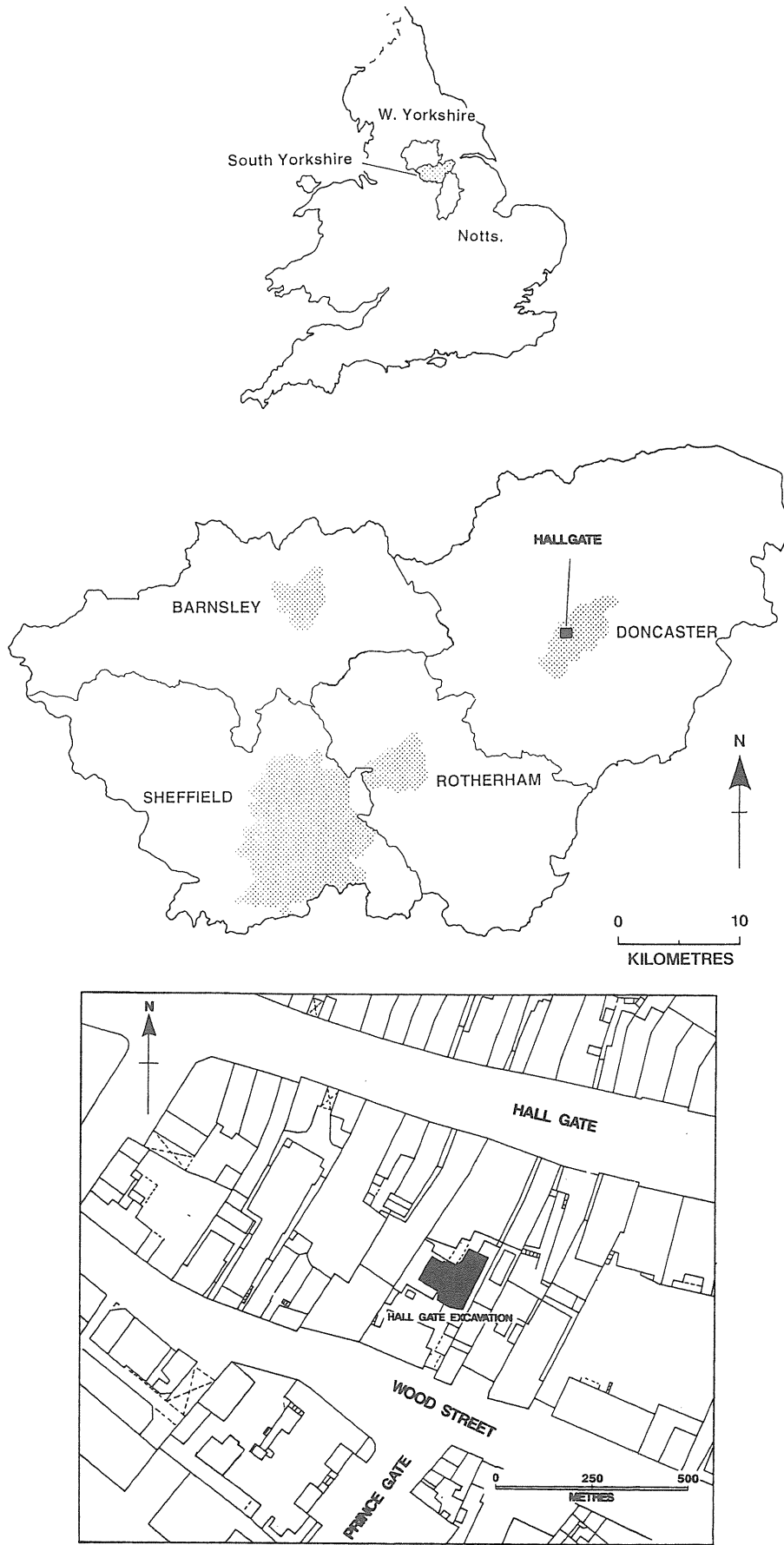


Fig. 1. Location maps showing Hallgate, Doncaster.

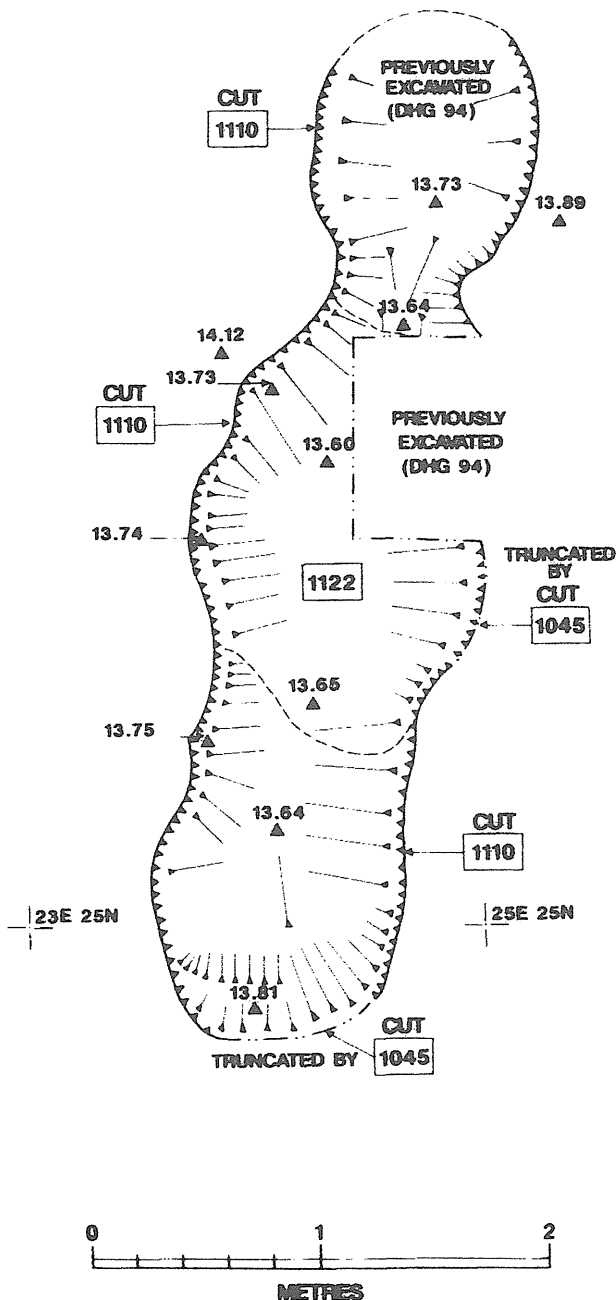


Fig. 2. Plan of the kiln.

burning. Some charcoal was present, though only in small quantities. Contrasts in the pattern of burning within the kiln were interpreted as the result of the method of operation. Black-stained deposits containing charcoal were the result of burning of fuel at the northern and southern ends of the kiln. Orange/red stained sand within the central furnace represented indirect burning, the hot gases being drawn in from the flues. After firing the ash and partially-burnt wood were probably raked out, spreading the black staining outwards and keeping it away from the central furnace.

The overlying deposits, which filled the kiln and

were devoid of evidence for burning, had apparently accumulated after its abandonment. The earliest of these, 1117, sealed 1122 and 1112 and consisted of orange/brown sand and gravel, with a maximum depth of 0.15 m. A considerable amount of pottery (511 sherds) was found within this layer, perhaps representing pots left in the base of the kiln following its final firing.

Deposit 1117 was overlain by 1111, which was largely restricted to the area of the central furnace and consisted of mixed sand and silt with some residual evidence of burning. This layer was between 0.10 m and 0.15 m deep.

Layer 1105, which covered the full extent of the kiln, consisted of a grey-brown silt with some gravel, somewhat similar to the mixed deposit (1003) which covered the entire site. The upper part of 1105 had been severely truncated by a cut (1045) for a modern brick wall along the length of the kiln.

A number of cut features (pits and post holes) were found in the immediate vicinity of the kiln. Some contained pottery similar to that found within the kiln and were interpreted as contemporary with it and possibly associated with its use. These included two shallow, intercutting pits (cuts 1054 and 1064). The latest, 1064, was a broad but relatively shallow pit 2.40 m diameter by 0.90 m deep. It was roughly circular in plan with very steep sides and a flat base. It was filled by a mid grey-brown silty sand containing 20–30 per cent rounded gravel. Although it had no obvious function and was devoid of evidence for burning, its unusual structure suggested that it was related to some particular activity. Eighty sherds of medieval pottery, including kiln material, were recovered from within the fill of this feature. Pit 1054, cut by 1064, was also broad and shallow (2.50 m by 1.30 m by 0.20 m deep). The sides were not as steep as those of 1064 and the base was slightly more rounded. The fill was very similar, also being a mid grey-brown silty sand. Seventy-three sherds were recovered, the composition being similar to those from 1064. On the western edge was a smaller, deeper cut, oval in plan, with steep sides (cut 1061), 0.70 m long and up to 0.40 m deep below the base of pit 1054.

Two post-holes were associated with the kiln, one north of the pits (1068) and one to the east (1066); 1068 contained burnt material, apparently derived from the kiln. Neither contained any artefacts and their precise purpose was not clear, although they may have formed part of a covered working area.

THE CERAMIC ASSEMBLAGE

The pottery assemblage consisted of 2792 sherds from the kiln (weighing 53,170 g), 80 sherds (1380 g) from pit 1054, 73 sherds (1060 g) from pit 1064 and 835 sherds from other archaeological

Table 1. Total numbers, weight and ENV of sherds by fabric type from the kiln (all phases).

	Sherd Nos.	Sherd Wt.	E.N.V.	Sherd No. (%)	Sherd Wt (%)	E.N.V. (%)
A	48	635	45	1.72	1.19	1.72
A type	11	90	10	0.39	0.17	0.38
A1	578	15555	552	20.7	29.26	21.08
A1 R	44	2050	42	1.58	3.86	1.6
A1 type	60	1580	58	2.15	3.04	2.22
B type	5	25	5	0.18	0.05	0.19
C type	34	75	34	1.22	1.14	1.3
C1	863	12150	847	30.91	22.85	32.35
C1 type	39	265	39	1.4	0.5	1.49
C2	3	160	3	0.11	0.3	0.11
C3	167	1425	165	5.98	2.68	6.3
C3 type	5	70	1	0.18	0.13	0.04
D	140	4485	116	5.01	8.44	4.43
D type	1	55	1	0.04	0.1	0.04
E	553	11365	477	19.81	21.37	18.22
E R	1	25	1	0.04	0.05	0.04
E type	51	960	40	1.83	1.81	1.53
F	12	270	11	0.43	0.51	0.42
F type	2	365	1	0.07	0.69	0.04
Ha type	26	60	26	0.93	0.11	0.99
Other	149	1505	144	5.35	2.84	5.5
Total	2792	53170	2618	100	100	100

features and deposits. The material from all of these contexts was examined and the results are included in the unpublished archive report, copies of which have been lodged with the South Yorkshire Archaeology Service and Doncaster Museum.

The Roman pottery from the site, which included funerary vessels, will be the subject of a separate report; amongst the residual Roman pottery in medieval contexts were a number of amphora sherds which had been used in the construction of the kiln and were coated with green glaze.

Three methods of quantification were employed in the analysis of the assemblage from Hallgate 95; sherd numbers, sherd weights and estimated number of vessels. All methods of quantification have their drawbacks (Orton, Tyers and Vince 1993, Orton 1989, Fletcher and Heyworth 1987) and a wholly satisfactory measure of quantity may not exist. In the case of the Hallgate 95 assemblage the figures are intended to be used to compare the representation of different types within the assemblage, a task made easier by the limited range of vessel forms and size. The caveats expressed by the statistically informed writers cited above should be borne in mind in evaluating the statistics used in this report.

Sherd count as used here is the absolute number of sherds, the joining of sherds (either old or fresh breaks) being ignored for this calculation. The numbers of joining sherds are recorded as the estimated number of vessels (ENV), a figure which represents the maximum number of vessels in the assemblage (to be distinguished from the estimated vessel equivalent or eve, which is not used here).

Sherd weight is accurate to five grams. The basic data is presented in Tables 1 to 3. Fabrics not made on the site (described below) are subsumed under the category of 'other'. Full details are contained in the archive report.

FABRICS

The following descriptions are based upon the examination of the sherds with the aid of a x10 hand lens. Ten samples were submitted for petrological and ICPS analysis. The results, which generally support the conclusions reached by macroscopic examination, are contained in Appendix 1.

Fabric DHG A

The Hallgate A fabric (Buckland *et al.* 1979) is an oxidised, sandy textured ware containing small rounded to sub-rounded quartz grains. The colour is predominantly light red (2.5 YR 6/8), but variations are not uncommon. The colour, quality and extent of the glaze is highly variable, ranging from green to yellowish red (5 GY 4/6 to 5 YR 5/8). The vessels appear to have been wheel thrown, although Buckland *et al.* have commented that the fine fabric might not have been conducive to the preservation of coiling marks (1979, 18). Hallgate A ware appears to be equivalent to Hayfield's FD type (1985:15), but it is not clear whether he recognised the existence of the earlier, splash glazed, A1 type, described below.

Eleven sherds (90 g) from Hallgate 95 were classified as of A type, closely resembling Hallgate

Table 2. Numbers, weights and ENV of sherds from pit 1054.

Context	Data	A	A type	A1	A1 R	C1	D	E	E type	Hall. type	Other	Total
1055-1	Sum of Sherd No.	11	0	8	1	19	1	16	0	0	1	57
	Sum of Sherd Wt	365	0	210	5	220	40	265	0	0	5	1110
	Sum of ENV	11	0	8	1	18	1	15	0	0	1	55
1055-2	Sum of Sherd No.	0	2	3	0	10	1	1	3	1	2	23
	Sum of Sherd Wt	0	35	20	0	135	15	10	30	15	10	270
	Sum of ENV	0	2	3	0	9	1	1	3	1	2	22
Total Sum of Sherd No.		11	2	11	1	29	2	17	3	1	3	80
Total Sum of Sherd Wt		365	35	230	5	355	55	275	30	15	15	1380
Total Sum of ENV		11	2	11	1	27	2	16	3	1	2	77

Table 3. Numbers, weights and ENV of sherds from pit 1064

Context	Data	A	A type	A1	A1 R	A1 type	B	C type	C1	D	E	Hall. type	Other	Total
1038-1	Sum of Sherd No.	0	0	5	1	1	2	1	16	9	2	2	8	47
	Sum of Sherd Wt	0	0	165	5	10	15	20	155	195	80	10	20	675
	Sum of ENV	0	0	4	1	1	2	1	14	7	2	2	8	42
1065-1	Sum of Sherd No.	0	3	0	0	0	1	0	0	0	0	0	1	5
	Sum of Sherd Wt	0	70	0	0	0	30	0	0	0	0	0	15	115
	Sum of ENV	0	3	0	0	0	1	0	0	0	0	0	1	5
1065-2	Sum of Sherd No.	1	2	3	0	0	1	0	4	0	4	0	6	21
	Sum of Sherd Wt	10	40	65	0	0	10	0	30	0	65	0	50	270
	Sum of ENV	1	2	3	0	0	1	0	4	0	4	0	6	21
Total Sum of Sherd No.		1	5	8	1	1	4	1	20	9	6	2	15	73
Total Sum of Sherd Wt		10	110	230	5	10	55	20	185	195	145	10	85	1060
Total Sum of ENV		1	5	7	1	1	4	1	18	7	6	2	15	68

A, but not identical to it. The fabric showed certain minor variations in its texture and composition which set it apart from the main group. This variation probably reflects chance factors in the processing and mixing of the clay.

Fabric DHG95 A1

A hard oxidised fabric containing moderate to abundant quartz grit of a sandy grade and occasional rounded red ferrous grains. Although directly related to the Hallgate A fabric, it is distinguished from it by its slightly coarser texture. Fabric A1 Reduced (A1 R) appears to be an overfired version of A1 and the relatively large number of wasters in this fabric (over 70 per cent of the total) may reflect this.

The majority of sherds in the A1 fabric show evidence of coiling and smoothing, sometimes involving the use of a turntable, particularly on the necks and rims of the vessels. A1 was the commonest fabric type in the kiln group by weight (15,555 g), although there were more sherds of type C1 (863, weighing 12,150 g), probably a consequence of the softer character of the C1 fabric and its greater tendency to break up into small fragments.

Fifty eight sherds (1,525 g) were classified as of A1 type for reasons similar to those described above in connection with fabric A. Two sherds (55 g)

resembled type A but were decorated with splash glaze.

Fabric DHG95 C1

A red oxidised fabric containing abundant, rounded, red ferrous grit and quartz sand, giving the fabric a characteristic gritty texture. The hardness of the fabric varied considerably from a soft form which can be scratched with a fingernail to a hard, well fired type. The fabric was, in general, softer than A1. Fabric C1 appeared to be the counterpart of Buckland's earliest fabric, Hallgate C, which was poorly represented in the Hallgate assemblage, but resembled that from the Market Place kiln (Hayfield 1984). It is probable that these fabrics can be related to Hayfield's GD gritty ware type (1985,15).

Variants of the basic type included the rare C2 (three sherds, 160 g), with sparse to moderate white non-crystalline inclusions (the sandstone noted in Appendix 1), and C3, a soft, finely tempered fabric with lower quantities of ferrous and quartz grit (167 sherds weighing 1,425 g).

The C1 and C3 type fabrics may reflect the kind of variation as noted in the case of the A type, described above, although the presence of the sandstone in C2 might indicate a different source of clay or additives.

Fabric DHG95 D

A buff and grey fabric containing prominent fine black iron inclusions and quartz. Typically glazed with a dark green glaze and decorated with combed wavy lines, this fabric was notably harder than group C. Variation within the type was represented by only one sherd, classified as D type.

Fabric DHG95 E

A fabric displaying a considerable degree of variation around a basic norm. It was generally buff to pale pink in colour and contained quartz grit and soft, pale red, iron rich inclusions. The hardness varied widely from a soft, scratchable type to a harder, well fired type. This was amongst the three commonest fabrics, with the 553 sherds weighing 11,365 g.

A single sherd in this fabric (E R) was reduced, probably due to an accident during the firing. Rather more (51 sherds weighing 960 g) showed minor variations within the type, and were classified as E type.

Fabric DHG95 F

A hard, pale grey fabric, similar to Hallgate E, but containing moderate to abundant fine grains of black grit, probably iron, in addition to the ubiquitous quartz. Two sherds, joining to form the neck, rim and handle of a jug (context 1117-1) were classified as F type to allow for minor variations in the colour and texture of the fabric.

Other fabrics

In addition to locally produced types, a variety of other wares were recovered from the kiln and associated contexts. Full details are given in the archive report, and, for the sake of brevity, the details can be summarised here.

Hallgate B (Buckland *et al.* 1979, Hayfield 1985) was rare at Hallgate 95, with only five small sherds recovered from a cleaning layer (307-10). Twenty six sherds (60 g) could not be definitively described as belonging to any one of the Hallgate types, although they shared many of the traits (notably the presence of moderate quantities of red ferrous grit and/or fine black grit). These were termed *Hallgate type* and were particularly common in context 1117. Thirty-six sherds of *White Gritty ware* and twelve sherds of *Gritty ware* appear to represent regional imports, probably from West Yorkshire. The fabric and rim forms (e.g. contexts 307-1, 305-6, Figure 7:64) closely resembled those defined by Moorhouse and Slowikowski (1987, Fig. 39:7) as Pimply/Hillam wares. On this basis the examples from Hallgate 95

were dated to the 12th or early 13th centuries. Petrological analysis (Appendix 1) confirmed the non-local origin of White Gritty ware.

The term *Fine Thrown Oxidised ware* (FTO) is used to refer to a type which occurred in small quantities in contexts 1117-2,3, 305-1,3,5,6, 307-1,2 and 309-1. The ware was distinguished from local types by the fineness of the fabric, which had a smooth, oxidised, sandy texture with no visible inclusions and by the fact that it was clearly wheel thrown. No precise origin can be suggested, although the petrological and ICPS examinations confirmed a non-local source.

Seven sherds of *Stamford ware* were recognised amongst the material associated with the kiln; four from stratified contexts (301-1, 1038-1, 1048-1, 1057-1) and three unstratified (U/S and 1003). All were body sherds and those associated with the kiln were found in pits 1054 and 1064. The fabric resembled Kilmurry's type C (Kilmurry 1980), suggesting a date within the 12th or early 13th centuries. All of the sherds were glazed with a patchy, shiny pale green to yellow glaze similar to Kilmurry's Glaze 1. One sherd, from context 1054, was decorated with a thin, incised line around the circumference of the vessel.

The terms *Medieval Sandy ware* and *Reduced Sandy ware* are used to refer to eleven sherds (110 g) in fabrics which did not appear to be of local origin, but whose precise type was indeterminable. In all probability these were local and regional imports to the site, possibly from Lincolnshire.

Humber ware, defined by Watkins (1987), was conspicuous by its absence from the contexts most closely associated with the kiln. Three sherds (15 g) were recovered from context 307-10, a small, rather mixed, group consisting of material from cleaning around the kiln. A further three sherds (30 g) were found in the group from pit 1064. Both contexts contained other material of apparently later date than the kiln and should be considered to be mixed.

A single small sherd of *South Yorkshire Gritty ware* (type B) was found in context 305-6. This was slightly unusual in that it was decorated with splashed glaze, a trait also noted by the authors amongst the assemblage from Church Walk, Doncaster, and apparently at odds with the accepted date for the early phase of the Firsby / Rawmarsh industry of the 13th or early 14th centuries (Hayfield and Buckland 1989). This should not be considered surprising given the very poor state of research into this important component of the medieval pottery industry of South Yorkshire. A further four sherds (55 g) were found in pit 1064.

Fifty-six sherds of *Shell-Tempered ware* were recovered from the site, forty-six of which were stratified. A full report was prepared by Jane Young

(City of Lincoln Archaeology Unit) and forms part of the site archive.

THE POTTERY AND THE SITE

Summaries of the quantities of pottery from the kiln and from pits 1054 and 1064 are presented in Tables 1–5. Further details can be found in the archive report and in the synthesis published elsewhere (Cumberpatch 1997).

In the course of excavation three distinct stratigraphic units were detected within and around the kiln. The upper, sealing, layer consisted of two contexts (305 and 1105). The fill of the kiln, which accumulated, or was dumped, after its final use, consisted of four contexts (310, 311, 1122 and 1112). Contexts 1117, 1111, 309 and 307 appeared to be the result of the initial collapse of the sides of the kiln after the final firing. Context 1122–2 may be the earliest fill within the kiln, apparently representing the blocking of one of the flues before the final firing of the kiln.

The latest type present in any significant amount was fabric A, which, although present in the earliest context (1122–2, 4 sherds, 90 g), was commonest in the cleaning layers and second phase of the kiln. Together with three sherds of Humber ware (307–10), and South Yorkshire Gritty ware B (305–6), this would seem to indicate the presence of intrusive material. That Hallgate A should constitute 1.74 per cent (by sherd number, 1.19 per cent by weight) of the total kiln assemblage is perhaps unsurprising given the proximity of the nearby workshop. The closely similar A type was present in smaller quantities, all but one small sherd (1111–1) coming from 1105–1, the cleaning layer. The earlier Hallgate type B, was present in insignificant quantities.

Within the Hallgate 95 assemblage there was no evidence for a chronological distinction between different fabrics as was found at Hallgate. The commonest types, (A1, C1 and E) were present in similar proportions in both phase 1 and phase 2, while of the secondary fabrics (C3 and E), E was also present in both phases. Only the absence of C3 from phase 1 might be held to have some significance, but as there were no wasters in this fabric it is not even certain that it was a product of the same workshop. It seems that production using different mixes of clay proceeded side by side, possibly divided by vessel form and intended function. While it would not be safe to suggest that the percentages of different types within the assemblage relate in any way to the output of the kiln, the evidence would not support a chronological sequence of fabric types. In addition there was no indication of differential abrasion indicating residuality.

The contents of the pits, 1054 and 1064 (Tables 2 and 3) generally reflected the proportions of types

found in the kiln itself, although a number of types were absent.

The date of the Hallgate 95 kiln assemblage

Relative dating

Dating of the pottery assemblage from Hallgate 95 is based upon internal evidence of the pottery itself, stratigraphic and artefactual evidence from excavations elsewhere in Doncaster and from other sites within the region.

In their discussion of the material from Hallgate, Buckland *et al.* (1979, 59) suggested that the three fabrics identified represented a chronological succession from the earliest, Hallgate C, to the latest, Hallgate A, and spanned a period between the latter part of the 12th century and the early 14th century. A development of this scheme was proposed by Colin Hayfield in his discussion of the Market Place kiln where a splash-glazed fabric similar to Hallgate C suggested a production date between the later 11th and the first half of the 12th century (1984, 43). A more immediate question is the implication that the variation in fabric type may have chronological significance. The evidence from Hallgate 95 does not support this contention as it appears that the various fabrics were manufactured alongside each other for the following reasons:

The condition of all sherds was remarkably good. Abrasion was limited and there were no marked differences in the degree of wear between the various types, suggesting that the filling of the kiln and associated pits was a relatively rapid event and that deposits did not represent the slow accumulation of material over a number of years. There was certainly no evidence for an earlier fabric enjoying a 'residual' relationship with a later, as was the case with Hallgate C and A at Hallgate. Hallgate C was said to be residual in contexts containing Hallgate A at the first Hallgate kiln. All the evidence from Hallgate 95 pointed to simultaneous production of different fabrics.

Techniques employed in the manufacture of the different vessels were similar, with the principal difference being in the use of glaze, and it is probable that this relates more to the function of the vessels than to any chronological variation with glazed and unglazed vessels being fired in the same kiln (Cumberpatch 1996, 1997).

Differences in vessel form suggest that variation in fabric was more closely related to the intended function of the vessel than it was to changes in the pattern of raw material exploitation by the potters; the potters appear to have been using certain clays (or clay mixes) for certain types of pots rather than simply changing from one source of clay to another

(Cumberpatch 1997). The wider implications of this will be discussed further below.

Dating

The dating of the assemblage depends upon the character of the glaze and, to a lesser extent, the fact that vessels in all fabrics were of coiled construction.

In his consideration of methods of pottery manufacture, Hayfield noted that cooking pots and peat-pots were, at some potteries, coil built until the 14th-century while the coil building of jugs seems to have become rare by the late 12th to early 13th centuries (Hayfield 1980,32). At Hedon (Hayfield and Slater 1984) the fineware vessels in fabric FH1, found in contexts dating to the earlier 12th century, were predominantly coil built and splash glazed. Vessels in the later FH2 fabric, (c. 1150 to 1300) were, in contrast, generally wheel thrown, with only a few early vessels being splash glazed.

Perhaps more convincing than evidence of construction methods is the character of the glaze. Splash glazing dominated the assemblage, with suspension glazes virtually restricted to the Hallgate A and FTO types. There is a considerable body of evidence to suggest that splash glazing flourished in Yorkshire between the mid-11th and late 12th to early 13th centuries, after which it was supplanted by suspension glazes.

In Doncaster the evidence from the Market Place kiln (Hayfield 1984,43), Hallgate (Buckland *et al.* 1979) and other sites in Doncaster (Buckland *et al.* 1989), suggests strongly that the transition occurred during the mid to late 12th century. This is broadly reflected in the evidence from the wider region. McCarthy and Brooks (1988:35) have characterised splash glazing as typical of the 12th and 13th centuries. At Flaxengate (Lincoln), Adams Gilmour (1988) noted that splash glazed ware from potteries in Nottingham dated to the 12th and early 13th centuries. Summarising the evidence from York, Mainman has noted that splash glazing began in the mid to late 11th century and 'had a currency throughout the 12th century' (1990,486; 1993,585; cf. Brooks 1987,151).

In Beverley, Watkins noted that the suspension glazes were characteristic of the mid to late 11th century and that the transition to suspension glaze occurred around the middle of the 12th century (1991,80).

In West Yorkshire (and specifically at Tanners Row, Pontefract) splash glazing is found on both sandy and gritty ware vessels (Cumberpatch unpublished 1) and appears to date to the 12th and early 13th centuries, although further work on assemblages from the town is required to verify this date range. A broadly similar date is suggested by the

evidence from the north-east of England (Cumberpatch unpublished 2).

In London, splash glazing is found on London-type wares from c. 1080 and tends to continue throughout the 12th century, dying out in the early 13th century (Vince 1991, 260 ff.). Post-medieval references to the use of powdered glaze (Coleman-Smith and Pearson 1988), do not seem to relate to a continuous tradition of manufacture.

Splash glazing, as a manufacturing tradition, probably ended at different times in different potteries, but had generally been superseded by suspension glazes by the mid-late 13th century (Newell 1995,86), with the Doncaster potters moving over to suspension glaze rather earlier, before the end of the 12th century.

The pottery from the Hallgate 95 kiln and associated features was probably manufactured sometime between the mid-11th and earlier 12th centuries, with an early 12th-century date being perhaps the most likely. This conclusion requires verification through the analysis of large well stratified assemblages from other sites in Doncaster. The most critical is that from the excavations in Low Fishergate, publication of which by the York Archaeological Trust is eagerly awaited.

The presence of other wares (notably Stamford ware, Gritty ware and Shell-Tempered wares), while generally supporting a 12th-century date, offers little in the way of greater precision.

Production technology

Manufacturing technique

Vessels of fabric A1, C1, C2, C3, D, E and F are of coiled construction. The pattern of coiling and smoothing is sometimes clearly visible, particularly on the inside of jug necks and shoulders (e.g. Figs. 3:6–13, 4:19). Amongst everted rim jars a significant number had been finished on a turntable, giving a smoother, more even finish, resembling that of a thrown vessel (Fig. 4:22, 23, 26–32). Nineteen sherds of Hallgate A and two of A type also appear to have been hand made, unlike the vessels described by Buckland *et al.* (1979). These may represent an intermediate phase of production in which vessels were made by traditional coiled and smoothed techniques but using the Hallgate A mixture of clays. In the pit (1054) where the numbers of sherds of fabric A equalled those of A1, all the fabric A vessels were hand built.

That the practice of coil building, rather than throwing, pots is not a simple matter of technological progress is illustrated by the presence of contemporary wheel thrown Gritty wares and Fine Thrown Oxidised wares. Coil building continued in some parts of England until at least the 14th century,

A MEDIEVAL POTTERY KILN IN HALLGATE, DONCASTER, SOUTH YORKSHIRE

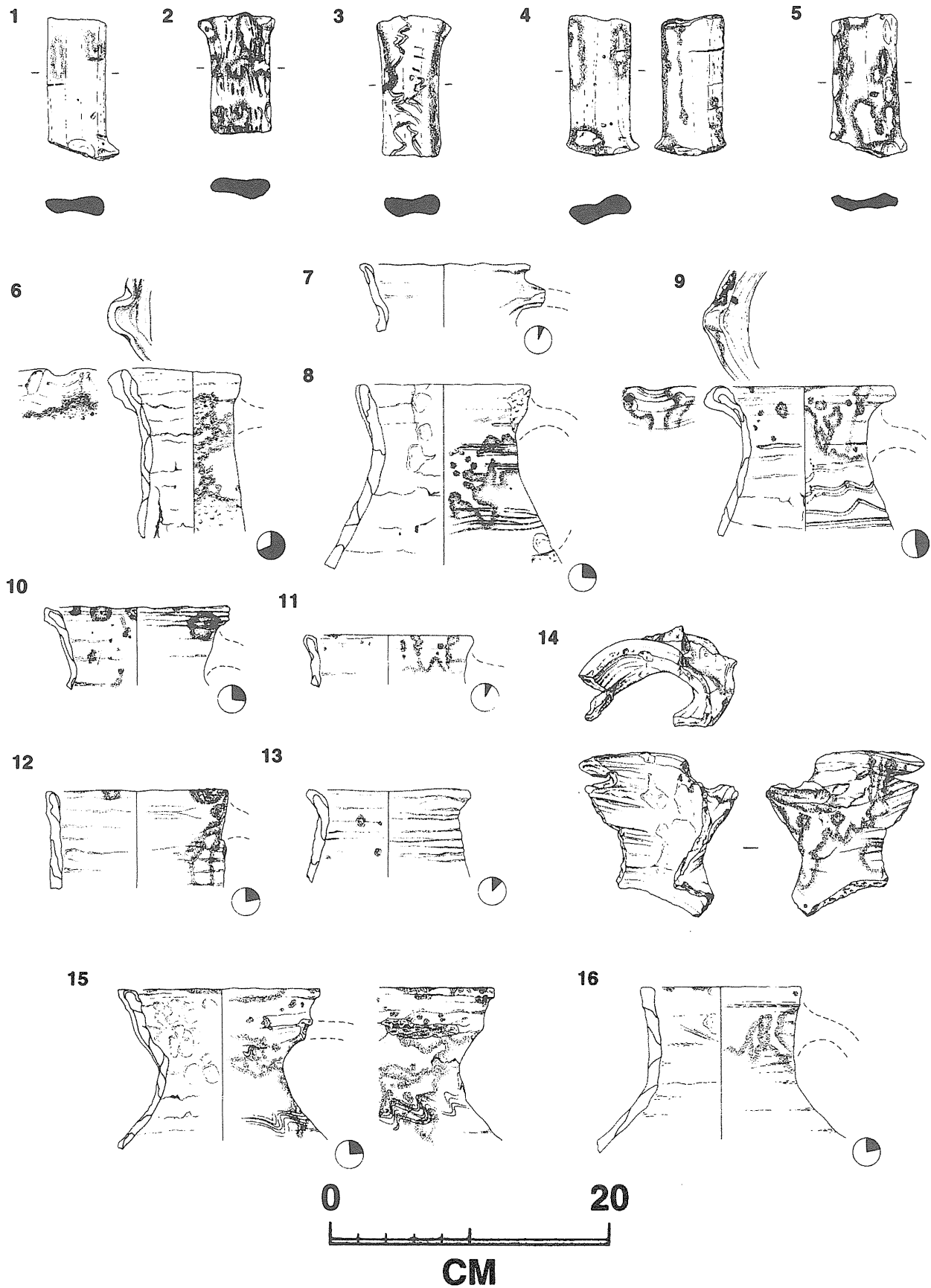


Fig. 3. Pottery from the Hallgate kiln, Nos. 1-5 Strap handles; Fabrics: 1: A1R, 2: A1, 3: A1 with combed decoration, 4: A1R, 5: A1, 6: Upper body and spout; A1, 7: Jug rim; A1, 8: Jug body and spout; A1 with combed decoration, 9: Jug rim/spout; A1 with combed decoration, 10: Jug neck and rim; A1, 11: Jug rim; A1, 12: Jug rim; A1, 13: Jug; C1, 14: Waster, jug; A1R, 15: Jug; A1, and 16: Jug; A1.

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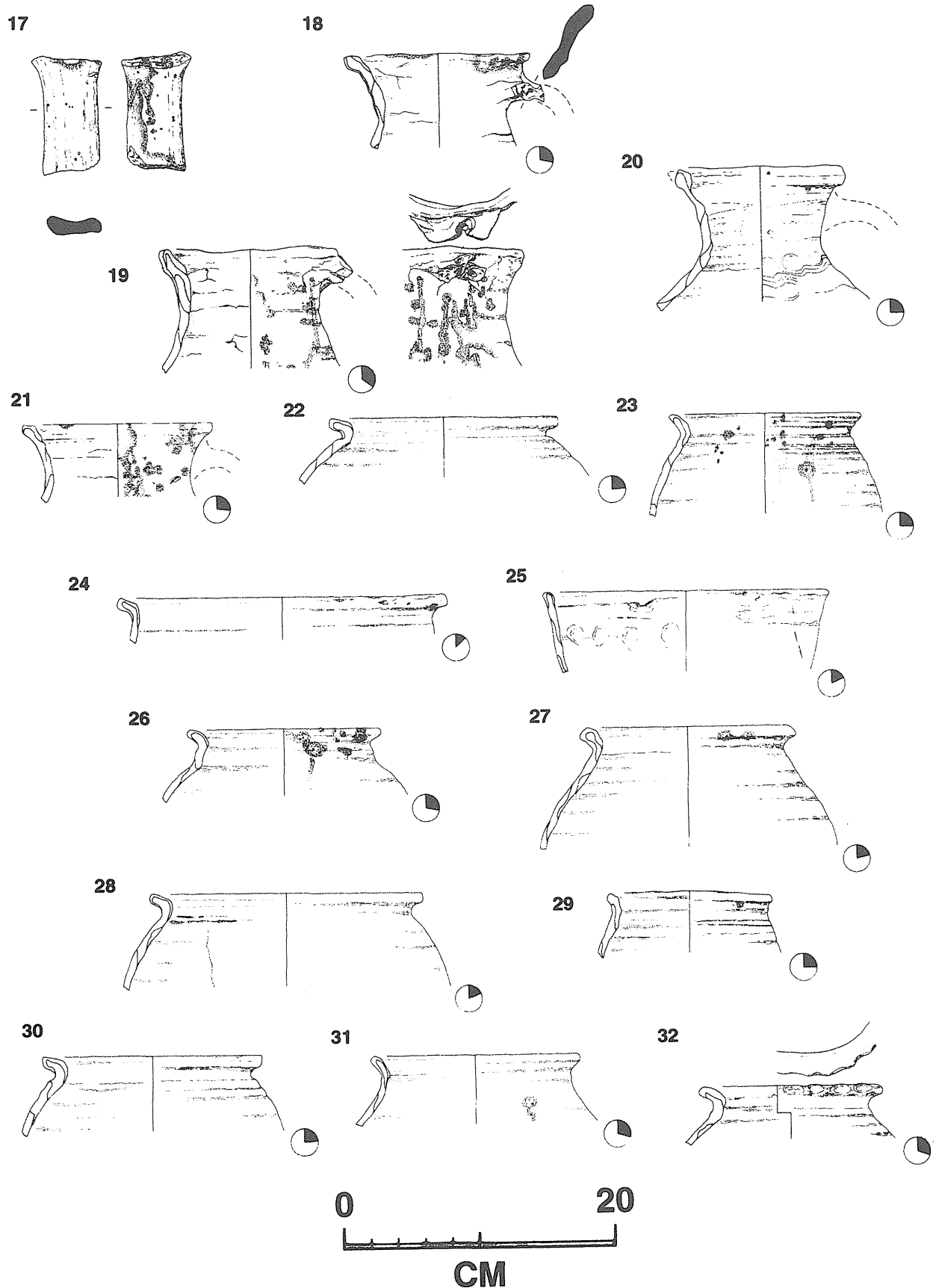


Fig. 4. Pottery from the Hallgate kiln, 17: Strap handle; A1, 18: Jug; A1, 19: Jug with perforated handle; A1, 20: Jug; A1 with combed decoration, 21: Jug; A, 22 and 23: Jar; C1, 24: Jar/Cooking pot; C1, 25: Jar/Cooking pot; C1, 26-31: Jar; C1, and 32: Jar; C1 with finger impressed decoration.

Table 4. Vessel handles from the kiln.

Fabric	Flat rod	Twisted	Rod	Stump	Strap	Strap (e)	Strap (p)	U/ID.	Total
A	0	0	0	0	0	0	0	0	0
A1	0	0	0	2	34	1	1	0	38
A1 R	0	0	0	1	4	0	0	0	5
A1 type	0	0	1	0	2	1	0	0	4
C1	0	0	0	0	1	0	0	0	1
C1 type	0	0	0	0	1	0	0	0	1
C2	0	0	0	0	0	0	0	0	0
C3	0	0	0	0	2	1	0	0	3
D	0	0	0	1	8	0	0	0	9
D type	0	0	0	0	1	0	0	0	1
E	1	1	0	0	25	2	0	1	30
E type	0	0	0	0	0	1	0	0	1
F	0	0	0	0	1	0	0	0	1
F type	0	0	0	0	0	1	0	0	1
Total	1	1	1	4	79	7	1	1	95

notably at Lyveden in Northamptonshire (Blinkhorn pers. comm.). It is thus unreliable as a chronological indicator, and reflects rather the strength of traditions of practice within the workshop or the strength of resistance to change amongst producers and consumers alike.

Vessel forms

Three vessel forms dominate the assemblage from the kiln; jugs, everted rim jars and deep open bowls or pancheons (Figs. 3–7). These are manufactured in fabrics A1, C1, C2, C3, D and E, although pancheons were relatively rare. Of the 313 recognisable forms, 205 (65.5 per cent by sherd number) are jugs or pitchers (the latter including vessels for which there was no evidence of a spout), 84 (26.8 per cent) are jars, 15 (4.79 per cent) are pancheons, five (1.59 per cent) are bowls (of various types), and the remainder, other forms, many of which are of ambiguous character. The pattern was repeated in the pits. Forms which were of considerable significance at Hallgate (notably pipkins) were conspicuous by their absence, as were cisterns and cauldrons.

Jugs and pitchers dominated the assemblage, but there was a further distinction by fabric type. Whereas jugs and pitchers are commonest in the finer, sandy textured fabrics (A, A1, D, E, F and types), only four were recognised in the coarser, red gritted, C type fabrics (Cumberpatch 1997, table 7). Everted rim jars and pancheons are the commonest forms in these fabrics (Fig. 4: 22–32), and, significantly, are rarer in other fabrics (Figs. 3, 6 and 7). The same picture emerged from the pits although here numbers of recognisable forms were so low as to make definite conclusions hazardous.

In a number of respects the evidence from Hallgate 95 supports that from Hallgate (Buckland *et al.* 1979). On both sites there appeared to be a

tradition of flat bases (as opposed to sagging bases) and a general absence of pinched 'feet' on the base/body angle (a common trait amongst the Humber wares). This may represent part of the local tradition of manufacture, reflecting the transmission of knowledge and practice between the two workshops.

The types and occurrence of handles are listed in Table 4. Of the 95 present all but three are broad strap handles, the remainder being rod handles, one twisted (Fig. 6:59). Seven examples, strap (e), are distinguished by the presence of small shoulders or 'ears', added at the junction of the handle and the neck of the vessel, presumably to strengthen the join (Fig. 6:48, 56). One handle, strap(p), was perforated vertically at the point where it joined the neck, possibly to attach a loose cover of some perishable material (Fig. 4:19). The handles were smoothed onto the necks of the jugs and pitchers and there was no evidence for the plugs of clay found in the later Humberware vessels (Hayfield 1980). There did not appear to be any distinction between the handle types in relation to the fabric. Five strap handles (three in fabric A, one in D and one in E) were found in pit 1054 and two (in fabrics A and E) in pit 1064.

The types and numbers of spouts are listed in Table 5. The distinction between pinched and pulled spouts is a minor one. Both were made with a single finger pulling the lip of the vessel out to form a simple spout. Pinched types showed a slightly greater degree of lateral pressure and tended to be slightly more clearly defined, which may relate to minor variations in practice between individual potters. The complete absence of tubular spouts, relatively common in the Hallgate assemblage, is an indication of the more restricted range of vessel forms compared with the products of the later workshop.

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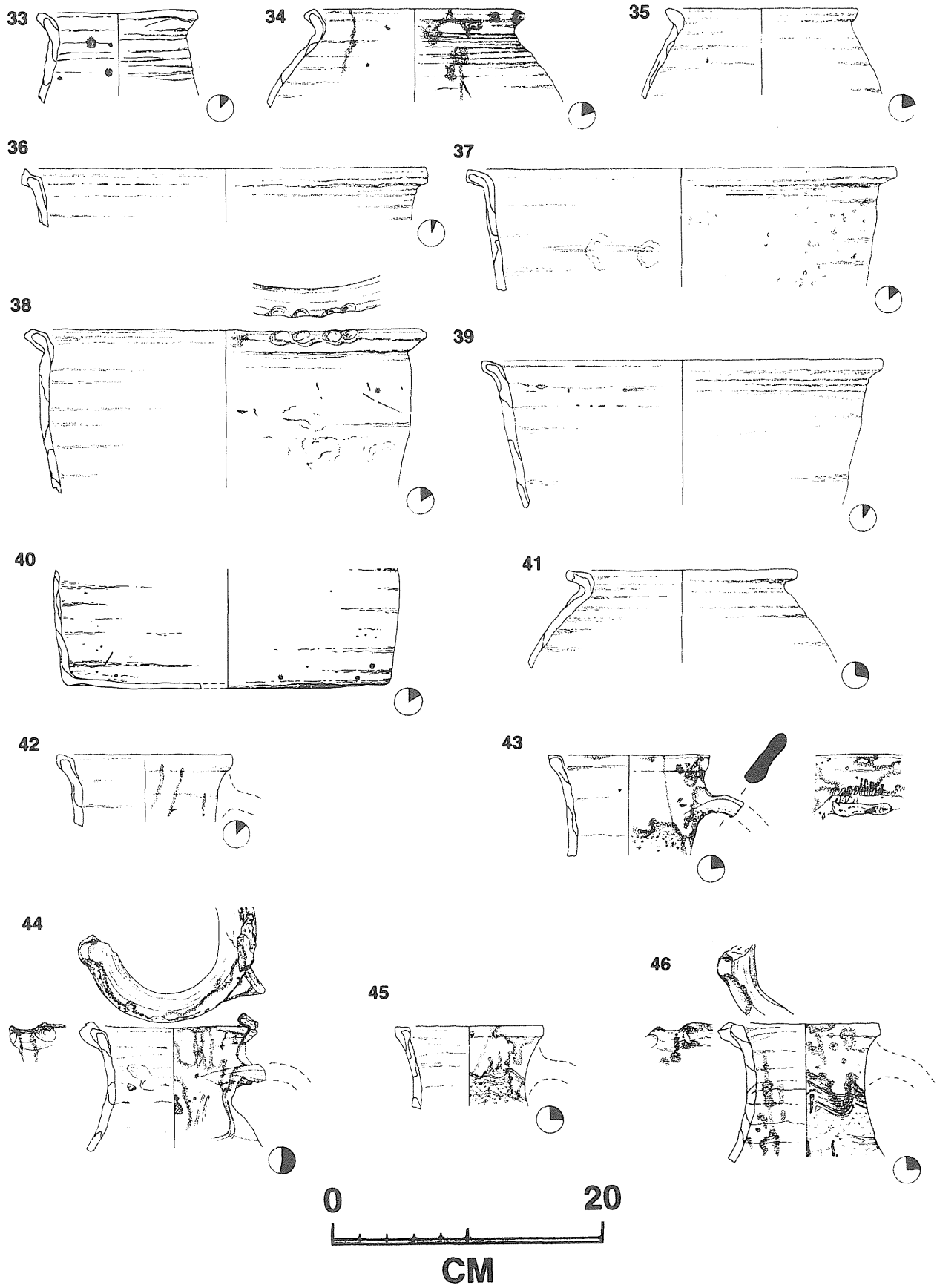


Fig. 5. Pottery from the Hallgate kiln, 33-5: Jar; C1, 36-9: Jar/Cooking pot; C1, 40: Jar/Cooking pot; C2, 41: Jar; C2, 42: Jug; C3, 43: Jug; D, 44: Jug; D with part of a vessel in fabric C1 attached to the rim, and 45-6: Jug; D with combed wavy decoration.

A MEDIEVAL POTTERY KILN IN HALLGATE, DONCASTER, SOUTH YORKSHIRE

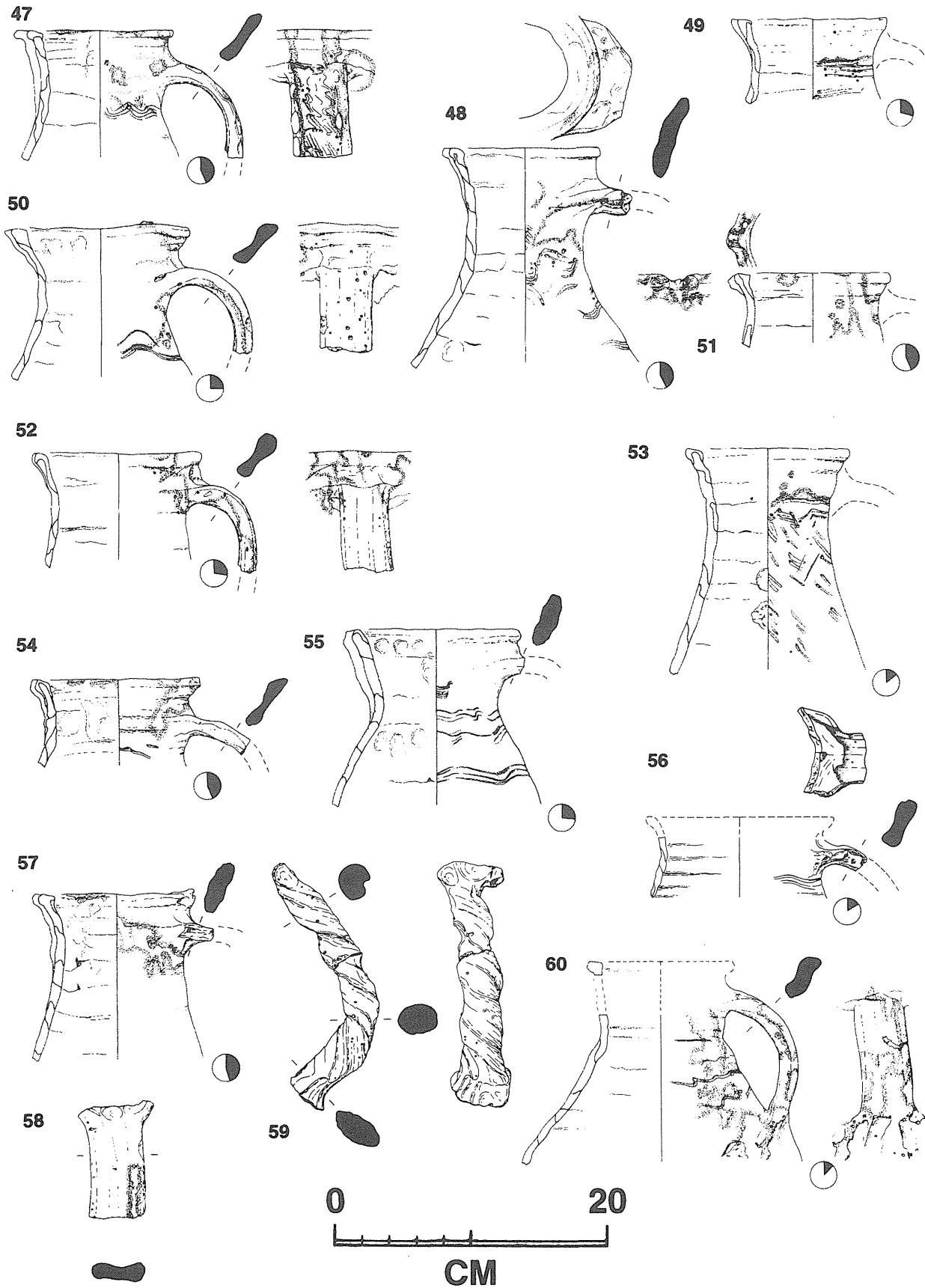


Fig. 6. Pottery from the Hallgate kiln, 47: Jug; D with combed decoration on neck and handle, 48: Jug; E with combed decoration on shoulder, 49: Jug; E, 50: Jug; E with combed decoration on shoulder, 51-2: Jug; E, 53: Jug; E with short lengths of combed decoration, 54: Jug; E, 55-6: Jug; E with combed decoration, 57: Jug; E, 58: Strap handle; E, 59: Twisted rod handle; E, and 60: Jug; E.

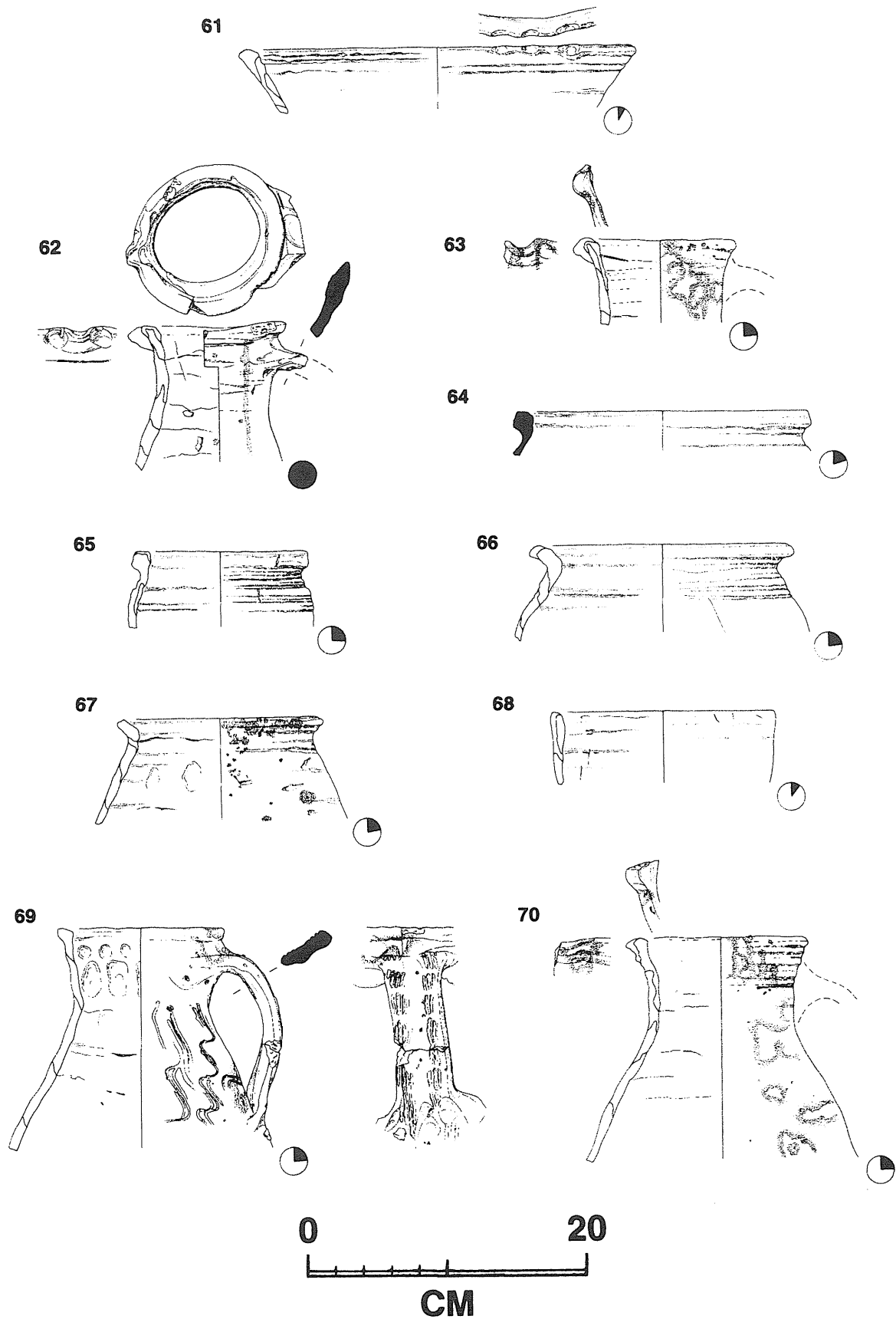


Fig. 7. Pottery from the Hallgate kiln, **61**: Bowl/cooking pot; E with finger impressed rim, **62**: Jug; F, **63**: Jug; F, **64**: White Gritty ware jar/cooking pot, **65-6**: Jar; A1, **67**: Jar; C1, **68**: Jar; Hallgate type, **69**: Jug; Hallgate type with combed decoration on body and handle and **70**: Jug; Hallgate type.

Table 5. Type and occurrence of spouts (kiln).

Fabric	Spout		Total
	Pinched	Pulled	
A	0	0	0
A1	2	3	5
A1 R	1	1	2
A1 type	1	0	1
C1	0	0	0
C2	0	0	0
C3	0	0	0
D	1	2	3
E	3	2	5
F	0	1	1
F type	1	0	1
Total	9	9	18

Glazing and firing

The bulk of the pottery was splash glazed, with the distinctive pitting prominent on the upper sections of the vessel bodies and the undersides of bases. The range of colour varied from greenish brown to deep green with a number of vessels bearing clear glaze which enhanced the colour of the underlying fabric. The general intention appears to have been to create a green, mottled effect contrasting with the dull red or buff unglazed surface of the vessel. The method of applying glaze appears to have affected the final outcome, with individual blobs of glaze showing a 'chromatographic' effect, with colour bleeding from a variable green in the centre to amber at the outer edge (cf. Adams Gilmour 1988,145). Misfiring, probably underfiring, appeared to have affected a considerable number of the pots. In these cases the glaze was 'patinated' with a whitish surface. Others were overfired with a crazed or slightly blistered surface, although in few of these cases did the vessels appear to be true wasters. Small blobs of metallic lead were noted on a number of the sherds, often in the centre of the small craters which were a typical feature of the glaze finish (cf. Pearce *et al.* 1985,4-5; Adams Gilmour 1988,159; Courtney 1993).

Recent discussions of glaze technology (Coleman-Smith and Pearson 1988; Barton 1990; Griffiths and Redknapp 1991; Newell 1995) have succeeded in refining our understanding of the variety of possible methods of glaze application. The Hallgate 95 material has all the characteristics of use of a glaze containing relatively coarse particles of lead in an organic/water binding agent applied by brushing. Small droplets of metallic lead appear to indicate firing at a relatively low temperature (760°-800°) which precluded a complete glaze-making reaction (Newell 1995,82). The evidence for the use of lead carbonate reported by Buckland *et al.* (1979,12) would probably not have given rise to the glaze effects seen on the material from Hallgate

95, further reinforcing the suggestion that this kiln preceded the Hallgate industry.

There were indications that glaze was commoner on the finer A1 and related fabrics than on the coarser C1 types. Whereas 89.2 per cent (by number) of the sherds in fabric A1 (and related types) were glazed, only 29.8 per cent of fabric C1 and C1 type were glazed (Cumberpatch 1997, table 11). This contrast is highlighted when the incidence of accidental glazing is considered. This was judged to have occurred when a sherd or vessel bore only small, discrete patches of glaze on an otherwise unglazed surface. It has been noted on a number of sites, including Hedon (Hayfield and Slater 1984,26), Firsby (Hayfield and Buckland 1989,14) and in the assemblage from the Market Place kiln in Doncaster (Hayfield 1984,43).

Of the 224 Hallgate type sherds (omitting a single sherd of Gritty ware) which show evidence of accidental glazing, 128 are in fabrics C1 and C1 type (57.1 per cent) with a further 33 (14.7 per cent) in C2, C3 and related fabrics. A1, D, E and their related types constitute only 9.37 per cent, 7.14 per cent and 11.6 per cent of the total. Similar proportions were found in the pits, although here neither A1 nor A1 type bore accidental splashes.

The proportion of deliberately glazed sherds is further reduced when glazing on the underside of bases is considered. This appears to have resulted from the practice of firing the vessels upside down, allowing glaze from the upper surfaces of vessels to run over the bases of those on the lower tier. Vessels which were otherwise unglazed may thus have received an uneven, patchy coating of glaze on their bases. Stacking scars are common and, as noted above, four vessels were stuck so firmly that at least one, and probably both, of the lower vessels were broken during the unloading of the kiln.

For all fabrics except C1, C2 and C type the percentage of deliberately glazed sherds was over 60 per cent. That it was not higher is probably a result of the fact that the glaze was generally applied to the upper surfaces of the vessels, with the lower third unglazed. Deliberate glaze on fabrics C1 and C2 was, in contrast, much rarer, only 7.76 per cent of C1 and C1 type sherds being deliberately glazed. Quantities of type C2 were too small for the significance of the complete absence of glaze to be assessed. In comparison to fabric A1 it seemed as if C1 and related fabrics were less likely to be glazed, but were in contact with glazed vessels, probably in the kiln. While the groups from pits were small in size, the figures offered general support to the conclusions drawn from the kiln group.

The firing atmosphere seems to have varied somewhat, although oxidation is indicated in most cases. Reduced sherds were particularly common in fabric A1 (A1 R). Whether this was deliberate or

whether these vessels represent the results of abnormal firing circumstances is unclear.

Decoration

Three hundred and fifty-seven sherds of pottery from the kiln are decorated, 12.7 per cent of the group, and of these 316 (88.5 per cent of the decorated sherds) bear combed or stabbed motifs; continuous or broken wavy lines, short, interrupted combed lines or stabbed comb impressions. Of the remainder, fifteen (4.2 per cent) are thumb impressions on rims or outer edges of handles and 26 (7.2 per cent), various others, predominantly grooves and ridges created during the turning and finishing of vessels. There are none of the elaborate face jugs or knight jugs of the types found in the Hallgate assemblage and only one small and ambiguous example of applied decoration.

Whereas decorated sherds in fabrics A1, D, E and F formed between 13 per cent and 36 per cent of the total, only 2.5 per cent of the C1 sherds were decorated (Cumberpatch 1997, table 14). Added to the relatively low incidence of glazing, this suggests that vessels in C1 fabrics were relatively plain and unelaborate. Four sherds from pit 1064 were decorated — three, in fabric D, with combed wavy lines and a handle, in fabric E, with thumb impressions. Pit 1054 included only two decorated sherds, both with combed wavy lines, one in fabric E and one of Hallgate type.

The numbers of recognisable vessel forms which were decorated were low, only 2.86 per cent of the total assemblage. Jugs and pitchers are the most commonly decorated vessels while others were less commonly decorated. Thumb-decorated rims, absent from the jug/pitcher category, formed half the decorative motifs on jars (Figs. 4:32, 7:61, 5:38). Only one jar is decorated with combed lines, whereas combed lines of various kinds are the commonest decorative motif applied to jugs and pitchers (e.g. Figs. 3, 6 and 7:69). A similar distinction applied to bowls and pancheons which also have thumb-decorated rims but no combed or incised lines. Of the decorated sherds from the pits only two are from recognisable vessel forms, both jugs or pitchers and both in fabric E. Both handles bear combed wavy decoration.

Wasters

The only positive evidence for the types of pottery fired in the kiln (or in others close by) is that of the 119 wasters found amongst the assemblage. A further three wasters (all of A1 type) were found in contexts 1001–5, 1046–3 and 1184–2. Wasters were found in all of the principal fabrics but were commonest in A1 and related fabrics (70.5 per cent of the total number of wasters). They ranged from

heavily distorted vessels (Fig. 3:14) to small sherds with glaze covering broken edges. A number of overfired vessels were omitted from the figures as they may have survived as serviceable pots. In context 1112–2 the rim of a jug of fabric type D was attached to a sherd of fabric C1 (Fig. 5:44) and in context 305–6 the rim of a jug was stuck to the base of a second vessel, both of fabric A1 R. No wasters of fabric A or A type were found in direct association with the kiln, even in the cleaning layer.

Although there was no direct evidence that any of these vessels was fired in the kiln, it may be significant that the layer at the bottom of the kiln (1122–2) contained twenty-four waster sherds, more than any other single context. Fabric A1 and related types predominated, but the group also included a waster of C1 type. This might be taken to imply that vessels in these fabrics were fired in the kiln, with the evidence for D and C having been fired together suggesting that the firing of different fabrics took place simultaneously within the same load.

Three wasters were found in pit 1054 (context 1055–1). Two were jug handles in fabric A and the third a jug rim in fabric A1. This, together with the greater proportion of fabric A found in the pit, suggests that it contained a more mixed assemblage than that from the kiln, and the feature was probably open at a later date. Three wasters were also found in pit 1064, in fabrics A1 R, A1 type and Hallgate type.

CONCLUSION

The 1995 excavations in Hallgate have added considerably to our knowledge of the Roman and Medieval town of Doncaster, the importance of which has tended to be unjustifiably overshadowed through a combination of research bias, negative effects of the competitive tendering system and neglect by the municipal authorities. This article, which is intended to build on the pioneering work of Buckland, Hayfield, Dolby and Magilton, should encourage further interest in this important medieval town and persuade those holding archives pertaining to other major excavations of the early 1990s to publish them fully and comprehensively.

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Table 6. Petrological analysis of the Hallgate fabrics: size and frequency of inclusions.

Fabric	Sample	Clay matrix	Quartz	Chert	Iron-rich	Sandstone	Other
Hallgate DHG95 A1 R	L1995, context 1105-2	isotropic	<0.5 mm abundant, rounded	<0.5 mm sparse, rounded			rounded, vesicular, opaque
Hallgate HG95 A1	L1986, context 307-2	anisotropic	<0.5 mm abundant, rounded	<0.5 mm sparse, rounded	sparse, rounded, dark brown, some with angular quartz		
Hallgate DHG95 C1	L1994, context 307-1	anisotropic	<1.0 mm abundant, rounded sand	<1.0 mm sparse rounded	<1.0 mm moderate, rounded, dark brown, some with angular quartz		
Hallgate DHG95 C2	L1993, context 1105-2	anisotropic	<1.0 mm abundant, rounded sand	<1.0 mm sparse rounded	moderate, rounded, dark brown, some with angular quartz	<1.0 mm sparse, with opaque matrix (containing quartz <0.6 mm)	
Hallgate DHG95 C3	L1992, context 305-5	anisotropic	<0.5 mm abundant, rounded	<0.5 mm sparse, rounded	sparse, rounded, dark brown, some with angular quartz		
Hallgate DHG95 D	L1991, context 1122-2	anisotropic	<0.5 mm moderate rounded plus <0.2 mm abundant, angular	<0.5 mm sparse, rounded	sparse, rounded dark brown, some with angular quartz		
Hallgate DHG95 E	L1990, context 307-1	anisotropic	<0.5 mm moderate rounded plus <0.2 mm abundant, angular	<0.5 mm sparse, rounded	sparse, rounded dark brown, some with angular quartz		
Hallgate DHG95 F	L1989, context 1117-1	anisotropic	<1.0 mm moderate, rounded plus <0.2 mm abundant, angular	<1.0 mm sparse, rounded	sparse, rounded dark brown, some with angular quartz	<1.0 mm sparse, rounded containing well sorted grains <0.1 mm in an opaque matrix	
White Gritty ware	L1988, context 1105-1	highly birefringent, few inclu- sions, low iron	>0.5 mm abundant, rounded			<2.0 mm sparse, containing rounded quartz grains <0.5 mm with no obvious cement	<1.0 mm moderate mudstone/ shale/ relict clay fragments, some almost opaque, others with very low iron
Fine Thrown Oxidised ware	L1987, context 307-1	anisotropic	<0.4 mm sparse, rounded	<0.4 mm sparse, rounded			<0.1 mm moderate muscovite laths

APPENDIX 1

Petrological and Inductively Coupled Plasma Spectroscopy (ICPS) analysis

Dr Alan Vince (Lincoln) with Dr N. Walsh (Royal Holloway College, London)

Ten samples of pottery were submitted for analysis, representing the types known to be products of the kiln together with sherds of White Gritty ware and Fine Thrown Oxidised ware. The thin section samples have been registered into the Lincoln Ceramic Petrology Laboratory Reference Collection with the codes L1986 to L1995.

Petrology

The results of the petrological analysis are given in Table 6. The kiln products all had a similar sand temper, composed mainly of rounded quartz with a little chert and a similar clay matrix, which contained abundant quartz silt. All the fabrics also contained rounded, dark-brown, iron-rich inclusions. The identity of these inclusions is uncertain — they are unlikely to be relict clay since they differ in iron content and texture from the rest of the clay matrix. They may be detrital fragments of an 'ironstone' or mudstone which entered the pottery fabric alongside quartz sand or they may be relicts of iron panning or other concretions present in the clay. Fabric A1 R is distinguished solely on the basis of the firing pattern and firing temperature which has led to it having an isotropic matrix and to the alteration of the iron-rich inclusions to vesicular masses. The remaining differences are due to the texture of the sand temper which is much coarser in fabrics C1 and C2 than in the remaining samples (*c.* 1.0 mm maximum compared to *c.* 0.5 mm maximum). Fabric F was very similar to Fabrics A to E, although it contained sparse sandstone fragments absent from the other kiln products.

White Gritty ware was quite different from the kiln products and appeared to have been produced using a clay with a low iron content and abundant clay relicts. This is probably a Coal Measure clay of the sort used extensively in the medieval period and later for white wares.

The sand in the Fine Thrown Oxidised ware differed mainly in texture from those used in the kiln products, but the clay matrix contained white mica (muscovite) absent from the kiln products and was therefore obtained from a separate source.

Inductively Coupled Plasma Spectroscopy (ICPS)

The samples submitted for petrological examination were also the subject of ICPS analysis. The graphical and elemental data from these analyses form part of the site archive. Almost without exception the values recorded for the White Gritty ware sherd were extreme and indicated that the sherd was not a local product. The Fine Thrown Oxidised ware sample also appeared to be an outlier and often had values for the frequencies of elements at the other extreme from that occupied by the White Gritty ware.

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Résumé

Les fouilles entre Hallgate et Wood Street, à Doncaster, dans le département du South Yorkshire, ont mis à jour un four de poterie médiéval et de petites zones dépotoires. Le site était à proximité d'un autre four plus tardif fouillé dans les années 60 par le personnel du Musée de Doncaster. Le nouveau four (Hallgate 95) s'est avéré être de date relativement plus précoce (la moitié du XI^e — début XII^e siècle) et avoir été employé pour la cuisson de mobiliers dans une gamme de types de différentes pâtes, probablement simultanément.

Zusammenfassung

Ausgrabungen zwischen Hallgate und Wood Street, Doncaster, South Yorkshire, brachten einen mittelalterlichen Töpfer-Brennofen und kleine Ablagerungen von Produktionsabfall zutage. Die Ausgrabungsstelle lag in der Nähe eines späteren Brennofens, der in den 1960er Jahren von Archäologen des Doncaster Museums ausgegraben wurde. Es stellte sich heraus, daß der neue Ofen (Hallgate 95) aus früherer Zeit stammte (Mitte 11. — frühes 12. Jahrhundert) und daß er zum Brennen verschiedener Gefäßmaterial-Typen, wahrscheinlich nebeneinander, benutzt wurde.