Review of the archaeometallurgical residues from Shandon, Co. Waterford (00E0422 ext., 01E0327 and 01E0327)

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I. Introduction

The site at Shandon was excavated over several campaigns between 2000 and 2002 (Elder et al. 2007:1). The main feature was an enclosing ditch with internal and external features interpreted as a potential moated site and was dated, by association with internal and outlying features containing pottery, to the 12th/13th century (ibid.:11). Metal working residues, both ferrous and non-ferrous, were found in several area, most of them outside of the enclosure. Archaeometallurgical specialist Neil Fairburn previously wrote a report on this material (Fairburn 2007). A review of the residues, made avaible by Jacinta Kiely of Eachtra Archaeological Projects Ltd., compared with this report showed that Fairburn had not had access to all the excavated material. Because other interpretations of early iron making technology are currently available, it was decided to review of the Shandon material (see Appendix 1: Catalogue).

II. Past and current knowledge of early Irish iron smelting

Brian G. Scott argued in his overview publication *Early Irish Ironworking* (Scott 1990) that the lack of tap-slag combined with the consistent occurrence of hollows, clay-lined or otherwise, on sites producing ironworking residues, 'makes it certain' that, at least before late medieval times, iron was smolten using bowl-furnaces (ibid.:155, 158-167). Concerning the planoconvex slag cakes found on these sites, the author stated that a general European consensus accepted that the larger ones (more than 30 cm diameter) could be seen as Furnace Bottoms (produced in a bowl-furnace), while smaller ones (10-15 cm) should be seen as Smithing Hearth Bottoms (ibid.:155-156). One of the earliest criticisms of this model was published as a specialist report on metalworking residues excavated at Tara Hill (Co. Meath) (Crew and Rehren 2002:96), were the 'myth of Irish iron-smelting in the so-called bowl-furnaces' was denounced. Instead it was suggested that the hollows published as bowl-furnaces were actually the bases of shaft-furnaces. But in general, even if potential confusion with smithing sites was accepted, it continued to be believed that early iron smelting in Ireland was undertaken in small hearths in a wide variety of settings (Edwards 1996:86-87; Barry 2004:108-110). It was only after excavations were carried out in non-settlement contexts as a result of infrastructure works, and people with training in archaeometallurgy were engaged in those projects, that a different picture started to emerge. Tim Young wrote reports on furnaces from Tullyallen (Co. Louth), Cherryville (Co. Kildare) and Carrickmines (Co. Dublin) (Young 2003). The author interpreted these features as pits under the actual furnace, which would have had a shaft, i.e. as a type of slag pit furnace, albeit of a smaller type, with less slag, than examples of this furnace type known from abroad (ibid.:3). The main difference between the 'pit furnace' and 'shaft furnace', both actually have a clay shaft, is that the former is built over a pit to receive the slag, while with the latter the slag is tapped lateraly. The drippy slag from the Irish sites indeed showed impressions of relatively large pieces of wood, interpreted as stacking material in the furnace pit before firing. This theory was re-enforced by the survival of a frothy 'furnace cake' (11.2 kg) with partial slag flow at the upper part of the Tullyallen furnace. An additional 21 features, interpreted as the basal pits of iron smelting furnaces, were uncovered in 2003 during the excavation on the N7 trajectory (Young 2005). Next to slag with wood impressions and fragments of furnace cake, also furnace wall fragments and indications of an arch in the walls to facilitate slag and bloom removal. Photos-Jones, on the other hand, would interpret similar features (vertically sided pits ca. 40 cm diameter, drippy slag), found along the trajectory of the M4 motorway and excavated in 2002, unequivocally as 'bowl furnaces' (Photos-Jones 2003). In the report on the material found at Killickaweeny, Co. Kildare, the same author states that slag from different furnace types are difficult to distinguish visually (dripped vs. dropped) and that the furnace bottoms are indicative of 'largely unsuccessful smelts' (Photos-Jones 2006:15). The same author also composed a report on an area of intense iron working uncovered at Derrinsallagh 4, Co. Laois (Photos-Jones and Wilson 2009). Here again the author, dismisses the dense drippy slag as tapped slag and instead suggest that

the material represents 'slag accumulation clogging the furnace' while no bloom would have formed (ibid.:471). One of the furnaces from this site was lifted after it was partially excavated and further examined and described by Tim Young (2009). This author again interpreted the feature as a slag pit furnace with an arch and working hollow in front to facilitate slag and bloom removal. The furnace was somewhat unusual as the blow hole through the furnace wall was moved from a wall at right angles to the arch to the back wall, presumably because the former got blocked up by slag (ibid.:211). In the meantime, other specialists had also begun making reports on Irish iron working remains. Neil Fairburn (Dowd and Fairburn 2005) was the first to actually publish an account differing from the traditional bowl furnace model. A relatively small amount of slag recovered from a shallow depression during gas pipe line construction in Farranastack, Co. Kerry was identified as tap-slag and deemed the result of iron smelting in a shaft furnace. Although originally only discerning shaft versus bowl furnaces, Fairburn (2009) would later on also identify pit furnaces as such at Monganstown, Co. Westmeath. The idea of slag pit furnaces being the dominant furnace type in use in early Irish iron ore smelting has recently also been adopted by non-specialists, although remnants of the 'bowl furnace' model are still in evidence (2008:91-93; O'Sullivan et al. 2010:108-109). Finally, some semantic issues still exist, for example whereas Tim Young would see the pit furnace as non-slag tapping, others would see them as slag tapping, albeit vertically instead of laterally (Buchwald 2005:185). The latter terminology will be used in this report.

III. Description of the features and residues connected to metal working

Inside the enclosure, of the fifty-three features identified, three were half sectioned and one fully excavated. One of the half sectioned ones, pit c. 123 (fill c. 116), contained bone, shell, 12th/13th century pottery and metal working residues. One of these residues, 01E0327:105 was a piece of dense slag with slight flow structure and was interpreted as tap slag (ibid.:28). The other material (01E0327:111) was described as four pieces of vitrified lining (ibid.), but only a single piece of light slag is currently logged under that number. Other material from inside was available from unexcavated features (c. 120 and c. 121). This included fragments of a crucible (01E0327:27/28), multiple pieces of slag, some of which could have been weathered smelting slag (01E0327:110) (Pl. 1) and a hammerscale particle and slag adhering to a small stone (01E0327:122). Context c. 121 also produced a small copper ingot, an iron sewing needle and 12th/13th century pottery.

The enclosing ditch itself c. 156, only produced two tiny pieces of slag (01E0327:113).

In area III, immediately south of the enclosure, metallurgical residues were recovered from various spreads and layers (c. 1152, c. 1158, c. 1196 and probably c. 1156) and two pits (c. 1203 and c. 1232). The material from this area was generally rather undiagnostic but did include a smithing hearth cake from the latter pit (Pl. 2). Pit c. 1203 also contained 12th/13th century pottery and deposit 1196 an 11th century Hiberno-Norse coin.

Area IV, an area some 75 m north-east of the enclosure comprised two concentrations of features and a large rubbish pit.

Concentration 1 comprised a several of pits and a series of stake-holes and a slot trench which might have formed a circular structure. One of the pits, c. 2005, was 46 cm by 40 cm and was 11 cm deep and the fill, c. 2004, was described as charcoal rich, but no finds were recorded from this feature. However, material labelled both as c. 2004 and c. 2005 was included in the material available for study. The amount of slag was small (five pieces), but showed the typical characteristics of slag from a pit furnace, i.e. dense, flowed slag with impressions of largish wood particles (Pl. 3). The ceramic material included both tuyere material (Pl. 4) and furnace wall fragments (Pl. 5). Another feature with fill c. 2006 was, upon completion, realised to comprise two

pits, c. 2018 and c. 2019. Both were roughly circular (resp. 26 x 23 cm and 36 x 31 cm) , rather shallow (resp. 15 and 10 cm deep) with gradual sides. Again no material is mentioned from these contexts, but was included in the material available for study. This material also represents typical pit furnace material, i.e. dense, flowed slag (Pl. 6), furnace cake fragments (Pl. 7) and furnace wall fragments (Pl. 8). Pit c. 2008, immediately to the south west of the former measured 28 cm by 23cm and was 24 cm deep was interpreted as an iron smelting furnace (ibid.:11). Different values (24 cm x 14 cm x 11 cm) are given in the feature list (ibid.:19), but the photograph of this feature, with scale, (ibid.: 108, Plate 14)(Pl. 9) shows the first measurements to be correct. As the sides seem to be undercut, the diameter of the slag pit would have been larger. In the feature listing no fill is mentioned for this pit and no slag is recorded as coming from this feature in the finds list. Three bags, containing over a hundred pieces of slag, were retrieved from c. 2007. In the feature listing this context is mentioned as the fill of three stakeholes (ibid.:18-19). The same number is also found as the fill of pit c. 2090 (ibid.:22), but this is certainly a mistake and should be c. 2077. In the report by Fairburn (2007:81), the author does mention a 'small quantity of fluidic slag' suggestive of iron smelting from this feature. It is suggested here that c. 2007 represents the fill of c. 2008, and its metalworking residues are consistent with material from a pit furnace, i.e. dense, flowed slag with impressions of largish wood particles (Pl. 10), some furnace cake fragments (Pl. 11) and and a few small smoothened furnace wall fragments, one with possible decoration in the form of an incised curving line (Pl. 12).

The second concentration of features, to the west of the former, consisted of stakeholes and pits possibly forming a structure in the northern half and a series of pits in the southern half. One of these pits c. 2090 measured 46 cm by 40 cm and was 18 cm deep with vertical sides. One bag of material from the fill of this pit c. 2077 (01E0327:103) was studied by Fairburn and identified as tap slag. Another bag from the same fill contained over a hundred more pieces of slag. The dense nature and the impressions of wood pieces (Pl. 13) suggests pit furnace material. The dimensions and shape of the feature would conform with known slag pits of Irish pit furnaces. Another nearby pit, c. 2093, with fill c. 2089 was not recorded as having metallurgical residues, but a bag of material was included in with the study material. This material consisted of several lumps of slag, light slag and a single small piece of possible smelting slag together with undiagnostic vitrified ceramic material.

Neither of these two concentrations produced any datable material.

An isolated pit, c. 2211, was uncovered 6 m south-west from concentration 1. This pit was sub-circular in plan, measured 122 cm by 135 cm, was 87 cm deep and contained seven fills. Three of these (c. 2200, c. 2205 and c. 2207) contained metallurgical residues together with 12th/13th century pottery. Only one bag (01E0327:114) from fill c. 2200, containig 30 g of slag, seems to have been available to Fairburn. The additional metalworking material, mostly from c. 2207, consisted of nine smithing hearth cakes (Pl. 14), undiagnostic slag and undiagnostic vitrified ceramic material, but also included possible smelting slag (Pl. 15).

IV. Discussion

The material from inside and immediately outside the enclosure definitely includes material related to non-ferrous metalworking (crucibles and copper ingot) and iron smithing residues (smithing hearth cake and hammerscale). Some of the slag from iron working could be the result of smelting. This situation is similar to that found in the rubbish pit in area IV, which had both smithing hearth cakes and somewhat more convincing smelting slag. Most of the features above contained similar 12th/13th century pottery. The other material from area IV however is very different. Two features, c. 2008 and c. 2090 are undoubtedly pit furnaces, the residues showing all the typical characteristics

such as dense slag showing clear flow pattern with hollows left by wood fragments, frothy furnace cake and furnace wall fragments. Pit c. 2005 is more difficult to interpret, with a few pieces of smelting slag, furnace and tuyere material. The upper break of slope was sharp and the sides vertical. It could be a badly truncated furnace (it was only 11 cm deep), a (bloom) smithing hearth or a rubbish pit. The other feature with predominantly smelting material, pits c. 2018/c. 2019, also contains both slag and furnace wall. If the high proportion of furnace wall fragments from these pits (Fig.1) is significant, the roughly similar proportion in pit c. 2005 would indicate the latter is not a furnace. The near absence of furnace wall fragments in the two furnaces pits implies the material inside is the in-situ remains of the last smelt and not deposited waste.

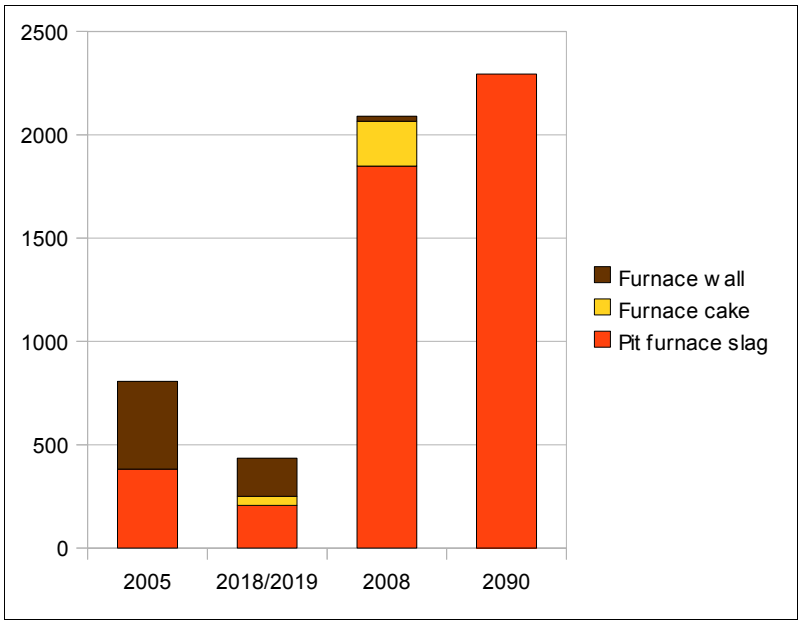

Fig. 1. Weight (g) of residues in the four features predominantly containing smelting residues

V. Conclusions

The material at Shandon represents the residues from two iron smelting furnaces of the Irish pit-furnace type on the one hand, and iron smithing together with non-ferrous metal working on the other. There are indications that these activities were carried out within the same time period, i.e. the 12th to 13th century. The smelting residues, vertically tapped slag with wood impressions and frothy furnace cake fragments, are accompagnied by furnace wall fragments which show these to have been smoothened and possibly even decorated. The thickness or the height of these walls could not be estimated. The iron smithing residues consist of fairly typical Smithing Hearth Cakes with some evidence for the use of ceramic tuyeres. It is impossible, without analysis, to be sure which type of products were made at Shandon, but some of the recovered iron objects, nails, pins, needles, fishing hooks and a spearhead, could have been made on site, possibly even from local iron ore.

VI. Bibliography

Barry T. B. 2004 *The Archaeology of Medieval Ireland*. 4 ed. London, Routledge.

Buchwald V. F. 2005 *Iron and Steel in Ancient Times*. (=Historisk-filosofiske Skrifter 29). Copenhagen, Det Kongelige Danske Videnskabernes Selskab.

Carlin N. 2008. Ironworking and production. In Carlin N., L. Clarke, et al. (ed.). *The Archaeology of Life and Death in the Boyne Floodplain: The Linear Landscape of the M4 Kinnegad-Enfield-Kilcock Motorway.* NRA Scheme Monographs 2. Bray, Wordwell:87-112.

Crew P. and Rehren T. 2002. Appendix 1: High-temperature workshop residues from Tara: iron, bronze and glass. In Roche H. (ed.). *Excavations at Ráith na Ríg, Tara, Co. Meath* (=Discovery Programme Monographs 6). Dublin, Royal Irish Academy/ Discovery Programme:83-102.

Dowd M. A. and Fairburn N. 2005. Excavations at Farranastack, Co. Kerry: Evidence for the Use of Shaft Furnaces in Medieval Iron Production. *The Journal of Irish Archaeology* 14:115-121.

Edwards N. 1996 *The Archaeology of Early Medieval Ireland*. 2 ed. London, Batsford Ltd.

Elder S., Dennehy E., Tierney J., Noonan D. and Doolan A. 2007 *Archaeological Excavation Report, Shandon td., Dungarvan, Co. Waterford*. Cork, Eachtra Archaeological Projects.

Fairburn N. 2007. Appendix 7 : report on industrial residues from Shandon. In Elder S., E. Dennehy, et al. (ed.). *Archaeological Excavation Report, Shandon td., Dungarvan, Co. Waterford*. Cork, Eachtra Archaeological Projects:79-83.

Fairburn N. 2009. Appendix 4: Assessment of Industrial Residues from Excavations at Monganstown 1. In Lehane J. and P. Johnston (ed.). *Final Archaeological Excavation Report, Monganstown 1, N6 Kinnegad to Kilbeggan, Co. Westmeath. Metalworking site*. Unpublished Final Report, Eachtra Archaeological Projects:35-53.

O'Sullivan A., McCormick F., Harney L., Kinsella J. and Kerr T. 2010 *Early Medieval Dwellings and Settlements in Ireland, AD 400-1100. Vol. I: Text*. (=Early Medieval Archaeology Project (EMAP) Report 4.2).

Photos-Jones E. 2003. "If it works, don't fix it": Early (and later) Iron working in Ireland along the KEK-M4 Motorway. In Murphy D. (ed.). *Report On Archaeological Excavation At Kinnegad 2 County Westmeath Licence Number 02E0926*. (= SASAA 93). Unpublished Report, ACS ltd:25-35.

Photos-Jones E. 2006. The technical Examination of Metallurgical Waste from Killickaweeny, Co. Kildare. In Walsh F. (ed.). *Site AE23 Killickaweeny. Excavation Report*. (= SASAA 112). Unpublished Final Report, Irish Archaeological Consultancy ltd.:533-599.

Photos-Jones E. and Wilson L. 2009. Derrinsallagh 4, Co. Laois, Eire. 'Soft Archaeology' Characterisation. In Lennon A.-M. (ed.). *Report on the Archaeological Excavation of Derrinsallagh 4, Co. Laois*. (= SASAA 204.3). Unpublished Final Report, ACS ltd.:219-244.

Scott B. G. 1990 *Early Irish Ironworking*. Belfast, Ulster Museum.

Young T. 2003. *Is the Irish iron-smelting bowl furnace a myth? A discussion of new evidence for Irish bloomery iron making*. (=GeoArch Report 2003/09). Cardiff: GeoArch.

Young T. 2005 *Evaluation of Archaeometallurgical Residues from the Heath-Mayfield N7 development (03E0151, 03E0966, 03E0461, 03E0603, 03E0633, 03E0679, 03E0602, 03E0635)*. (= GeoArch Report 2005/12), Unpublished specialist report.

Young T. 2009. Detailed recording of furnace C397, Derrinsallagh 4 (E2180), M7 Portlaoise to Castletown/M8 Portlaoise to Cullahill Motorway Scheme Contract 2, Co. Laois. In Lennon A.-M. (ed.). *Report on the Archaeological Excavation of Derrinsallagh 4, Co. Laois*. (= GeoArch Report 2008/34). Unpublished Final Report, ACS ltd.:204-218.

VII. Plates

Pl.1. Possible smelting slag from unexcavated feature c. 121 inside the enclosure

Pl.2. Small Smithing Hearth Cake from fill c. 1232 of pit c. 1230 just south of the enclosure

Pl. 3. Pit furnace slag showing wood impressions from fill c. 2004 of pit c. 2005 in Area IV, Concentration 1

Pl. 4. Interior of protruding blowhole of a tuyere from fill c. 2004 of pit c. 2005 in Area IV, Concentration 1

Pl. 5. Smoothened furnace wall fragments from pit c. 2005 in Area IV, Concentration 1

Pl. 6. Pit furnace slag from fill c. 2006 of pits c. 2018/c. 2019
in Area IV, Concentration 1

Pl. 7. Small fragments of frothy furnace cake from fill c. 2006
of pits c. 2018/c. 2019 in Area IV, Concentration 1

Pl. 8. Smoothened furnace wall fragments from fill c. 2006
of pits c. 2018/c. 2019 in Area IV, Concentration 1

Pl. 9. Post-ex photo of furnace c. 2008 in Area IV, Concentration 1

Pl. 10. Pit furnace slag from fill c. 2007 of furnace c. 2008 in Area IV, Concentration 1

Pl. 11. Fragments of frothy furnace cake from fill c. 2007 of furnace c. 2008 in Area IV, Concentration 1

Pl. 12. Small fragments of smoothened furnace wall from fill c. 2007 of furnace c. 2008 in Area IV, Concentration 1

Pl. 13. Pit furnace slag from fill c. 2077 of furnace c. 2090
in Area IV, Concentration 2

Pl. 14. Smithing Hearth Cake from fill c. 2207 of pit c. 2211 in Area IV

Pl. 15. Possible pit furnace slag from fill c. 2207 of pit c. 2211 in Area IV

Appendix 1: Catalogue

Find no.	Context	Type of feature	Description	Weight (g)
01E0327:105	116	Fill of pit c.123	Piece of dense slag with slight flow structure	29
01E0327:111	116	Fill of pit c.123	Small piece of vitrified slag	1
01E0327:108	120	Unexcavated	Small piece of drippy slag	2
01E0327:27/28	121	Unexcavated	Two fitting pieces of a small crucible	2
01E0327:110	121	Unexcavated	23 pieces of relatively dense slag, some pieces could be weathered smelting slag	170
01E0327:122	121	Unexcavated	Small flat stone with adhering slag and hammerscale particle	NA
01E0327:113	157	Fill of ditch c.156	Two tiny pieces of slag	1
01E0327ext:182	1152	Deposit	Lump of rather dense slag with rust adhering on several sides	75
01E0327ext:183	1152	Deposit	Fragment of small round disc of slag	12
01E0327ext:184	1156	?	Piece of heavily oxidised iron	NA
01E0327ext:185	1158	Deposit	Piece of drippy vitrified slag	6
01E0327ext:186	1196	Deposit	7 small pieces of rounded rather light slag	20
01E0327ext:187	1202	Fill of pit c.1203	Small rounded lump of rusty slag	6
01E0327ext:188	1232	Fill of pit c.1230	Small vitrified SHC with rust adhering to both sides	116
01E0327	2004	Fill of pit c.2005	Two large and three small pieces of dense drippy slag, some with impressions of large wood/charcoal fragments. Smelting	382
01E0327	2004	Fill of pit c.2005	Six pieces of heat affected clay material with some vitrification	79
01E0327	2004	Fill of pit c.2005	9 pieces of vitrified clay with adhering slag. One piece with protruding blow hole slagged on the exterior, tuyere fragment	74
01E0327	2004	Fill of pit c.2005	16 pieces of heat affected clay, some with a smoothened side. Furnace wall.	42
01E0327	2005	Cut of pit [?]	Multiple fragments of hardened clay, one side smoothened, thickness about 1 cm	230
01E0327	2006	Fill of pits c.2018/2019	17 pieces of dense drippy slag. Smelting	207
01E0327	2006	Fill of pits c.2018/2019	11 pieces of light frothy slag. Furnace cake material.	43
01E0327	2006	Fill of pits c.2018/2019	39 pieces of heat affected clay, some showing a smoothened side. Furnace wall.	185
01E0327	2007	Fill of pit c.2008?	100+ pieces of dense drippy lobed shiny slag, some with impressions of wood/charcoal. Smelting.	1849
01E0327	2007	Fill of pit c.2008?	Multiple pieces of frothy slag, most very small. Furnace cake.	216
01E0327	2007	Fill of pit c.2008?	17 small pieces of heat affected clay and stone, one with possible decoration in the form of an incised curving line	25
01E0327	2077	Fill of pit c.2090	100+ fragments of shiny drippy lobed slag with impressions of large wood/charcoal pieces	1997
01E0327:103	2077	Fill of pit c.2090	24 fragments of shiny drippy lobed slag with impressions of large wood/charcoal pieces	297
01E0327	2089	Fill of pit c.2093	Lump of rather dense slag	160
01E0327	2089	Fill of pit c.2093	Lump of rather dense rusty coloured slag	64
01E0327	2089	Fill of pit c.2093	Lump of rather dense slag	160
01E0327	2089	Fill of pit c.2093	9 pieces of relatively light slag	65
01E0327	2089	Fill of pit c.2093	15 pieces of vitrified clay with adhering slag film, tuyere or hearth lining	142
01E0327	2089	Fill of pit c.2093	Small piece of shiny lobed slag, poss. Smelting	3
01E0327	2089	Fill of pit c.2093	Piece of baked clay	NA
01E0327	2089	Fill of pit c.2093	7 pieces of plate iron, one with poss handle	NA
01E0327	2200	Fill of large pit c.2211	Dense semi-circular SHC	478
01E0327	2200	Fill of large pit c.2211	Fragment of very dense thick SHC	541
01E0327	2200	Fill of large pit c.2211	10 pieces of relatively light slag lumps	359
01E0327	2200	Fill of large pit c.2211	Relatively dense lump of slag with adhering burnt clay on a flat side	152
01E0327	2200	Fill of large pit c.2211	Fragment of vitrified slag droplet	1
01E0327:114	2200	Fill of large pit c.2211	Piece of relatively dense slag	19
01E0327	2205	Fill of large pit c.2211	Relatively light elongated SHC with flow structure on the base	288
01E0327	2205	Fill of large pit c.2211	Relatively dense SHC lump	419
01E0327	2205	Fill of large pit c.2211	Small relatively dense SHC	154
01E0327	2205	Fill of large pit c.2211	Relatively light piece of slag showing clear flow structure	147
01E0327	2205	Fill of large pit c.2211	Two pieces of relatively dense slag with rusty patches	116

Find no.	Context	Type of feature	Description	Weight (g)
01E0327	2205	Fill of large pit c.2211	Three small pieces of vitrified clay with adhering slag, tuyere or hearth lining	13
01E0327	2207	Fill of large pit c.2211	Large dense, well formed SHC	634
01E0327	2207	Fill of large pit c.2211	Large dense, relatively thick SHC	629
01E0327	2207	Fill of large pit c.2211	Dense, thin SHC	356
01E0327	2207	Fill of large pit c.2211	Dense elongated SHC	273
01E0327	2207	Fill of large pit c.2211	Dense mass of heavily lobed slag with small patch of burnt clay adhering (smelting?)	249
01E0327	2207	Fill of large pit c.2211	5 pieces of dense rusty coloured slag	405
01E0327	2207	Fill of large pit c.2211	8 small pieces of rather light slag	40
01E0327	2207	Fill of large pit c.2211	Small flat piece of vitrified clay with adhering slag	7
01E0327:142	2207	Fill of large pit c.2211	Four fitting fragments of piece of vitrified clay, probably tuyere or hearth lining	9
01E0327ext:189	Sondage 3		Small fractured piece of rusty slag	10
01E0327ext:190	Sondage 5		4 small pieces of slag	13
01E0327ext:191	Sondage 5		8 pieces of relatively light slag, some possibly smelting	59
01E0327:22	Stray		Piece of vitrified clay and adhering slag, probable tuyere or hearth lining	1
01E0327:102	Stray		Small piece highly shiny slag with fayalite crystals	7
01E0327:104	Stray		3 small pieces of rather light slag, one piece could be weathered smelting slag	20
01E0327:106/7	Stray		2 small pieces of vitrified slag	1
01E0327:109	Stray		25 small pieces of rusty slag. Some could be weathered smelting slag	166
01E0327:112	Stray		2 small pieces of drippy shiny slag, possibly smelting	7
00E0442:48	Stray		Piece of rather dense, flowed slag, smelting?	14
00E0442:50	Stray		Tiny piece of drippy slag	1
00E0442:60	Stray		Piece of irregular shaped, vitrified slag	24
00E0442:75	Stray		Piece of drippy slag, rather dense.	23
00E0442:80/81/82	Stray		Three pieces (one tiny) of drippy, irregular rather dense slag	58
00E0442:84-92	Stray		9 pieces of relatively light slag, some vitrified	95