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Evaluation of archaeometallurgical residues from the N9/N10 Waterford-Kilcullen, Site AR015, Ballykillaboy, Co. Kilkenny (E2502)

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Dr T.P. Young

Abstract

The assemblage from Ballykillaboy comprised approximately 54kg of hand-picked slag and other residues, together with a substantial quantity of residues (about 25kg of magnetic material) derived from an intensive programme of sieving.

The assemblage is essentially one of iron-working (blacksmithing), although it is clear that copper alloy objects were being handled in the workshop (smithy) as well as the dominant iron objects.

The slag from the site is highly unusual for iron-working assemblages from Ireland. The assemblage includes slag masses identifiable as smithing hearth cakes (SHCs). The SHCs are unusually open-structured, with many comprising a loose coalescence of blebs and prills of slag. The SHCs are generally very small and grade downwards into individual slag blebs and prills, indicating that a high proportion of slag in the smithing hearth was not incorporated into the main slag mass. This downward gradation from small SHCs into unincorporated hearth slags means that defining the statistics of the SHC weight distribution is problematic, but up to 113 SHCs were identified, with the full group ranging from just 50g up to 478g, with a mean of 139g.Only 9 examples out of the 113 SHCs had weights over 250g and a modal weight of approximately 100g is suggested.

The site can be interpreted as a smithy working primarily to produce or repair iron artefacts from stock iron. Work was also undertaken in copper alloy, although the distinction between product and scrap is not clear. There is no clear evidence for the casting of copper alloy, so again the artefacts were probably worked (forged) from stock or reclaimed materials. The artefact finds suggest that the work undertaken may have included manufacture or repair of sheet metal (possibly both copper-alloy and iron) vessels. The copper alloy nails present in wood fragments suggests an activity such as producing decorative fixings for wood work, perhaps furniture (although, alternatively, the recovered sheet metal fragments, rivets and decorative nails might represent scrap materials being recycled for other purposes).

The site presents a rare example of a 15th-17th century rural smithy undertaking light repair and fabrication work.

Contents

Methods

All investigated materials were examined visually, using a low-powered binocular microscope where necessary. All macroscopic materials were individually examined and recorded to a database (Table 1 for hand-picked materials and Table 2 for the 4mm dry-sieved residues). For microscopic residues a general statement of the nature of each assemblage was recorded (Table 3). As an evaluation, the materials were not subjected to any high-magnification optical inspection, nor to any other form of instrumental analysis. The identifications of materials in this report are therefore necessarily limited and must be regarded as provisional.

Comment on the associated finds of copper alloy and composite cooper alloy-iron objects is based on the description of those materials in the specialist report by Jacqueline Mac Dermott.

Results

Nature of the assemblage

The assemblage from Ballykillaboy comprises 54.4kg of hand-picked specimens of macroscopic archaeometallurgical residues and associated materials together with a large suite of micro-residues from a programme of detailed sampling, with the archaeometallurgical component mainly contained within 25.5kg of magnetic material.

In addition 64 items of copper alloy were classified as finds (and not examined for this study; reported on by Jacqueline Mac Dermott). A further 2 copper alloy pieces were identified from the archaeometallurgical residues, together with 5 examples of copper alloy blebs incorporated within iron-working slags.

Description of the residues

Smithing hearth cakes

Smithing hearth cakes (SHCs) are abundant in the Ballykillaboy assemblage, but are of a rather unusual form for an Irish assemblage. Very few of the SHCs showed the typical development seen in an SHC with a relatively dense, relatively macroscopically homogenous, bowl overlain either by charcoal –rich slags or by a smooth, blown surface. Instead, most SHCs are developed as crudely plano-convex aggregates of prills or flow lobes, with an open structure, sometimes surmounted by a glassy layer of iron-poor slag derived directly from the melting of the adjacent tuyère. The SHCs are typically sub-circular in plan and sizes of 60-80mm diameter and 25-35mm thickness are typical. One particularly common morphology shows a discontinuous dimpled basal crust, of polished appearance, forming several distinct, strongly convex lobes. Such features are unusual, but the lobate bases of dense slag of polished appearance and evidence for internal prills can be paralleled in the late medieval to early post medieval smithing slags from Ballykilmore, Co. Westmeath (Young, in prep.).

Such forms are clearly gradational with those cakes termed “pro-tuyère tongues” (or simply “tongues”; Young 2006) which have a slab-like sheet of glassy low-iron slag with pendulous prills of higher-iron slag below (see below).

Although such SHCs are easily identifiable in larger, unbroken examples, the large size of the component internal prills and flows makes recognition of broken and small examples more difficult. Considerable doubt exists in the determination of many specimens as “SHC” or “smithing hearth slag” – and again the distinction may be an arbitrary point on a continuum of both morphology and origin with the smith’s hearth.

If the identification of SHCs is taken broadly, so that all potential examples are included in the statistics, then there are 113 examples, with weights ranging from 50 – 478g (mean 139g). If the identification of the SHCs is drawn more tightly around the more certain specimens, then the range of weights for the 82 certain examples is 52- 478g, with a mean of 152g. The difference between the two sets of parameters is clearly that the looser group includes more small specimens, but the overall difference between the two is small.

Rare examples of SHCs bearing globules of copper-alloy corrosion products were recorded, indicating that copper alloy was being worked in the forge.

A total weight of 21.1kg was identified as being from SHCs, with a large part of that (11.3 kg) deriving from topsoil or fills of furrows, and a further 6.8kg from features 8 and 10.

Smithing hearth slag

Smithing hearth slag is a term usually employed to describe slag that has formed within the hearth, but which has not become incorporated into the main SHC. On this site, the open-textured style of SHC makes differentiation of SHC fragments from other hearth slags difficult. Thus this category includes dense smithing slags which are not morphologically classifiable as either SHCs or tongues.

There were 23kg of slag in this category, 9.5kg of which from topsoil and furrow fills and 10.4kg from features 8 and 10.

The most common morphology of slag in this category is as rounded, lobate or blebby masses or prills.

Pro-tuyère tongue

The pro-tuyère tongue was a class of slag introduced by Young (2006) to include slag cakes with a low-iron slab like, flat surfaced upper section, overlying iron-rich slag prills and lobes. Tongues do not have a plano-convex or bowl-shape, as do SHCs, but may, like some SHCs, show a proximal attachment to the hearth ceramic (probably the lower tuyère face).

On this site there were 10 cakes identified as being tongues, with weights ranging up to 92g, 3 cakes described as “tongue-like” but included in the broad definition of SHCs (with weights of 82, 88 and 172g) and fragments of three others. This is in quite strong contrast to the early medieval assemblages on which the concept was based in which tongues were more typically in the 200-300g range (Young in prep.).

The term is accordingly maintained here, but in this difficult assemblage it is possible these cakes are simply small, lining-slag rich SHCs. There was just 0.8kg of slag of this type.

Ceramic

The assemblage includes 4.1kg of technical ceramic. This material derives from vitrification of the clay around the blowhole. Approximately twelve pieces show part of the blowhole margin, with two pieces (both from c47, f10) showing enough of the margin to indicate blowholes of c.15mm diameter.

Several fragments show aspects of the morphology of the tuyère within which the blowhole was placed, but there are no pieces large enough to indicate the overall tuyère form with any certainty.

Two conjoining fragments from c7 (f9) suggest a straight margin, probably the base of a "D"-shaped tuyère. An asymmetrical tuyère is also suggested by fragments with suggestions (if elliptical) of being 180 x 140mm (c216, f8) or 120 x 100mm (c47, f10). Other fragments give radii of external curvature of 50 - 70mm (c75, f7), c. 70mm (c50, f90 and c. 100mm (c70, f4).

The piece from c216 (f8) suggests that the face of tuyère was at 120° to one of it sides, with the bore perpendicular to the face. The geometry of this is difficult to reconstruct, but may indicate a flat-based tuyère with an overhanging face and downward angled blowhole.

The tuyère fabric appears to be quite rich in gravel grade clasts – which is also reflected in the coarse siliceous inclusions present in both the lining slags and the upper surfaces of the SHCs.

Despite the problems in reconstructing the actual form of the tuyère from this material, the use of a tuyère does seem clear. Just one fragment of vitrified clay was different in form: a small fragment from c211 (f8) shows a thin sheet of oxidised fired clay with a vitrified face and a raised lozenge on the rear, suggesting the clay had been pressed onto a surface formed of stone, or possibly wattles.

Lining slag

This material is gradational into some of prilly hearth slags, but is lower density (due to its lower iron content). In some cases the flowed lining slags have carried with them pieces of much less altered ceramic, probably derived from sloughing from the tuyère tip during partial melting.

Vitrified stone

This material comprises discrete stones with a vitrified surface. In part this material is gradational with the most gravelly of the lining slags, and may represent accumulation of unmelted coarse debris from the melting tuyère, but it probably also includes small pebbles which have become incorporated into the hearth by other means – perhaps as accidental inclusions within the fuel.

Concretions

This group of material is not a class of residue in the sense of the preceding classes, but instead embraces corroded iron and material bound together with the secondary products of that weathering (rusting) process.

There are two main groups of concretions in the assemblage: there are pieces which are simply exploded corroded iron (corroding iron "explodes", particularly with the growth of iron chlorides, because the weathering products have a higher volume than the initial material, forcing the original iron to burst apart) together with material concreted by the secondary iron minerals and there are pieces of so-called smithing floor. Smithing floor comprises the fine particulate debris which accumulates on the smithy floor bound together by secondary iron oxides derived from corrosion of iron particles. In some cases smithing floors may receive so much fine iron that the entire floor deposit becomes cemented, but at Ballykillaboy the cementation process, even within hammerscale-rich deposits, is localised around small discrete fragments of iron. In most cases the nature of the iron objects is unclear, and it is not known whether they represent discrete artefacts or iron debris from the fabrication process. A few pieces of such floor deposits also include copper-alloy fragments. Although this texture is known as smithing floor, not all examples are indeed actually from a floor, but many are from secondary dumps of fine-grained residues swept or washed from the smithy floor to other areas of accumulation.

Iron was observed in several cases in the form of nails, with other examples of square cross-section rod possibly being nail shanks. Other occurrences were in the form of thin sheet, together with a few pieces in a narrow, blade-like shape.

Cu-alloy residues

Little evidence for Cu-alloy working remained in the residue assemblages, so there is little to add to the comprehensive account (see specialist report by Jacqueline Mac Dermott) of Cu-alloy materials hand-picked during excavation.

Slags, probably from SHCs, bearing blebs of Cu-alloy corrosion were recorded from c1 (topsoil), c9 (f9), c113 (f10) and possibly c56 (f9). Prills bearing Cu-alloy corrosion were recovered from c47 (f10). In contrast pieces of Cu-alloy sheet were recorded from c258 and c230 (both f1).

Microresidues

The microresidues are dominated by hammerscale, with flake hammerscale much more frequent than spheroidal hammerscale. Spheroidal hammerscale does however occur widely, which is important in view of the evidence from the small, open-structured SHCs which might otherwise have suggested that forge welding was not a major activity (flake hammerscale may originate in relatively low temperature iron working, but spheroidal hammerscale is more strongly associated with the high temperature activity of forge welding).

As well as the small hammerscale particles, larger components include slag flats (flake hammerscale-like thin slag coatings spalled from the surface of the workpiece). Some of the slag flats show right angled re-entrant angles, which may be from a corner of the workpiece, but which are likely to be from slag accumulating on the smith's tools during use. Larger sub-spheroidal droplets of slag (including the dimpled "coffee-bean" spheroids) may be slag droplets from within the fuel bed rather than from outside the hearth.

The range and morphology of microresidues is similar to that described in detail from the earlier medieval site at Coolamurry, Co. Wexford (Young 2008a).

Distribution of the residues

The catalogue is presented sorted by residue class, context and feature in Table 4. The residue assemblage includes several distinct components:

1. substantial deposits of microresidues (including 22.9kg of magnetic materials contained within the soil samples taken) in f1: these are suggestive of the deposits which build up on the smithy floor, and are probably indicative here of a major focus of activity.

2. moderate amounts of microresidues with variable, but low, quantities of macroresidues from f2 and f4.

3. variable, but generally low, quantities of macroresidues from f3, f5 , f7 and f10.

4. good assemblages of both microresidues and macroresidues together with artefact material (scrap?) from f8.

5. a large assemblage of macroresidues from the furrows (f9) and topsoil.

Such a distribution can be interpreted as f1 being the core area for the smithing. The interpretation of the individual features is difficult, and it is likely that the area of scorching (mostly associated with the base of c285) may be the site of the floor-level hearth. The suggestion that c297 might represent the base of the anvil is certainly possible. Hollows c257 and c284 show less scorching, and may be either other positions of the floor-level hearth, or perhaps just worn hollows in the floor. In this scenario the cluster of stakeholes S of c297 and E of c285 might be associated with the bellows. It is possible that the redeposited ridges and perhaps the gap in the burnt deposits interpreted as "furniture" might represent the bases of cob, or other earth-built, walls to the smithy. The boundary between the hammerscale-rich and charcoal-rich deposits occurs roughly on this line; it is possible that the charcoal-rich deposits represent dumping of hearth ash outside the building, whereas the hammerscale-rich deposits represent internal "floors".

In contrast, the deposits to the west of the containing macroresidues (f3, f5, f7, and f10) would represent locations for the dumping of the hearth slags outside the smithy. Such slags would have been pulled from the hearth each time it was cleaned (probably daily) and could be carried to a place for disposal. The original purpose of the features would not have been for waste disposal. F3 is discussed further below. Pit c217 (f8) appears to have functioned for disposal of a substantial amount of waste from the smithy, including both micro- and macro-residues, together with scrap metal.

The large quantity of macroresidues recovered from the furrows (f9) and the modern topsoil is again indicative that much of the macroresidues from the smithing was deposited outside the smithy. Although some of this material may have been derived from truncation of cut features, it is also possible that upstanding slag dumps were subsequently degraded by agricultural activity. The deposits of f8, f9, f10 and the topsoil together provided 82% by weight of the SHC material from the site.

The assemblages from the hearths f2 and f4 are sparse, but contain hammerscale and macroscopic slag (f4 only). They are somewhat similar to hearth f3, mentioned above which contains a very small assemblage with some slag and a trace of hammerscale. It may be of significance that the amount of hammerscale recorded in each hearth decreases from east to west, possibly suggesting that the hammerscale component is derived from the smithy to the east. Pit 217 (f8) also contains a rich hammerscale assemblage, probably indicating material dumped from the smithy. The primary purpose of the three hearths, f2, f3 and f4, may therefore not have been as smithing hearths. It is suggested that they may have been pits for the production of charcoal, the fuel required for the smithy. Although small, each pit would have been capable of burning a useful quantity of charcoal. Another possibility for hearths without high temperature metallurgical residues, but lying just outside a smithy, would be as an external hearth used for putting iron tyres on wooden wheels. This task is usually done outside the smithy and a "bonfire" without forced draught is usually sufficient for the heating of the iron to expand it to be fitted over the wooden wheel.

In summary, the site appears to comprise a well-used smithy, with ash disposal (or possibly charcoal storage) to the east, and an area used for waste disposal and possibly charcoal burning to the west. The smithy may have had earth walls.

Interpretation

The primary activity on the site was the working of iron (blacksmithing). Evidence for this is of two kinds – the microresidues from f1 which are small particles (hammerscale, slag and iron) derived from the workpiece during its fashioning, and the macroresidues (chiefly smithing slags, but also tuyères and slags derived from their melting). The microresidues would probably have formed mainly outside the hearth and accumulated on the floor of the smithy (although some may have formed in the hearth and been lost during hearth cleaning). The macroresidues in contrast, would have formed mainly inside the hearth, have been removed during hearth cleaning and repair, and then deliberately disposed of outside the smithy area.

The smithing hearth cake (SHC) assemblage comprises exceptionally small SHCs in comparison with most Irish assemblages. Recent evidence (Table 5 and Young 2009b) suggests that smaller SHCs are a feature of late medieval to post-medieval sites. Sites such as the 13th - 14th century site at Garryleagh, Co. Cork (Young 2009b; mean SHC weight 331g, maximum weight 802g), an undated site at Clonmacnoise (author's unpublished data; mean SHC weight 341g, maximum SHC weight 1457g) and the later post-medieval site at Mucklagh, Co. Offaly (Young 2008b; mean SHC weight 373g, maximum SHC weight 1206g) show a trend of decreasing SHC size in the late medieval – post medieval periods (Young 2009). Earlier smithing sites almost always have a component of large (>2000g) SHCs, that Young (2009b, in prep.) has associated with the working of iron distributed in the form of billet (part refined, compacted blooms) rather than fully refined bar iron.

Small SHCs are common in many British ironworking assemblages, but the assemblages typically show mean SHC weights of around 300g.

The size of the SHCs at Ballykillaboy can be even more closely matched by a small assemblage from the post-medieval clachan at Moyveela, Co. Galway (Young 2009a). The assemblage from Moyveela was small (just 15 SHCs) and the weight distribution of the SHCs (Table 5) is not statistically significant, but the similarity of the material is strong. At both Ballykillaboy and Moyveela differentiation of the smaller SHCs from other hearth slags was difficult.

The technical ceramic recovered at Ballykillaboy is suggestive of the use of moderately large tuyères. Such material is characteristic of smithing assemblages of this period in Ireland, although the assemblage has a lack of pieces with clear evidence for the precise form and size of the tuyères. The total weight of material derived from tuyères is approximately 8% of the total macroresidues assemblage. The ratio of the weight of tuyère sherds to the weight of SHCs is 0.19. This is a fairly high value (a ratio of just 0.02 was, for instance, recorded for the large early medieval smithing assemblage from Clonfad), but a ratio of 0.50 was recorded for a late medieval to early post-medieval smithing assemblage from Ballykilmore, Co. Westmeath (Young in prep.).

The fuel employed at Ballykillaboy seems to have been entirely charcoal.

The nature of the product at Ballykillaboy remains unclear. The presence of a significant number of rivets and copper alloy sheet fragments (probably patches) might be taken as evidence for either the repair of domestic vessels or the reuse of scrap vessels for other purposes. No certain casting debris was found; the small number of copper-alloy blebs may represent accidental loss of heated material into the hearth. However, it is possible that the blebs of copper alloy represent deliberate recasting of scrap (possibly without the use of crucibles) into a form suitable for beating into shape. It is unlikely that the scrap was actually recast into new objects, at least with any regularity, given the lack of evidence for either moulds or crucibles. It would appear likely, therefore, that the copper alloy was being worked by forging – either from fresh materials or more probably from scrap. The iron working evidence suggests that forge welding was undertaken (since spheroidal hammerscale is relatively abundant in the microresidue assemblages), but that the work periods, as presented by the SHCs, involved a relatively small loss of iron to the hearth. It would appear therefore that the iron objects manufactured or repaired were rather small.

The indications are, therefore, that the smithy was involved in the repair and/or manufacture of small objects, including composite copper alloy/iron objects. The presence of copper alloy nails with wood fragments suggests that the manufacture, repair or recycling of furniture fittings may have been involved, as well as the repair of domestic sheet metal vessels as described above. Such light, multi-metal, fabrication and repair coincides in part with activities associated with itinerant “tinkers” in later periods, but the substantial evidence from Ballykillaboy does not suggest an ephemeral smithy, but a more substantial structure serving the needs of the local rural community.

Evaluation of potential

The assemblage from Ballykillaboy an unusual one. Few post-medieval smithies have been examined in Ireland and none, to the author’s knowledge, has received thorough archaeometallurgical investigation. The period shows marked contrasts with earlier medieval smithies and marks a period transitional to what is commonly considered the “traditional” village blacksmith. At this period there is a marked change in the nature and use of metal artefacts, with the onset of more industrialised production, and also a marked change in the nature of iron reaching the end user smith as cheap industrial bar iron from the indirect process begins to replace the traditionally- (and often locally-) produced bloomery iron. In other ways, however, the smithy is conservative, with the use of floor-level hearths, charcoal fuel and ceramic tuyères, features which do not become superseded in many rural Irish smithies (by waist-level hearths, coal and iron tuyères respectively) until, depending on the area, between the late 18th and early 20th centuries.

The work being undertaken in the smithy appears to have involved some activities often thought of as being associated with the itinerant tinker, particularly the repair of sheet metal domestic vessels. The structure of the smithy suggests, however, that this was a well-used, and probably permanent, building, although the details of the structure remain unclear.

The smithing hearth cakes are unusual in that many examples show a loose, open structure of agglomerated prills. This is quite distinct from the texture of conventional SHCs. The assemblage of SHCs is characterised by a very small size of individual cakes, with the mean as low as 140g and a modal weight of around 100g.

The site also presents a rare occurrence with both micro- and macro- residues well represented and well-preserved.

These characters mean that the site has great potential for further analytical investigation to fully characterise the smithing activity at a period for which no comparable data is available, certainly in Ireland and to the author’s knowledge there is no comparable site in Europe either.

References

Young, T.P. 2006. *Evaluation of archaeometallurgical residues from Clonfad 3, Co. Westmeath (A001:036)*. GeoArch Report 2005/14. 7pp

Young, T.P. 2008a. *Archaeometallurgical residues from Coolamurry 7, 04E0323*. GeoArch Report 2006/10. 46pp.

Young, T.P. 2008b. *Evaluation of archaeometallurgical residues from Mucklagh, Co. Offaly, NTB06, A033/E2845. GeoArch Report* 2008/07. 8pp.

Young, T.P. 2009a. *Evaluation of archaeometallurgical residues from the N18 Oranmore-Gort, Moyveela 3, Co. Galway (E3907),* GeoArch Report 2009/39, 4 pp.

Young, T.P. 2009b. *Evaluation of archaeometallurgical residues from the N8 Fermoy-Mitchelstown, Garryleagh, Co. Cork (E2433),* GeoArch Report 2009/47, 10 pp.

Young, T.P. *in prep*. Chapter 6. Exploiting the bog: iron production and metalworking *in:* N6-N52 NRA Monograph.

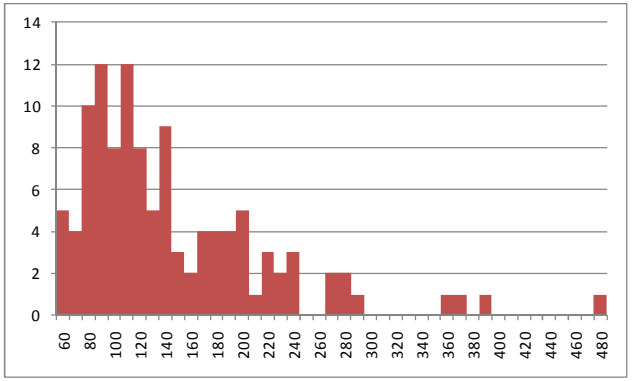

Figure 1. Size-frequency distribution bar chart for SHCs from Ballykillaboy.
Number of examples per 10g interval is plotted against the upper weight of the class interval.

Table 1: Summary catalogue of residues from Ballykillaboy, ordered by context and sample

C	S	F	no	wt	notes	SHC prop	SHC orig?
1	1		12	288	fired/vitrified lining with adhering slag. No examples show blowholes or tuyère margins		
			1	30	low density slag containing exploded foliated sandstone or shale fragment - probably not clinker		
			1	98	dense rusty dimpled SHC, 60x65x25mm	100	98
			1	196	110x85x40mm low density SHC, upper surface glassy, central void, thin lower crust	100	196
			1	198	60x85x45mm (of which 30mm bowl) good dense SHC with irregular smoothish top and microdimpled base	100	198
			1	52	50x50x20mm tiny plano-convex slag piece, probably complete SHC, although just possibly the broken base of one	100	52
			1	222	80x80x40mm dense SHC, smooth dimpled base, plano-convex, top lobate with charcoal entrained	100	222
			1	66	60x55x15mm sheet , dense basal dimpled contact top glassy some gravel, not certainly SHC	100	66
			1	68	40x60x25mm dense tiny SHC	100	68
			1	126	60x80x35mm gravelly SHC with maroon surface	100	126
			1	278	65x100x40mm dense transverse SHC with slightly glassy, gravelly top, has dense non-wetting flows on proximal side, distal side broken, proportion not clear	100	278
			1	102	55x80x30mm small transverse SHC	100	102
			1	236	80x75x35mm rather irregular-shaped SHC with dished smooth top	100	236
			1	146	55x(65)x40mm broken small dense prilly SHC		
			1	130	55x75x35mm transverse low density cavernous rounded SHC	100	130
			1	132	75x75x30mm wide, sub-circular SHC with smooth, spiky top, smoothly lobate base hints at contact with firm surface	100	132
			1	170	65x100x25mm very dense semi-circular SHC with smooth top and prilly/lobate base	100	170
			1	82	55x65x20mm extremely irregular prilly dense piece	100	82
			1	100	50x75x25mm dense small SHC with dished top with charcoal impressions	100	100
			1	76	65x70x20mm dense thin SHC with lobes and charcoal impressions	100	76
			1	148	irregular piece from blown rounded SHC lip, microprilly base		
			1	78	50x60x25mm small gravelly maroon SHC of irregular shape	100	78
			25	1735	incomplete small SHCs		
			107	1058	mainly blebby lobate slags probably hearth slags or poorly formed SHCs		
			1	74	SHC with copper alloy bleb on upper surface, probably incomplete		
			22	94	fragments from at least 3 corroded iron pieces, one spike-like c.25mm long, the other two flat sheet/blade		
			3	100	SHC fragments exploded from corroding iron content		
			1	46	tiny possible SHC, lobate		

Table 1 contd.

C	S	F	no	wt	notes	SHC prop	SHC orig?
1	1		6	80	natural pebbles		
			17	150	concretions around exploding iron		
			37	420	low density gravelly lining slags and vitrified stones		
			21	166	vitrified ceramic, one with blowhole margin fragment		
			92	1020	indeterminate denser slags, mostly rounded lumps		
1	1		263	3755	indeterminate mainly lobed slags		
			36	396	vitrified ceramic		
			2	12	natural chert		
			5	226	fragments of conventional dense SHCs		
			many	134	corroded exploded iron - many pieces but unclear original number		
			2	42	concretions		
			1	86	tongue? Rounded, possibly folded, glass with charcoal moulds		
			1	42	small SHC shaped dense slag piece - but too small for real SHC		
			1	54	tongue fragment		
			1	62	small fragment of SHC similar to those below, well formed microprilly bowl with deeply impressed upper moulds		
			1	186	irregular block, deeply impressed charcoal moulds on top, microprilly base		186
			1	152	dense small SHC, microprilly base, top slightly dished with deep dimples and charcoal moulds 60x95x45mm (of which 25mm bowl)		152
1	1		52	1405	indeterminate mainly lobed or rounded slags, varying from lining - dense		
			9	734	larger irregular pieces that could be odd SHCs in their own right		
			3	86	vitrified stones in slag		
			3	96	lining slags, probably off tuyère but with no attached tuyère		
			3	98	vitrified ceramic fragments - all probably tuyère		
			24	103	fragments of exploded iron - largest piece is flat - sheet or blade probably		
			1	218	75x110x35mm good SHC, prilly base, top with deeply-impressed charcoal, plano-convex		218
			1	160	60x80x25mm good plano-convex SHC with slightly glassy top proximally - elsewhere deeply-impressed charcoal, base has moderately large lobes in well defined contact		160
			1	102	fragment of dense SHC in which dense crust is almost entirely encased in gravelly lining slag		
			1	158	60x95x35mm very slightly biconvex SHC, lower open, prilly, top rusty with charcoal impressions and cavities covered by thin slag		158
			1	80	irregular deformed lump of gravelly lining slag - folded up tongue?		
			1	156	small dense fragment of prllly dense SHC, with smooth blown, slightly maroon dense top - proportion of cake unknown		
			1	106	small rounded dense nub, probably a rather dimpled SHC, smoothed by wear		106
			1	106	nub with microdimpled lower surface, charcoal pressed into top		106

Table 1 contd.

C	S	F	no	wt	notes	SHC prop	SHC orig?
			1	98	semicircular lining slag cake with smooth dimpled base - not clear if this is an entire cake or not		98
			1	72	lobate sheet, large lobes, possibly a strange SHC		72
			1	54	dense tongue like sheet, top maroon glass, base lobate, thin		54
			1	76	45x65x20mm small SHC formed of coalesced large prills		76
			1	68	fragment of sheet with non-wetted basal contact and impressed charcoal dimples on top		
1	2		29	442	oxidised fired vitrified ceramic - 3 pieces show irregular blowhole margins, no tuyère margins		
5 & 12	24		31	346	corroded iron concretions. Mainly in a sandy matrix with some charcoal, but with rather low levels of hammerscale		
			14	130	low density lining slag blebs, sheets and associated vitrified stone fragments		
			18	148	blebby indeterminate dense slags		
			6	68	vitrified ceramic, one shows irregular blowhole margin		
			1	62	dense slag sheet with charcoal dimpled base		
			1	106	fragment of dense conventional SHC in concretion with adhering material		
			1	202	100x75x40mm, part or all of irregular SHC with microdimpled base to bowl with multiple convexities and charcoal-rich bowl fill		202
7	4		7	66	vitrified ceramic - 2 largest sherds together from probably flat tuyère base		
			4	30	concretions on iron		
			1	18	prilly slag fragment		
9	3	8	48	770	indeterminate slags ranging from open textured prilly masses, larger blebs, and a few charcoal-rich pieces		
			1	14	dense horizontal flow		
			18	174	blebby glassy gravelly lining slags		
			2	32	vitrified stones in lining slag		
			5	44	pieces of vitrified ceramic, one has a blowhole margin, another has tiny section of outer tuyère margin		
			1	46	tongue-like slab, glassy top - but has sediment-rich, almost gravelly, base suggestive of contact, rather than normal prilly base		
			1	100	60x70x25mm very irregular SHC with lobate structure, prilly base has included charcoal, top has moderately deep dimples		100
			1	196	75x80x40mm, crudely plano-convex probable SHC, rather open-textured but comprises large dense lobes/blocks - each with microdimpled polished surface		196
			1	78	wedge-shaped SHC or SHC fragment, slight double-layered, basal crust has small dimples, top fairly deeply impressed with dimples		78
			1	70	45x70x30mm possibly tiny SHC with oval, very dense, bowl formed of lobes, upper spike extends up 15mm		70
			1	54	small plano-convex bowl with polished microdimpled base and charcoal rich fill. Base bears bleb of corroded Cu alloy. Probably not an intact SHC, but the base of something slightly larger		

Table 1 contd.

C	S	F	no	wt	notes	SHC prop	SHC orig?
14	58		3	10	rounded slag blebs		
22	54		9	20	small slag in blebby and prilly pieces		
			1	2	vitrified ceramic		
24	64		7	10	small slag fragments		
26	62		5	10	small slag fragments		
28	66		6	10	slag fragments		
			1	2	nail fragment?		
43	5		9	76	concretion on iron - rich in charcoal and quartz grains, but not hammerscale		
			4	58	very quartz-rich lining slags and possible vitrified stone		
			5	36	slag scraps		
47	20	46	1	30	rounded lining slag nub		
			1	6	concretion on iron		
			1	266	medium sized SHC, 110(80)x90x30mm, well-formed SHC with smooth dished top, with lobe extending laterally from bowl, lobe has dimpled top and base, base of main SHC also dimpled		266
			1	92	rolled up tongue? Gravelly lining slag in rounded lobate ball		92
			1	138	small SHC with raised top, smooth lobed, maroon, charcoal rich lower parts		138
47	13	46	12	86	particularly low density glassy gravelly lags		
			3	76	natural stones		
			68	640	indeterminate slags, mainly prilly/blebby ranging from lining to dense		
			2	46	open textured prilly slags with tiny blebs of Cu-corrosion		
			4	24	corrosion around iron fragments		
			7	78	vitrified ceramic, 2 pieces have small traces of blowhole margins c15mm diameter - none has outer tuyère margin		
			1	118	50x80x30mm prilly mass with slightly more coherent upper surface with traces of glaze		118
			1	128	70x70x30mm SHC, dense, dimpled top, prilly base, adhering accretion on upper surface		128
			1	70	spike-like mass with dimpled surface - probably part of a possibly deformed SHC		
47	120	46	1	126	open textured mass of dense prills with overall roughly plano-convex shape, 65x65x25mm		126

Table 1 contd.

C	S	F	no	wt	notes	SHC prop	SHC orig?
			1	50	small sheet of slag with small dimples on base and larger ones on top, 50x55x20mm		50
			1	62	vitrified lining with hint of blowhole margin on one side and possible trend towards margin - if so would only by c.120x100mm		
			4	102	prilly/blebby slag pieces		
50	10	49	1	184	90x70x55mm(of which bowl 35mm) folded SHC, top dimpled, flat, base microprilly.		184
			1	78	vitrified ceramic, shows tuyère margin, suggests 140mm minimum diameter on basis of rather irregular inclined margin		
52	38		1	34	small tongue?		
			1	24	small tongue?		
			1	18	concretion on iron		
			11	124	small blebby slag scraps		
54	37		9	122	various rather blebby slag fragments		
			2	12	concretions on small iron fragments		
			2	24	rather lobate lining slags with abundant crystal debris		
54	115	53	3	30	vitrified ceramic		
			4	150	large pieces of lining slag, low density, sandy glass - mainly in slightly folded sheets		
			32	308	small pieces indeterminate blebby slag		
			1	52	sheet with rough top and dimpled base - possibly SHC equivalent?		52
			1	78	irregular lump of coalesced prills in roughly crescentic shape		78
			1	52	dense plano-convex slag piece, could be SHC equivalent		52
			1	114	appears to be merged slag discs - so either a small SHC merged with sheet from hearth floor, or two merged SHCs		114
			1	80	very irregular dense lobate lump - possibly a deformed SHC		80
			1	74	small slag lump possibly a small SHC		74
			1	98	irregular rounded dense slag lump		98
			1	100	semi circular piece of dense sheet of coalesced lobes with dimpled top and irregular angled base		100
			1	86	low density mass of coalesced lobes- beard/SHC?		86
			1	64	tiny plano-convex SHC with charcoal inclusions and lobate base, 50x50x25mm		64
			1	274	70x105x50mm irregular SHC with smooth, slightly lobed top, microprilly base		274
			1	234	70x105x50mm irregular but broadly semicircular SHC piece, probably incomplete, dished top, thinnish crust, rather conventional in comparison to most material here	60%?	390
			1	18	accretion on flat piece of iron		

Table 1 contd.

C	S	F	no	wt	notes	SHC prop	SHC orig?
54	266	53	1	222	90x70x45mm triangular SHC with lining rich glassy top with some sandy adhering blebs and a well formed, but internally prilly base		222
			1	48	rounded nub of prilly slag like tiny SHC , but probably only a fragment		
			1	36	irregular fragment of prilly slag		
			2	20	gravelly lining slags		
56	267	55	2	90	vitrified ceramic - no diagnostic features		
			4	104	gravelly lining slag		
			2	34	denser prilly slag fragments		
			3	118	natural pebbles		
56	36		13	120	lobate blebby lining slags, some gravelly, some with maroon surface		
			1	2	stone with adhering slag		
			1	6	rusty lobate slag		
56	170	55	1	180	60x90x40mm plano-convex SHC, upper flat plate, slightly domed with pendant more lobate material below		180
			1	82	60x90x25mm digitate lobate tongue-like object but with little upper glass		82
			6	266	various lobate to internally prilly slags, but none with SHC form		
			1	30	lobate dense slag attached to small dimpled crust, crust bears weathered Cu globule		
58	268	57	2	32	vitrified ceramic		
			3	40	gravelly lining slag		
			1	12	exploding iron fragment		
			1	22	natural pebble		
			13	252	indeterminate dense lobate or prilly slags		
61	70	5	1	266	100x100x45mm open textured SHC with glassy top , prilly base and large iron lump in one side, irregularly slab-like		266
70	21	4	2	8	2 fragments of vitrified ceramic		
			7	56	rounded lobate blebs or multiple blebs		
			29	596	irregular slags, most agglomerated lobes and related materials		
			1	100	70x50x30mm small irregular dense SHC		100
			1	212	irregular - resembles broken small SHC with mass out to one side - might be most of a cake perhaps		
			1	98	rounded mass with slightly lobate top and dimpled base, probably SHC		98
			1	72	vitrified material from tuyère tip - suggests around 200mm diameter		

Table 1 contd.

C	S	F	no	wt	notes	SHC prop	SHC orig?
			1	106	small rounded mass - possibly SHC, contain some lobed material and some more porous and massive		
70	31	4	31	464	small pieces of blebby indeterminate slag		
			1	102	60x55x30mm probable small flat SHC		102
			1	118	75x55x35mm irregular small dense SHC		118
			1	118	60x70x35mm small SHC with smooth , marginally-lobed top and irregular lower part		118
			1	88	60x40x30mm, small SHC		88
			3	36	accretion on iron - 2 larger pieces both suggestive of hooks or rings		
			1	76	slag lump broken from tuyère- suggests large diameter		
			9	182	vitrified tuyère fragments - all fairly non-diagnostic		
75	55		1	32	fragment from near margin of tuyère front, suggests possibly 100-140mm diameter		
			1	66	fragment from thin dense SHC, prilly-dimpled base smooth top but good dense sheet 10mm thick		
			1	2	vitrified stone		
			1	66	stone with adhering slag		
			13	204	blebby slag fragments - ranging from lining slag to dense slag, but all in blebs/prills		
77	44	78	1	478	100x140x40mm SHC with slight double layering, dished top, thinnish lower crust, base sheet like with dimpled amalgamated prills, top rough and slightly accreted		478
77	45	78	1	62	65x55x30mm slightly contorted sheet with irregular edges, smooth top and polished lobate base with dimples, SHC		62
77	69	78	3	42	vitrified ceramic		
			3	86	masses of lining slag - one with possible tuyère attachment		
			1	58	gravelly lining slag mass - could be called tongue possibly		
			2	22	fragments of dense slag		
80	49	7	3	52	accretions on iron - two of which rod/nail like		
			86	1285	blebby slag fragments		
			1	16	exploded small piece of iron		
			3	50	stones with vitrification and or adhering slag		
			10	192	vitrified ceramic - no clear features - one has wedge shaped slag in section on it suggesting approach to margin of tuyère or hood?		
			1	94	small dense plano-convex lump from centre of small SHC, 30mm thick, slag microprilly to prilly with dimpled base	100?	94
			1	140	60x80x35mm small SHC with smooth fairly deeply dimpled top , base prilly		140

Table 1 contd.

C	S	F	no	wt	notes	SHC prop	SHC orig?
			1	34	tiny plano-convex accumulation of prills with charcoal moulds - possible SHC?		
			1	116	80x60x40mm irregular vaguely plano-convex accumulation of slag lobes with charcoal moulds, smoothish top and prilly base		116
			1	60	microprilly mass		
			1	42	sheet with lobate base - possible SHC part		
82	17		51	314	concretion on corroding iron, most of which appears to be thin sheet		
			4	40	rounded slag lumps		
			1	58	most of small dense SHC, but proportion not determinable		
			4	48	vitrified ceramic - 3 probably from tuyère margin		
			1	16	stone		
84	35		19	164	dense slag fragments, mainly prilly masses		
			2	48	pebbles		
			1	4	concretion		
			7	136	lining slag fragments, gravelly, rounded masses with maroon glaze locally		
88	123	285 f3	1	152	corroding block of iron - possibly irregular bar, but might be artefact		
108	72	107	40	370	rounded slag blebs of various density and degrees of coalescence		
			1	80	small dense SHC-like piece, 55x50x30mm, rounded large lobes coalesced in roughly plano-convex shape		80
			1	16	vitrified ceramic		
109	50	5	1	64	lobate, slightly maroonish slag		
			1	58	lobate, slightly maroonish slag		
109	71	110 f5	1	316	90x(75)x40mm incomplete dense SHC with planar top and dimpled/lobate base	90	351
			1	40	coalesced dense large lobes		
113	76		160	2920	blebby and prilly slag fragments		
			7	514	lobate lumps of slag, no overall form, but these could be poorly developed SHCs given the nature of the more certain examples		
			20	470	vitrified ceramic, most not diagnostic. Oxidised fired		
			1	142	mass of dense lobate prills attached to fragment of tuyère margin, strongly incline face so radius hard to judge, but appears to be around 50mm		

Table 1 contd.

C	S	F	no	wt	notes	SHC prop	SHC orig?
			4	84	slag lumps held together by corrosion of iron, one piece looks like squarish staple (or buckle?), one is c10mm square rod		
			8	152	gravelly lining slag lumps		
			4	192	vitrified stones, one unvitrified but has attached slag		
			1	238	irregular shaped lump of vesicular slag with various downward-facing rounded lobes to base - probably a very dispersed SHC		238
			1	232	dense irregular lobate slag, probably a folded SHC		232
			1	172	arcuate piece of sandy glass on dense prilly slag - probably a tongue from curved tuyère tip		172
			1	134	80x65x30mm irregular dense flow, microdimpled polished dense lower lobes, one end shows small bleb of Cu corrosion		134
			1	88	75x50x35mm possible tongue - very irregular		88
			1	98	50x80x35mm prilly transverse SHC with smooth top		98
			1	136	70x70x45mm irregular dense mass, smooth sandy glass on one end - probably very poorly-formed SHC		136
			1	70	tongue - smooth glassy top, lobate base with charcoal moulds		
			1	144	dense conventional small SHC, but incomplete, crust to13mm		
			1	138	65x60x35mm slightly exploding biconvex SHC, rounded top, microprilly base		138
			1	100	irregular lump of lobed slag with crudely plano-convex shape		
			1	110	dense ball of microprilly slag, possibly a SHC folded in half		110
			1	116	60x80x35mm small SHC, top smooth lobes, base rough, lobate, with charcoal contacts		116
			1	102	dense slag lump, formed of large lobes with smoothish top		102
			1	32	small concavo-convex pad of lining slag		
115	132	f3	1	214	weathered rounded slag lump, probably an entire SHC, but details unclear		214
155	236	f5	1	368	90x90x50mm (of which bowl 25mm) dense SHC with smoothish top but with raised areas on top of one side, internally prilly		368
			1	284	65x110x30mm, elongate SHC with concentric rings on top, base microdimpled		284
			1	130	60x75x25mm small semicircular SHC, impressed dimples in smooth top, base microdimpled		130
			4	54	reduced fired vitrified ceramic fragments		
			4	28	dense slag scraps		
197	206		76	1580	dense lobate and prilly slags		
			10	116	exploding iron concretions		
			16	208	gravelly blebby lining slag		
			2	92	convoluted large lining slags with small residual reduced-fired lining patches		
			12	154	vitrified ceramic - all but one oxidised fired, one tiny fragment of blowhole margin area seen		
			1	10	quartz pebble		

Table 1 contd.

C	S	F	no	wt	notes	SHC prop	SHC orig?
			1	56	slightly deformed dense tongue, clear black upper glaze with a few gravel particles		
			1	142	slightly incomplete SHC with concentric shells with deep impressions on top above an inclined sheet with a highly polished microdimpled base		142
			1	76	60x55x25mm dense discoidal SHC, flat top, descending prills below		76
			1	106	arcuate burr-like object with smooth microdimpled contact passing forward into prilly slags, crescentic shape overall		106
			1	82	40x55x30mm dense, broken nub with smooth dimpled lower surface and somewhat prilly top - a tiny SHC		82
			1	126	55x75x40mm very irregular SHC, base smooth microdimpled, top irregular, has basal spike passing off obliquely		126
			1	82	70x55x40mm double layer mushroom-like object - possibly a double tongue		82
			1	80	60x60x25mm small dense SHC starting to explode, irregular smooth top, prilly base		80
			1	192	80x80x35mm irregular SHC with double base, both with microdimpled surface, polished, top smooth, internally prilly on distal side		192
			1	162	70x90x35mm prilly SHC with smooth top proximally, otherwise somewhat open in places		162
			1	178	80x70x30mm dense SHC with irregular smooth top and prilly/dimpled base, very dense		178
			1	120	70x55x40mm dense small SHC with lobe below of similar material at an angle, base polished dimpled		120
211	359		19	330	vitrified clay, probably tuyère , some apparent margins, 2 possible blowhole margin fragments, some show a planar rear face and possibly a planar base		
			1	48	lobe of dense slag with glass surface attached to curved tuyère margin		
			2	40	2 conjoining pieces of slag attached to a tuyère margin, orange fired, which has a curving face free of slag and vitrification		
			1	10	curious lining slag with very dark planar surface, thin, the rear face shows a diamond shaped raised area suggesting the clay was pressed onto a stone (or just possibly wattle) surface		
			19	298	lobate lining slags, some dark glassy, some paler and more gravelly, all good be pendent lobes from tuyère perhaps		
			9	150	concretions around altered iron - some include flake hammerscale		
			1	214	75x85x50mm crudely lobate mass with dimpled base - probably SHC but very iregular		214
			1	102	mass of lobes with dimpled base - crudely plano-convex, so may be an SHC		102
			1	80	tiny semicircular SHC, dished dimpled top, prilly base		80
			1	150	transverse arcuate dense mass of agglomerated prills, with crudely smooth top		
			1	60	gravelly, glassy, crudely lobate mass - possibly a beard		
			1	86	small dense SHC 45x65x35mm		86
			1	56	tongue - planar top, pendent prilly base, low density		
			1	88	dimpled lobate mass		
			1	70	dimpled lobate mass		
			1	42	small fragment from rather conventional SHC crust		
			111	2090	amorphous slags, mainly in rounded blebs, often merged, some with dark dimpled highly polished surfaces		
			8	72	corrosion around iron fragments - 1 is sheet, one ?bar and two wire or nail like		

Table 1 contd.

C	S	F	no	wt	notes	SHC prop	SHC orig?
216	358		1	144	60x90x35mm, rather low density curved SHC with glassy surfaces, formed of quite large coalesced blebs		144
			1	180	85x65x55mm (35mm bowl) glassy SHC with prilly base (ie. like a tongue) with raised amorphous lump at one end of top		180
			1	190	60x70x40mm dense neat plano-convex SHC with slightly dished top with dimples, base shows fine accreted organics, starting to explode		190
			1	194	irregular lump of prilly slag with developed basal crust with probable tool mark		
			1	162	80x70x35mm possible SHC - open texture irregular mass of prills	100	162
			1	172	60x80x25mm dense plano-convex SHC with slightly dished, slightly dimpled top, internally formed of fused prills	100	172
			1	116	50x70x35mm, prilly, rather weathered biconvex SHC	100	116
			1	106	60x90x30mm originally but now folded, open texture prilly SHC with lots of voids	100	106
			1	160	65x60x35mm small dense double layer SHC formed of well-flowed material	100	160
			1	74	small SHC formed of lobes with included charcoal, very open, 50x50x30mm	100	74
			1	102	incomplete sheet-like dense SHC with smoothly dimpled base and lobed top		
			1	76	rough cake formed by a series of parallel, gravelly, maroon flows		
			1	66	small incomplete SHC, very dense, smoothly dimpled base, glass top		
			1	106	dense SHC fragment - dense bowl and slightly detached dense upper layer both comprised by flows		
			3	176	3 conjoining sherds from face of tuyère , one radius is c.90mm, the other c.70mm, the face is at 60 degrees obliquely to the preserved margin (viewed in the section of the larger radius) the bore appears perpendicular to the face		
			2	106	2 conjoining sherds of vitrified ceramic. Glass rises off ceramic contact and form of ceramic is unknown - not necessarily tuyère		
			25	182	pieces of vitrified ceramic		
			5	166	irregular rounded masses of lining slag		
			64	1190	indeterminate slag lumps - mainly internally prilly, probably parts of SHCs or poorly formed equivalents		
			1	250	curious lump of 2 joined arcuate fragments - each rather beard like, but might be an SHC fragmented on extraction perhaps		
			1	94	irregular prilly arcuate slag piece - possibly a beard - but formed of discrete dense prills like the above SHCs		
			1	78	arcuate slag piece with substantial lining addition and glazed top - from tuyère face?		
			1	100	elongate prilly slag fragment - twisted beard?		
			3	38	stones		
220	276	236	2	62	reduced-fired vitrified ceramic, one has hint of possible tuyère margin, the other has large lining slag lobes		
			2	50	lining slag blebs		
			1	136	part of flat SHC, base has multiple lobes with polished dimpled surfaces, main body slab-like, top covered in fine charcoal-rich material		136
			1	56	lobate SHC/tongue fragment		
			1	92	40x70x30mm rounded lump with polished dimpled base and rough top - not clear if this is a whole cake or part		92
			1	106	2 superimposed elongate slag pieces each with dimpled smooth bases and obscured tops, oriented at right angles		
			1	134	similar to 136g piece above, part or all of small SHC with multiple dimpled base sections, and rough "clotted" texture top		134
			8	128	mainly prilly or lobate slag fragments		

Table 2: Catalogue of residues from the >4mm dry sieved samples, ordered by context and sample

C	*S*	*grid*	*no*	*wt*	*notes*
44	80	grid b4	20	20	slag blebs
			4	4	concretions
44	82	gridc1	1	1	concretion
44	84	grid c5	c50	88	slag blebs, with some small concretions
44	86	grid d2	19	48	slag blebs and fragments
			many	110	concretion around iron in floor
44	89	grid d4	17	15	iron concretion
			1	1	slag bleb
44	90	grid d6	2	1	slag blebs
			3	1	concretions
44	91	grid e1	1	1	slag bleb
44	93	grid e3	8	8	exploded iron concretion
44	95	grid e5	7	22	slag blebs
			3	2	oxidised fired ceramic
			19	22	concretions
			1	1	flat
44	97	grid e7	5	6	small concretions (or possibly fired clay?)
44	100	grid f4	7	2	slag fragments
44	102	frid f6	6	2	concretion
44	105	grid g3	4	6	natural?

Table 2 contd.

C	S	grid	no	wt	notes
82	136	grid b2	36	36	slag blebs and flats - including 3 with right angle re-entrants - from bar or tools?
			many	522	floor concretion
89	157	cut90	1	2	slag bleb
103	299	grid b2	7	50	concretions
			c60	242	slag blebs
103	301	grid a3		336	ashy concretions on iron and some lobate slags, also embedded in ash
122	137	grid e3	4	4	slag fragments
122	161	grid f2	2	2	natural
130	261	grid b6	14	22	ashy blebs and concretionary material
132	244	grid c3	6	68	vitrified ceramic
			1	2	vitrified stone
			1	12	stone
			many	204	debris - mainly concretion - including a tapered thin iron object, possibly a blade fragment
134	146	grid f6	2	4	blebby slags
			2	4	natural
134	148	grid g5	4	6	?slag in ashy concretion
			6	2	?natural
145	160	grid b4	5	18	oxidised fired soft ceramic
			16	10	blebby slags, mainly coffee beans
			40	74	concretion
145	163	grid c3	15	176	soft fired clay - not tuyère , planar surface, deeply oxidised but may have grey surface
			4	106	dense slag fragments
			many	666	dark concretionary material - several rod like fragments suggest corrosion around iron rod or nails

Table 2 contd.

C	S	grid	no	wt	notes
145	229	grid d4		22	exploded concretion material including tapered iron piece - possibly a blade fragment
153	245	grid c3	40	200	soft laminated charcoal rich orange consolidated material - probably floor, but just possibly a rotted fossiliferrous sandstone
			3	7	slag fragments
			2	5	hard concretion fragments
178	221	grid f4	1	2	bleb of slag
179	230	grid d2	1	5	exploded concretion around square section iron c.3-4mm bent in right angle - bent nail or deliberate artefact?
183	247	grid d4	9	28	dark floor concretions
190	260	grid b4	2	6	slag blebs
			2	2	concretion fragments
191	217	grid d2	1	52	slagged piece of shale
192	241	grid d3	2	38	slag blebs
			20	58	concretion
192	357	grid d2		534	dark charcoal rich matrix with messy smithing slags in multiple fused prilly pieces, several large iron concretions and small blebby slag debris
199	210	cut198	18	6	small pale silty concretions
211	234		c200	1220	blebs of slag, mainly fairly low density
			2	10	vitrified ceramic
			7	75	concretions on iron
212	225	grid f4	5	20	blebby slag pieces
212	228		5	6	probable ashy slag fragments

Table 2 contd.

C	*S*	*grid*	*no*	*wt*	*notes*
213	250	grid d4	1	4	dark concretion
216	270		19	64	slag blebs
			1	6	stone
224	316	grid e5		34	1 concretion, 2 slag fragments
224	334	grid f6		14	4 small slag blebs
230	306		150	1600	lumps of smithing floor -concretions bearing iron fragments, scale, charcoal etc. and at least one piece of copper alloy - probably in sheet form- with a rolled-over edge - so possibly a binding. Some of the iron fragments are sheet - some are probably nails
232	302/303	grid c3/b3		94	mainly tiny concretions in dark soil, some small slag blebs
233	310	grid b4		28	small slag fragments, one possible smithing floor piece with charcoal and slag debris adhering to oxidised fired (but not vitrified) ceramic
234	274		c60	164	concretion pieces
249	308	grid c3		98	rounded iron concretions in yellow clay with some scale, plus a variety of small slag blebs
256	331	grid A3		162	mainly small ashy slag blebs and tiny concretions, but one more substantial elongate iron - probably a nail
256	332	grid b2		254	sandy iron rich concretions on large iron fragments plus a significant proportion of natural stone
258	343			702	concretions, ash covered slag and a large tuyère sherd. Also a small fragment of twisted Cu alloy sheet
258	351			22	3 small concretions, 2 slag blebs
261	350			70	mainly small slag blebs in ash, one nail and other iron concretions

Table 3: Summary of sieved sample residues: hs = hammerscale, fhs = flake hammerscale, shs = spheroidal hammerscale. Grey tone indicates discrepancy of sample description.

S #	C #	Grid	4mm dry sieve. wt	4mm dry sieve. notes	2mm non-magnetic VJK notes	2mm non-magnetic TY notes	2mm magnetic notes	1mm non-magnetic notes	1mm magnetic notes	250 µm non-magnetic notes	250 µm magnetic notes
51	18	B6	x		50% charcoal, 50% grit		stone	sand and charcoal	stone	sand with charcoal	sand and hs
80	44	B4	24	slag blebs and concretions	80% grit, 10% charcoal, 10% vitrified clay	coarse angular gravel with 12g of lining slag blebs	lining slag, corroded iron	sand with charcoal	rich in hs, slag, glass, some stone	sand with trace charcoal	sand and hs
82	44	C1	1	concretion	90% charcoal		stone	charcoal with trace sand	stone, some charcoal	sand and charcoal	sand with hs
84	44	C5	88	slag blebs and concretions	95% charcoal, 5% grit	>95% coarse angular gravel	lining slag and stone	sand	stone with some slag and hs	pale sand	sand with hs
86	44	D2	158	slag blebs and concretions	95% charcoal, 5% grit	small slag blebs only	slag, flats	charcoal and sand	stone slag	sand and charcoal	sand with hs
89	44	D4	16	concretions and slag bleb	95% grit, 5% charcoal	coarse gravel	slag, spheroid	sand with trace charcoal	rich in flats. Fhs, shs some stone	pale sand	sand and hs
90	44	D6	5	slag blebs and concretions	80% charcoal, 20% grit		flats, large spheroids, slag, stone	charcoal with sand	rich in flats. Fhs, shs some stone	sand with charcoal	hs with sand
91	44	E1	1	slag bleb	90% charcoal, 10% grit		stone, slag, flats	charcoal with sand	rich in flats. Fhs, shs some stone	charcoal and sand	hs
93	44	E3	8	exploded concretion	30% charcoal, 70% grit		flats, large spheroids, slag	charcoal with sand	rich in flats. Fhs, shs some stone	sand with charcoal	hs with trace sand
95	44	E5	47	slag blebs, concretions, ceramic, flat	95% charcoal, 5% grit		flats, large spheroids, slag	charcoal with trace sand	rich in flats. Fhs, shs	charcoal with sand	hs
97	44	E7	6	concretions	95% charcoal, 5% grit		flats, large spheroids, slag, stone	charcoal with trace sand	rich in flats. Fhs, shs some stone	dominantly charcoal fines	hs with trace sand
98	44	F2	x		25% charcoal, 75% grit		slag	charcoal with sand	mainly slag and sone, some hs	mixed sand and charcoal	hs with trace sand
100	44	F4	2	slag fragments	95% charcoal, 5% grit		mainly stone some flats and slag	charcoal with trace sand	rich in flats. Fhs, shs	mixed sand and charcoal	hs with trace sand
102	44	F6	2	concretion	95% charcoal, 5% grit	95% gravel	flats, large spheroids, slag	charcoal with trace sand	rich in flats. Fhs, shs	dominantly charcoal fines	hs
105	44	G3	x	(natural)	90% charcoal, 10% grit		flats, large spheroids, slag	charcoal with sand	rich in flats. Fhs, shs	mixed sand and charcoal	hs
107	44	G5	x		<5% charcoal, 95% grit	gravel	slag, spheroids, flats	sand and charcoal	rich in flats and large shs	pale sand	hs with sand
12	64		x		95% charcoal, 5% grit		flats, large spheroids	charcoal with trace sand	rich in flats. Fhs, shs	dominantly charcoal fines	hs with trace sand
73	68		x		95% charcoal, 5% grit		slag, flats, spheroids stone	mainly charcoal	rich in flats. Fhs, shs	charcoal fines	hs with trace sand
22	70		x		75% charcoal, 25% grit		stone slag coarse hs	mainly charcoal	flats. Fhs, shs with stone	charcoal with sand	hs with trace sand

Table 3 contd.

S #	C #	Grid	4mm dry sieve. wt	4mm dry sieve. notes	2mm non-magnetic VJK notes	2mm non-magnetic TY notes	2mm magnetic notes	1mm non-magnetic notes	1mm magnetic notes	250 µm non-magnetic notes	250 µm magnetic notes
33	71&104		x		60% charcoal, 40% grit		none	charcol and sand		charcoal with sand	stone (and fired clay?) trace hs
41	77		x		70% charcoal, 30% grit		slag, flats, spheroids stone	sand and charcoal	stone with flats and hs	sand with charcoal	hs
136	82	B2	558	smithing floor, slag blebs, flats	80%charcoal, 20% grit		slag, stone	sand and charcoal	Flats, fhs, shs with stone	sand and charocal	hs with sand
142	89		x		40% charcoal, 60% grit		rich flats, slag and floor conceryions	mainly sand	rich hs with trace stone	sand with charcoal	rich hs
157	89		2	slag blebs	70% charcoal, 30% grit		stone, slag, coarse hs	mainly sand, with ome spheroids	Flats, fhs, shs with stone	sand with charcoal	hs with sand
299	103	B2	292	slag blebs and concretions	70% charcoal, 30% grit		stone	sand and charcoal	sand	sand with charcoal	sand with hs
301	103	A3	336	ashy concretions and slag	90% charcoal, 10% grit		slag, stone trae hs			sand and charcoal	hs with trace sand
168	117		x		10% charcoal, 90% grit			mainly sand	sand with hs	fine sand	sand with trace hs
137	122	E3	4	slag fragments	20% charcoal, 80% grit		stone, slag flats	mainly sand	Flats, fhs, shs, h stone (2 bags)	sand with charcoal	hs with sand (2 bags)
154	122	G3	x		60% charcoal, 40% grit		flats and slag with stone	pale sand	hs and flats	sand with charcoal	sand and hs
155	122	F2	x		40% charcoal, 60% grit		stone, coarse hs	mainly sand	flats, slag stone	sand with charcoal	sand with trace hs
156	122	F4	x		50% charcoal, 50% grit		slag, stone	mainly sand	stone with hs	sand with charcoal	sand and hs
161	122	F2	x	(natural)	85% charcoal, 15% grit		slag, flats, spheroids stone	mainly charcoal	hs	charcoal with sand	hs
263	128	B4	x		70% charcoal, 30% grit		gravel	mainly charcoal	sand	sand with charcoal	sand with hs
265	128	C5	x		40% charcoal, 60% grit		slag, flats, stone	sand and charcoal	rich hs with trace sand	sand with charcoal	hs with sand
261	130	B6	22	ashy blebs and concretions	50% charcoal, 50% grit		slag, flats	dominantly sand	sand with hs	sand	sand with hs
151	133		x		90% charcoal, 10% grit		slag stone concretion coarse hs	mainly charcoal, some and rare spheroids	hs with sand and concretion fragments	charcoal with sand	hs with trace sand
144	134	F4	x		>95% charcoal, 5% grit		fired clay, stone slag	mainly charcoal	sand with trace hs	charcoal with sand	sand
146	134	F6	4	slag blebs	<5% charcoal, 95% grit		stone slag	sand with some spheroids	mainly stone, some slag a few large spheroids	sand with trace charcoal	sand with hs
148	134	G5	6	ashy concretion	40% charcoal, 60% grit		slag concretion coarse hs	charcoal with sand	rich in flats. Fhs, shs	sand with charcoal	hs and sand

Table 3 contd.

S #	C #	Grid	4mm dry sieve. wt	4mm dry sieve. notes	2mm non-magnetic VJK notes	2mm non-magnetic TY notes	2mm magnetic notes	1mm non-magnetic notes	1mm magnetic notes	250 µm non-magnetic notes	250 µm magnetic notes
160	145	B4	102	concretions, ceramic, slag blebs	85% charcoal, 15% grit		flats domniated with slag and concerions	charcoal with sand	rich in flats. Fhs, shs	charcoal and sand	hs with sand
163	145	C3	1048	concretions on iron, ceramic, slag fragments	90% charcoal, 10% grit		slag, flats, spheroids	charcoal with little sand	rich in flats. Fhs, shs	charcoal and sand	hs with sand
229	145	D4	22	exploded concretion	85% charcoal, 15% grit		flats, slag	charcoal with sand	rich in flats. Fhs, shs	charcoal and sand	hs
245	153	C3	212	concretion, slag fragments	90% charcoal, 10% grit		slag, flats	dominanly charcoal	rich in flats. Fhs, shs	charcoal wth sand	hs
220	178	E3	x		90% charcoal, 10% grit		stone ,slag some coarse scale	dominantly charcoal	rich in flats. Fhs, shs	charcoal and sand	hs
221	178	F4	2	slag bleb	95% charcoal, 5% grit		slag, flats ,stone	dominantly charcoal	rich in flats. Fhs, shs	charcoal and sand	hs
230	179	D2	5	exploded concretion	90% charcoal, 10% grit		slag, flats , concretion, stone	dominantly charcoal	rich in flats. Fhs, shs	charcoal with sand	hs
232	179	E3	x		95% charcoal, 5% grit		conceryion coarse scale	dominantly charcoal	rich in flats. Fhs, shs	charcoal with sand	hs
247	183	D4	28	floor concretions	>95% charcoal, 5% grit		stone, flats, spheroids	dominantly charcoal	rich in flats. Fhs, shs	charcoal with sand	hs
237	184	E3	x		15% charcoal, 85% grit	significant proportion of grit is lining and linig slag	rich slag dominated assemblge	sand nad hcarcoal	rich in flats. Fhs, shs, but also has lots of stone and some charcoal	sand and charcoal (2 bags)	hs with sand
239	184	D4	x		25% charcoal, 75% grit	coarse rounded grvel		sand with rare charcoal	sparse slag and fhs	coarse quartz sand with charcoal	tiny amount of slag/hs
254	190	C3	x		5% charcoal, 95% grit	coarse rounded grvel	sparese, stone slag spheroid	sand with rare charcoal	sparse slag	sand with trace charcoal	sand and hs
260	190	B4	8	slag blebs and concretions	95% charcoal, 5% grit		slag, concretions, coarse hs and stone	dominantly charcoal	rich in flats. Fhs, shs	charcoal with sand	hs with sand
214	191	C1	x		>95% charcoal, 5% grit	significant proportion of grit is lining and lining slag	rich slag and flats dominate assemblage	dominantly charcoal 2 bags)	rich in flats. Fhs, shs	charcoal with sand	hs with sand
217	191	D2	52	slagged shale	60% charcoal, 40% grit	Some slag, coffee bean	rich slag dominated assemblage	charcoal and sand	rich in flats. Fhs, shs	sand and charcoal	hs and sand
241	192	C3	x		90% charcoal, 10% grit		rich coarse hs with stone	dominantly charcoal	rich in flats. Fhs, shs	charcoal with trace sand	hs with charcoal
244	192	C3	x		80% charcoal, 20% grit		flats, spheroids	charcoal and sand	rich in flats. Fhs, shs with stone	sand with charcoal	hs with sand

Table 3 contd.

S #	C #	Grid	4mm dry sieve. wt	4mm dry sieve. notes	2mm non-magnetic VJK notes	2mm non-magnetic TY notes	2mm magnetic notes	1mm non-magnetic notes	1mm magnetic notes	250 µm non-magnetic notes	250 µm magnetic notes
357	192	D2	x		50% charcoal, 50% grit	significant proportion of grit is lining and linig slag	stone ,slag concretion coarse hsd	charcoal and sand	rich in flats. Fhs, shs with moderate stone	mainly sand	hs with sand
210	199		x		5% charcoal, 95% grit			sand and charcoal	rich in flats. Fhs, shs	mainly sand	hs
234	211		1305	slag blebs, concretions, ceramic	20% charcoal, 80% grit	some lining/lining slag	slag and stone	sand with charcoal	rich in flats. Fhs, shs with moderate stone	sand	sand with hs
225	212	F4	20	blebby slags	10% charcoal, 90% grit	gravel	sparese slag, spheroids, concretion	mainly sand	spare, dominated by shs rather than fhs	mainly sand	hs with sand
227	212	G5	x		10% charcoal, 90% grit	gravel	sparse stone ,slag flats	mainly sand	sparse slag and fhs	mainly sand	sand with hs
228	212	E5	6	slag fragments	<5% charcoal, 95% grit	coarse gravel	slag, stone flats	mainly sand	sparse hs, plenty of lning slag	mainly sand	hs with sand
250	213	D4	4	dark concretion	40% charcoal, 60% grit	significant proportion of grit is lining and linig slag	rich flats, slag assemblage with some stone	charcoal with sand	rich in flats. Fhs, shs		hs and sand
270	216		64	slag blebs	70% grit, 30% charcoal	rounded gravel	slag, flats, large spheroids,?nail	mainly sand	rich in flats. Fhs, shs	sand with charcoal	hs and sand
314	224	F4	x		10% charcoal, 90% grit	gravel	slag, flats, spheroids, stone	sand with charcoal	rich in flats. Fhs, shs	mainly sand	hs and sand
316	224	E5	34	slag fragments, concretion	5% charcoal, 95% grit	gravel	rich slag dominated assemblage	sand rare charcoal	rich in flats. Fhs, shs with stone	sand with charcoal	sand with hs
334	224	F6	14	slag belbs	60% charcoal, 40% grit	charcoal iwht gravel	rich flats dominated assemblage	sand and charcoal	rich in flats. Fhs, shs	sand and charcoal	hs with sand
321	225	D2	x		50% charcoal, 50% grit	charcoal with gravel	rich flats dominated assemblage	sand and charcoal	rich in flats. Fhs, shs with stone	sand and charcoal	hs
326	225	F4	x		50% charcoal, 50% grit	charcoal and gravel	rich assemblage dominated by flats and small slag	sand and charcoal	rich in flats. Fhs, shs with stone	sand with charcoal	hs with sand
328	225	G3	x		5% charcoal, 95% grit	fine gravel	slag, spheroids, flats, concretion	sand	rich in flats. Fhs, shs with stone	sand with charcoal	hs and sand
360	225	E3	x		<5% charcoal, grit and poss burnt clay	gravel		sand	hs and flats (packed wit 0.25)		

Table 3 contd.

S #	C #	Grid	4mm dry sieve. wt	4mm dry sieve. notes	2mm non-magnetic VJK notes	2mm non-magnetic TY notes	2mm magnetic notes	1mm non-magnetic notes	1mm magnetic notes	250 µm non-magnetic notes	250 µm magnetic notes
349	228	D4	x		20% charcoal, 80% grit	gravel and charcoal	lining slag	mainly sand	particualry rich in spheroids. But also other hs	sand and charcoal	hs with sand
306	230	C3	1600	smithing floor	70% charcoal, 30% grit	charcoal and gravel	stone nad slag	sand and charcoal	rich in flats. Fhs, shs with stone	sand with charcoal	hs and sand (fired clay?)
342	231	C2	x		80% grit, 20% charcoal	gravel	slag scraps	mainly sand	rich in flats. Fhs, shs with stone	sand with charcoal	hs with sand (v rich in shs)
302/303	232	C3/B3	94	concretions, slag blebs	40% charcoal, 60% grit	gravel and charcoal	slagg, flats , conceretion	mainly sand	rich in flats. Fhs, shs	sand with charcoal	hs with sand
310	233	B4	28	slag fragments	10% charcoal, 90% grit	gravel and charcoal	slag, flats and spheroids	mainl sand	rich in flats. Fhs, shs	sand with charcoal	hs
274	234	B4	164	concretions	<5% charcoal, 95% grit	gravel		pale sand	sparse, slaggy scraps	sand with charcoal	sand trace hs
275	239		x		5% charcoal, 95% grit	gravel, slag, flats	rich slag dominated assemblage	mainly sand	rich in flats. Fhs, shs with stone	sand with charcoal	hs with sand (looks a bit poorly spearated?)
320	246	D2	x		10% charcoal, 90% grit	stones with some charcoal and slag	rich slag dominated assemblage	mainly sand	rich in flats. Fhs, shs with stone	sand with charcoal	hs (v large assemblage)
308	249	C3	98	concretions with scale, slag blebs	90% grit, 5% charcoal, 5% vitrified clay	gravel, 36g of lining slag, vit ceramic and conc	rich slag dominated assemblage, has some concretion material	mainly sand	rich in flats. Fhs, shs	sand, trace charcoal	hs (v large assemblage)
311	249	F4	x		60% charcoal, 40% grit	charcoal with stones, slag and vit lining	slag, flake, spheroids	mainly charcoal	rich in flats. Fhs, shs	charcoal with sand	hs
331	256	A3	162	blebs, concretions	70% charcoal, 30% grit	charcoal with gravel	slag and stone	mainly charcoal	hs with stone	charcoal and sand	hs with sand
332	256	B2	254	concretions	<5% charcoal, 95% grit	angular gravel	rich slag dominated assemblage, partially picked into flats and spheroids	mainly sand	rich hs with stone	sand with charocal	hs and sand
333	256	A3	x		70% grit, 30% charcoal	angular gravel with charcoal	slag, flats		hs and slag	sand with charocal	hs and sand
343	258	B2	702	concretions, slag, tuyere sherd	50% charcoal, 50% grit		concretion stone, some hs	mainly sand	stone wth hs and slag		stone (and fired clay?)
351	258	A3	22	concretions, slag blebs	80% charocoal, 20% grit	charcoal and gravel (2 bags)	slag, hs, spheroids	mainly sand (2 bags)	rich in flats. Fhs, shs (2 bags)	charcoal and sand	hs and sand (2 bags)

Table 3 contd.

S #	***C #***	***Grid***	***4mm dry sieve. wt***	***4mm dry sieve. notes***	***2mm non-magnetic VJK notes***	***2mm non-magnetic TY notes***	***2mm magnetic notes***	***1mm non-magnetic notes***	***1mm magnetic notes***	***250 µm non-magnetic notes***	***250 µm magnetic notes***
350	261	D4	70	slag blebs and concretions	<5% charcoal, 95% grit	angular gravel	rich in flats and spheroids	sand	rich hs with stone	sand	stone (and fired clay?) trace hs
344	271		x		100% grit	indurated sandy silt	mainly large lining slag pieces	sand	stone, hs	sand, trace charcoal	samd and hs
352	280	D4	x		100% grit	indurated sandy silt	small amount of hs	sand	stone, rare hs	sand, trace charcoal	sand and hs
353	281	-	x		95% charcoal, 5% grit	charcoal	mainly slag, but also flats, and other hs	charcoal	rich in flats. Fhs, shs	charcoal with sand, few sph	hs

Table 4. Summary of residue classes by context and feature. Total weight of magnetic microresidues and their % of the sample from supplied data. Macroresidue class weights in grams. Figures in boxes are the totals per feature. For Cu-alloy evidence X = evidence in residue collection, number = number of Cu-alloy finds recorded.

Stratigraphy			***Microresidues***			***Macroresidues***								
C			*wt mag*	*% mag*	*notes*	*SHC*	*hearth*	*tongue*	*ceramic*	*lining slag*	*vitrified stone*	*concretion*	*Cu*	*total*
14	fill of stakehole c13	f1											4	
18	fill of stakehole c17	f1	10	2.0%	no HS								2	
22	fill of stakehole c21	f1				**0**	**20**	**0**	**2**	**0**	**0**	**0**	1	22
28	fill of stakehole c27	f1				**0**	**10**	**0**	**0**	**0**	**0**	**2**		12
42	charcoal-rich deposit	f1											1	
44	charcoal-rich deposit	f1	1150	3.0%	good HS assm								4	
68	fill of slot trench c67	f1	16	0.2%	good HS assm									
82	waste deposit	f1	1732	34.6%	good HS assm	**58**	**40**	**0**	**48**	**0**	**0**	**314**	1	460
103	fill of pit c257	f1	980	18.2%	magnetic material dominantly sand, some HS									
122	waste deposit	f1	75	0.6%	good HS assm									
128	fill of hearth c285	f1	30	1.3%	moderate HS assm									
130	fill of hearth c285	f1	49	5.4%	magnetic material dominantly sand, some HS									
133	trample	f1	7	0.2%	good HS assm									
134	waste deposit	f1	65	1.0%	magnetic material dominantly sand, some HS									
145	waste deposit	f1	2450	18.8%	good HS assm								2	
153	fill of pit c284	f1	1058	21.2%	good HS assm								1	
178	waste deposit	f1	24	0.6%	moderate HS assm									
212	same as 178	f1	92	2.2%	moderate HS assm (rich in shs)									
179	fill of cut c286	f1	42	1.4%	good HS assm									
183	trample	f1	174	13.7%	good HS assm									
184	waste deposit	f1	5	0.2%	mixed assm,slag and HS, much sand									
190	waste deposit in c284	f1	624	11.3%	good HS assm									
191	waste deposit in c284	f1	266	13.3%	good HS assm									
192	waste deposit in c284	f1	2458	35.1%	good HS assm								1	
224	trample	f1	272	2.2%	good HS assm									
225	fill of slot c226	f1	71	0.7%	good HS assm									
228	redeposited oxidised soil	f1	26	1.3%	moderate HS assm (rich in shs)									
230	fill of pit c284	f1	2255	45.1%	good HS assm								X 2	
231	fill of pit c284	f1	6	4.1%	good HS assm									
232	fill of pit c284	f1	628	20.9%	good HS assm									
233	fill of hearth c285	f1	166	16.6%	good HS assm									
234	fill of hearth c285	f1	1120	11.2%	magnetic material dominantly sand, some HS								1	
239	fill of stakehole c238	f1	192	9.6%	good HS assm									
246	charcoal-rich deposit	f1	42	0.7%	good HS assm									

Table 4 contd.

Stratigraphy			***Microresidues***			***Macroresidues***								
C			*wt mag*	*% mag*	*notes*	*SHC*	*hearth*	*tongue*	*ceramic*	*lining slag*	*vitrified stone*	*concretion*	*Cu*	*total*
249	fill of pit c284	f1	974	19.5%	good HS assm									
256	fill of pit c257	f1	3734	20.7%	good HS assm								2	
258	dumped deposit in c257	f1	1266	14.1%	good HS assm, sandy								X	
261	fill of posthole c297	f1	822	8.2%	good HS assm									
271	fill of posthole c270	f1	6	0.6%	good HS assm, sandy									
280	oxidised subsoil	f1	6	0.6%	mainly sand									
281	oxidised subsoil in c285	f1	22	0.6%	good HS assm									
			22905			***58***	***40***	***0***	***48***	***0***	***0***	***314***		***494***
64	fill of hearth c73	f2	74	1.1%	good HS assm									
71/104	fill of hearth c74/hearth c59	f2	32	0.6%	mainly sand									
			106			***0***	***0***	***0***	***0***	***0***	***0***	***0***		***0***
88	fill of hearth c298	f3				**0**	**0**	**0**	**0**	**0**	**0**	**152**		152
89	charcoal rich deposit	f3	72	1.0%	mainly sand, some HS									
115	oxidised subsoil in c114	f3				**214**	**0**	**0**	**0**	**0**	**0**	**0**	1	214
117	fill of hearth c85	f3	3	0.3%	sand with a trace of HS									
			75			***214***	***0***	***0***	***0***	***0***	***0***	***152***		***366***
70	fill of hearth c69	f4	120	1.2%	good HS assm	**942**	**1116**	**0**	**262**	**76**	**0**	**36**	3	2432
77	fill of pit c78	f4	20	0.2%	moderate HS assm								3	
			140			***942***	***1116***	***0***	***262***	***76***	***0***	***36***		***2432***
61	charcoal-rich deposit in cut c154	f5				**266**	**0**	**0**	**0**	**0**	**0**	**0**		266
121		f5											1	
155	fill of foundation trench c154 (=c109)	f5				**1098**	**190**	**0**	**54**	**0**	**0**	**0**		1342
199	fill of posthole c198	f5												
			0			***1364***	***190***	***0***	***54***	***0***	***0***	***0***		***1608***
52	hill wash = c293	f7				**124**	**0**	**58**	**0**	**0**	**0**	**18**	1	200
75	fill of pit c74	f7				**66**	**204**	**0**	**32**	**0**	**2**	**0**		304
77	fill of pit c78	f7				**540**	**22**	**58**	**42**	**86**	**0**	**0**		748
80	fill of stone socket c79	f7				**426**	**1345**	**0**	**192**	**0**	**50**	**68**		2081
108	fill of pit c107	f7				**80**	**370**	**0**	**16**	**0**	**0**	**0**		466
			0			***1236***	***1941***	***116***	***282***	***86***	***52***	***86***		***3799***

Table 4 contd.

Stratigraphy			***Microresidues***			***Macroresidues***								
C			*wt mag*	*% mag*	*notes*	*SHC*	*hearth*	*tongue*	*ceramic*	*lining slag*	*vitrified stone*	*concretion*	*Cu*	*total*
197	waste deposit	f8				**1346**	**1580**	**56**	**154**	**300**	**0**	**116**		3552
211	fill of pit c217	f8	2128	42.6%	moderate HS assm	**524**	**2240**	**322**	**380**	**298**	**0**	**222**	14	3986
216	fill of pit c217	f8	106	2.1%	moderate HS assm	**1654**	**1906**	**0**	**464**	**166**	**0**	**0**		4190
220	fill of gully c236	f8				**700**	**230**	**0**	**124**	**50**	**0**	**0**		1104
			2234			***4224***	***5956***	***378***	***1122***	***814***	***0***	***338***		***12832***
47	fill of boundary ditch c46	f10				**988**	**788**	**0**	**140**	**116**	**0**	**30**	X	2124
113	deposit of waste in c46	f10				**1808**	**3608**	**70**	**470**	**152**	**192**	**84**	X	6384
			0			***2806***	***4396***	***70***	***610***	***268***	***192***	***114***		***8526***
5 & 12	fill of furrows (12 fill of slot trench?)	f9				**308**	**210**	**0**	**68**	**130**	**0**	**346**	2	1062
7	fill of furrow	f9				**0**	**18**	**0**	**66**	**0**	**0**	**30**		114
9	fill of furrow	f9				**498**	**784**	**46**	**44**	**174**	**32**	**0**	X	1578
50	fill of furrow c49	f9				**184**	**0**	**0**	**78**	**0**	**0**	**0**		262
54	fill of furrow c53	f9				**1698**	**344**	**0**	**30**	**194**	**0**	**30**	1	2296
56	fill of furrow c55 (=c84)	f9				**262**	**500**	**0**	**90**	**360**	**0**	**4**	X 2	1216
58	fill of furrow c57	f9				**0**	**252**	**0**	**32**	**40**	**0**	**12**		336
			0			***2950***	***2108***	***46***	***408***	***898***	***32***	***422***		***6864***
1	topsoil					**7325**	**7348**	**220**	**1390**	**96**	**536**	**523**	X 15	17438
43	u/s topsoil					**0**	**36**	**0**	**0**	**58**	**0**	**76**		170
			0			***7325***	***7384***	***220***	***1390***	***154***	***536***	***599***		***17608***
	Overall total		25460			21109	23131	830	4114	2296	812	2061		54387

Table 5. Comparison of the summary statistics for SHC weight compared with other Irish sites yielding "small" SHCs.

	Ballykillaboy	Moyveela	Garryleagh	Clonmacnoise (TMS)	Mucklagh
date	C16-17	Post medieval	C13-14	undated	C18/19?
SHC count	113	15	25	33	66
SHC min. wt	50	44	84	68	98
SHC max. wt	478	388	802	1457	1206
SHC mean wt	139	134	331	341	373
% <500g	100%	100%	76%	79%	77%
% <1000g	100%	100%	100%	94%	95%
% >1000g	0%	0%	0%	6%	5%
% >3000g	0%	0%	0%	0%	0%
Modal 100g interval	100-200	0-100	100-200	200-300	100-200
	This study	Young 2009a	Young 2009b	Unpub. data	Young 2008b

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